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Preface

This is the tenth volume of the series *Empirical Issues in Syntax and Semantics* (EISS), which, like the preceding nine volumes of the series, is closely related to the conference series *Colloque de Syntaxe et Sémantique à Paris* (CSSP). All of the 18 papers included in the present volume are based on abstracts that were accepted for (and, in most cases, also presented at) CSSP 2013, which took place on 26–28 September 2013 at Université Paris 7 (http://www.cssp. cnrs.fr/cssp2013/index_en.html). CSSP 2013 had a thematic session on experimental syntax and semantics, and so the papers originating from the thematic session (eight papers) are grouped together separately from the papers originating from the main session on (theoretical) syntax and semantics (ten papers).

I would like to take this opportunity to thank the external reviewers, whose comments aided the authors in revising the first drafts of their papers, often substantially. With their permission, the reviewers were (in alphabetical order by column):

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Finally, I would also like to thank both the scientific committee and the organizing committee of CSSP 2013 (http://www.cssp.cnrs.fr/cssp2013/contact/index_en.html) for their efforts in planning and organizing a very enjoyable conference.

Christopher Piñón December 2014

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Standard Change and the Finnish Partitive-Accusative Object Distinction

Eric K. Acton

Attempts to account for the Finnish partitive-accusative direct object distinction (PA distinction) based on a single semantic generalization either make false predictions or are stated in vague terms. I take a more focused approach to the PA distinction, restricting my analysis to verbs entailing potential for change (PFC) (Beavers 2011) in their themes. To account for the PA distinction among these predicates, I develop the notion of standard change—in essence, context-sensitive quantized change—and argue that a direct object's case does not simply follow from lexical entailments but in fact has truth-conditional force. In particular, I argue that accusative case-marking on the direct object of a PFC predicate contributes the entailment that the theme of the event described undergoes standard change, whereas partitive case-marking bears no such entailment.

Keywords: Finnish case, accusative, partitive, affectedness, telicity, standard change

1 Introduction

The direct objects of Finnish transitive verbs bear either partitive or accusative case, as in the following examples:

(1)	a.	ravist-i	purkki	-a.		
		shake-PAST.3	3SG caniste	er-Sg. Part		
		'…he shook	the caniste	er.' (Google	search f	or "ravisti")
	b.	Ravist-i-n	mato-	t.		
		shake-PAST-	1SG carpet	-Pl.Acc		
		'I shook the	carpets (ou	t).' (Heinär	näki 199	4:(14a))
(2)	a.	tänään m	ä loukk	as-i-n	hiukan	jalka-a-ni.
		today I.1	Noм injure	e-Past-1Sg	slightly	foot-Sg.PART-Poss.1Sg

- '...today I injured my foot slightly.' (Google search for "loukkasin hiukan")
- b. ...keskikenttäpelaaja loukkas-i polv-e-nsa.
 midfielder.Nom injure-PAST.3SG knee-SG.Acc-Poss.3SG
 '...the midfielder injured his knee.' (Google search for "loukkasi polvensa")

Many thanks to Beth Levin, Chris Potts, Penny Eckert, Donka Farkas, Dan Lassiter, Ethan Poole, the Stanford Semantics and Pragmatics Group, and the audience of CSSP 2013. Special thanks, also, to Arto Anttila, Lauri Karttunen, and Paul Kiparsky for their judgments and reflections, and again to Paul for inspiring this work. Lastly, I thank Chris Piñón and an anonymous reviewer for their helpful comments and suggestions.



⁽⁾ alle interiorer inferior interior (coogle contentior roundation portonion)

- (3) a. Pekka potkais-i pallo-a. Pekka kick-PAST.3SG ball-SG.PART
 'Pekka kicked the ball.'
 - b. Pekka potkais-i pallo-n takaisin ...
 Pekka kick-PAST.3SG ball-SG.Acc back
 'Pekka kicked the ball back ...' (Google search for "potkaisi pallon")

Linguists and grammarians have been examining the distribution of accusative and partitive case on the direct objects of Finnish transitive verbs for over a century, and no attempt to provide a single, concise generalization explaining the partitive-accusative object distinction (PA distinction) has been fully successful. The complexity of the PA distinction and the challenges it poses to single-generalization approaches are captured well by the following unintentionally humorous post to the language-usage website WordReference.com, in which the user expresses concern over a Finnish news headline:

(4) **Headline:** *Mies puukotti naista kaulaan Kontulassa*

(Translation: 'Man stabs woman(-SG.**PART**) in the neck in Kontula') **User Comment:** Why is *nainen* in the partitive? Isn't this a finished action? What kind of meaning does the partitive convey here and why not use the accusative? Thanks.

Here, the user is troubled not so much by the headline's horrific content, but by the case of the headline's direct object *naista*, the partitive singular form of *nainen* 'woman'. Generalizations like "Partitive case indicates an unfinished action" fail the hapless user.

Though the PA distinction is still not fully understood, previous research has delivered a number of important insights into the problem. At the highest level, it is clear that the PA distinction is a function of semantic considerations. Quantitatively indeterminate DPs (roughly, the Finnish equivalent of bare plurals and mass nouns) and imperfective aspect (in particular, progressive and iterative aspect), for instance, seem to require partitive direct objects (Kiparsky 1998). Prior work has also established links between the PA distinction and notions like resultativity (e.g. Hakulinen and Karlsson 1979, Larjavaara 1991), boundedness (e.g. Heinämäki 1984, Leino 1991, Heinämäki 1994, Kiparsky 1998, 2005), and telicity (e.g. Kratzer 2004). Some have tried to account for the PA distinction based solely on these notions, but, to my knowledge, each such analysis either makes some clearly false predictions or does not provide enough explicit discussion for one to know how to test its validity.

Another feature of previous research on the PA distinction relevant to the present article is that direct object case is often presented as simply following from the lexical entailments of the verbal predicate (setting aside the issue of imperfective aspect and the semantics of the direct object itself). One clear exception to this perspective is that offered by Kratzer (2004). On Kratzer's (2004) account, which focuses on the distribution of the accusative case, it's not that the accusative case is licensed only by verbs with certain aspectual properties; rather, it contributes the aspectual properties in question.

The central aims of this work are twofold. First, I will provide a semantic account of the PA distinction for a subclass of Finnish transitive verbs—namely, verbs involving *potential for change* (PFC) in their themes (Beavers 2011). In essence, these are verbs whose themes are acted or impinged upon in some way (e.g. *ravistaa* 'shake'; *loukata* 'injure, wound, hurt'; *potkaista* 'kick'; *siirtää* 'move'; *suudella* 'kiss'; *tappaa* 'kill'). The particular set of verbs underlying my

analysis is based largely on the corresponding Tongan verbs explored in Ball's (2009) work on argument realization, and includes verbs of change of state, cutting, exerting force, putting or removing, contact, contact by impact, destroying or killing, ingesting, and motion. Restricting ourselves to a principled subset of verbs yields a deeper understanding and more precise characterization of the dynamics underlying the PA distinction, and serves as an important counterweight to single-generalization approaches that, despite their insights, face significant empirical challenges or are stated in vague terms. Second, I argue for a broadly Kratzerian (2004) view of the PA distinction vis-à-vis PFC predicates, whereby direct object case-marking in Finnish has truth-conditional, aspectual force.

The remainder of the paper is structured as follows. I will begin with an overview of the PA distinction, focussing in particular on the influential work of Kiparsky (1998), highlighting both insights and challenges for analyses developed prior to Kratzer (2004). I will then offer a provisional account of the PA distinction among PFC predicates, based on Beavers' (2011) work on *affectedness* and his notion of *quantized change*. This provisional approach provides a step in the right direction but doesn't fully accord with the context-sensitivity of the PA distinction or the evidence that the lexical entailments of a verbal predicate do not fully determine the case of its direct object (even when controlling for imperfective aspect and the semantics of the object itself). I then turn to the analysis of Kratzer (2004), which speaks to these problems but, as I will show, does not work for PFC predicates.

In response, I present the notion of *standard change* to account for the PFC data. For now, standard change may be thought of as akin to Beavers' (2011) notion of *quantized change*, but, importantly, with provisions made for contextual factors, drawing in spirit on the work of Kennedy (2007) and Kennedy and Levin (2008). Roughly, standard change involves scalar change to a particular goal degree (i.e. *standard*) *g*, where the value of *g* and the nature of the requisite scale are contextually determined. The generalization, then, is that the accusative case on the direct object of a PFC predicate contributes the entailment that the theme of the event described undergoes standard change, whereas the partitive case bears no such entailment. I then answer some potential objections to my account and conclude by discussing some of the implications of this work and how research on the PA distinction might proceed from here.

Before proceeding, a brief note is in order. As mentioned above, quantitatively indeterminate direct objects and imperfective aspect require that a direct object be marked with partitive case. The main focus of this work, however, is the verbal-aspectual nature of the PA distinction, holding those other factors fixed. Thus, it may be assumed, unless otherwise specified, that we are dealing with event descriptions involving quantitatively determinate objects and perfective aspect—that is, instances in which the accusative case is not altogether precluded.

2 Previous Approaches: Insights and Challenges

I shall not attempt here to provide a comprehensive overview of previous research on the PA distinction. Instead, I will take as my point of departure the analyses in Heinämäki 1994 and Kiparsky 1998—two works that are theoretically united and together address much of the research preceding them (e.g. Dahl and Karlsson 1976, Hakulinen and Karlsson 1979, Heinämäki 1984, Larjavaara 1991, Leino 1991, Vainikka 1993). Both find the telicity- and resultativity-based approaches of prior accounts to be inadequate, and both center their analyses around the notion of *boundedness*. I begin with Kiparsky 1998, the more explicit of the two works.

For Kiparsky (1998), boundedness applies both to verbal predicates and their internal nomi-

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nal arguments. A verbal predicate, he says, is *bounded* if (and only if) it is not gradable: "What is relevant is the gradability of the event: bounded predicates, whether telic or atelic, admit of no degree." Kiparsky's diagnostic for the boundedness of a verbal predicate is whether "it can be modified by degree adverbs, [...] referring to the *extent of a single eventuality*" (269, emphasis in original). If so, the predicate is unbounded. Below are some English examples from Kiparsky 1998. Each includes a degree adverb, suggesting that the relevant predicate is unbounded:

- (5) a. The sportsman *shot at* a bear some more.
 - b. I *looked for* the key a lot.
 - c. Mary wanted the book very much. (Kiparsky 1998:(5a-c))

Analogously, boundedness in the nominal domain is also said to be a matter of gradability; all and only quantitatively indeterminate DPs are unbounded. The boundedness of a VP, then, is determined compositionally as in (6), and, in turn, Kiparsky's account of the PA distinction is as stated in (7).

- (6) A VP predicate is unbounded if [and only if] it has either an unbounded head, or an unbounded argument. (Kiparsky 1998:(38))
- (7) A partitive object is ungrammatical if the VP is bounded, and an accusative object is ungrammatical if the VP is unbounded. (Kiparsky 1998:286)

To see how this account works, consider (8), based on Kiparsky's example (1).

- (8) a. Ammu-i-n karhu-j-a. shoot-PAST-1SG bear-PL-PART
 'I shot (at) the bears.' / 'I shot (at) bears.' / 'I shot (and killed) bears.'
 - b. Ammu-i-n karhu-t. shoot-PAST-1SG bear-PL.**Acc** 'I shot (and killed) the bears.'

Consider first (8a), whose direct object *karhuja* is partitive. By (7), the VP of (8a) must have an unbounded interpretation, and by (6), this requires that either the verbal predicate, the direct object, or both have an unbounded interpretation. Leaving aside imperfective aspect, this yields three possible interpretations, as indicated in (8a). In the first one, the interpretation of the direct object is bounded ('the bears'), but the verbal predicate *ammuin* receives a gradable and thus unbounded interpretation; one can certainly shoot *at* something a lot, a little, etc. In the second interpretation, we have an unbounded interpretation for both the direct object (this time, 'bears') and the verbal predicate. Finally, in the third interpretation, the direct object receives an unbounded interpretation but the verbal predicate does not; the verbal predicate is taken to entail that bears were shot *and killed*, and, intuitively speaking, one generally cannot shoot and kill something a bit, to a great extent, and so on. In contrast, we have only one interpretation for (8b). The object is accusative, so it and its verbal predicate must receive a bounded interpretation, and we end up with, 'I shot (and killed) the bears'.

Kiparsky's analysis is instructive and appealing in its generality. Not only does it highlight the importance of both nominal and verbal semantics in the PA distinction, it also attempts to account for the PA distinction via a single semantic property, one that cuts across not only the nominal and verbal domains each taken as a whole, but also classes within the verbal domain.

Unfortunately, the account faces significant challenges. Take, for example, the PFC predicate *potkaista* 'kick'. Under Kiparsky's notion of boundedness, verbs that don't admit of gradability with respect to a single eventuality are bounded. It seems, then, that *potkaista* is one such verb. If, for instance, two individuals both kick a large boulder, one twice as hard as the other, we would not likely say that the former kicked the boulder "more" or "to a greater extent." Nor if a person were to kick something with an impressive amount of force would we likely say that she kicked it "a lot" or "very much." To say that someone has kicked something "a lot" or "more" amounts to a claim about the number of kicks executed, not the extent of a single eventuality. Thus, under Kiparsky's conception of boundedness, *potkaista* is bounded. But, counter to (7), *potkaista* generally takes partitive direct objects, as in (3a). The same goes for a host of similar verbs on their semelfactive readings, including but not limited to *sohia* 'poke', *lyödä* 'hit, strike, knock, beat', *suudella* 'kiss', *läimäyttää* 'slap, smack, slam', *nipistää* 'pinch, tweak', and *nuolla* 'lick'.

Conversely, *loukata* 'injure, wound, hurt', which is compatible with the degree adverb *hiukan* 'slightly' (see (2)) and comparative phrases, is apparently gradable and therefore unbounded, but typically takes accusative objects, as in (9).

(9) Loukkas-i-n polv-e-ni pahemmin kuin koskaan aikaisemmin.
 injure-PAST-1SG knee-SG.Acc-Poss.1SG much than ever before
 'I hurt my knee more than ever before.' (Lauri Karttunen, personal communication)

Certain stative verbs like *tuntea* 'know' and *ymmärtää* 'understand' present a similar challenge: both seem to be gradable, yet both typically take accusative direct objects (Djalali 2012).

So, some apparently bounded verbs tend to have partitive direct objects, and some apparently unbounded verbs tend to have accusative direct objects. This means that either the generalization in (7) simply doesn't hold, or some additional work is required to further explicate just how the notion of boundedness is to apply to particular verbs and verb classes.

Heinämäki 1994, another insightful account, runs into similar difficulty. Heinämäki, too, appeals to the notion of boundedness, and claims that accusative direct objects indicate a bounded event. Again, however, it is often unclear exactly why one predicate is taken to be bounded and another is not, as her analysis of the verbs *pitää* 'keep' and *odottaa* 'wait' illustrates. *Pitää*, in its 'keep' sense, often takes accusative direct objects, which Heinämäki explains by claiming that events of keeping have conventional temporal endpoints, and are thus conventionally bounded. At the same time, she claims that *odottaa* 'wait' typically takes partitive direct objects, "[...] because waiting [...] [has] no conventional end point" (219). One is left to wonder how it is that keeping something is any more associated with a natural endpoint than is waiting for something. Indeed, one could just as easily claim the opposite: a natural endpoint of waiting could be the arrival of the thing waited for.

In brief, despite their many insights, accounts attempting to explain the PA distinction via a single semantic property like boundedness have, to date, fallen short of their goal, either because they make some false predictions or because the predictions they make relative to certain important cases are unclear. In light of this, I will take a more focused approach in what remains, with the aim of getting the facts right for a principled class of predicates—namely, PFC predicates (cf. Djalali's 2012 account of the PA distinction among stative predicates).

3 A Provisional Approach: Quantized Change

The goal of Beavers' (2011) work is to provide a principled, independently-motivated definition of affectedness, a notion, "usually construed as a persistent change in or impingement of an event participant" (335). He divides eventive predicates into four groups based on the specificity of the predicates' entailments concerning the affectedness of their themes. Approximately speaking, Beavers says that for a predicate ϕ and a theme x, x: (i) is unspecified for change iff $\phi(x)$ does not entail any impingement or force upon x; (ii) has potential for change iff $\phi(x)$ entails some impingement or force upon x; (iii) undergoes non-quantized change iff $\phi(x)$ entails a change in x along some scale of change s; and (iv) undergoes quantized change iff $\phi(x)$ entails that x changes along some scale s to g_{ϕ} , where g_{ϕ} is a degree on s specified by ϕ that corresponds to a goal state. Beavers points out that any event of quantized change is likewise one of non-quantized change, and any event of non-quantized change is likewise one of potential for change. Thus, PFC predicates are predicates that entail "at least" potential for change; predicates entailing (non-)quantized change are themselves PFC predicates. Beavers also stresses that this way of categorizing predicates is equally applicable to predicates of motion, creation/consumption, and change-of-state, all of which can be understood as involving scalar change. From the perspective of affectedness, the differences between these types of change simply correspond to different scale types—paths, extent scales, and property scales, respectively (Beavers 2008, 2011, Rappaport Hovav 2008). I adopt the same perspective herein, and any claims or accounts to follow are intended to apply to any of these event types.

It turns out that this conception of quantized change provides a useful, if imperfect, way of thinking about the PA distinction among PFC predicates. I offer the following provisional generalization (recall that quantitative determinacy in a direct object is a necessary but not sufficient condition for the accusative case).

(10) **Provisional Generalization** A quantitatively determinate direct object of a Finnish PFC predicate ϕ is accusative iff ϕ entails quantized change in its theme (barring imperfective aspect).

Let's see how this proposal handles the data I have presented thus far, beginning with *potkaista* 'kick'. Again, *potkaista* typically takes partitive direct objects, as illustrated in (3a). The generalization in (10) predicts this: *potkaista* does not entail change of any kind in its theme, let alone quantized change, so the verb's direct object is usually partitive. Happily, the same is true for other Finnish PFC verbs that do not strictly entail any change in their themes: since they don't entail change on their own, they typically take partitive direct objects, in accordance with (10). At the same time, (10) seems to account for examples like the resultative (3b). The idea is to treat the main verb *potkaista* 'kick' and the adverbial phrase *takaisin* 'back' as together forming a PFC predicate that entails that its theme traverses some path from its initial location to its prior point of origin as a result of being kicked. This composite predicate (assuming contextual resolution of the deictic *takaisin* 'back') thus entails quantized change in its theme—in this case, change along some scale (a path) to a particular degree, the latter corresponding to the theme's prior point of origin. Thus, in keeping with (10), the direct object in (3b) is accusative. More generally, resultative constructions based on PFC verbs take accusative direct objects, as observed by Heinämäki (1994) and Kiparsky (1998) and as predicted by (10).¹

¹Note that a partitive direct object is felicitous in such constructions given an interpretation involving imper-

Importantly, according to (10) entailed change in a theme is not enough to engender an accusative direct object, as (11a) illustrates. The verb *siirtää* 'move' does entail change on the part of its theme—in particular, change in its location or orientation. But *siirtää* on its own does not provide a particular goal state to be attained. Hence, it does not entail quantized change in its theme, and, in line with (10), its direct object is partitive in (11a). As with *potkaista* 'kick,' however, *siirtää* can take an accusative direct object when it occurs with a locative adverbial like *pois* 'away', as in (11b). Here, the account is analogous to that of (3b): *siirtää* and *pois* together form a PFC predicate that entails that its theme traverses a scale corresponding to a path from its initial position to wherever *pois* 'away' is understood to be in context, the latter being the requisite goal state. Thus, we have an entailment of quantized change and an accusative direct object.

(11) a. Siirs-i-n kirja-a. move-PAST-1SG book-SG.PART
'I moved the book.' [entailed change; no particular goal state]
b. Siirs-i-n kirja-n pois ... move-PAST-1SG book-SG.Acc away
'I put away the book ...' [entailed change and particular goal state] (Google search for "siirsin kirjan")

The data in (12) tell a similar story. *Leikata* 'cut, mow, trim' certainly entails some change in its theme in its 'cut' sense, but it does not entail change to a particular degree on its own, thus often taking partitive direct objects. This is exemplified in (12a), where the vagueness of the result of the cutting event is made explicit by the phrase *mutta ei siitä tullut mitään* 'but nothing came of it'. However, when combined with a result phrase, the verb takes an accusative direct object, as in (12b). In that example, which comes from a story about an illusionist cutting people in half, we again have what may be viewed as a composite predicate entailing quantized change; the result phrase *kahtia* 'in two' specifies the requisite degree to have been attained, corresponding to the state of being in two pieces. Thus, the direct object is accusative, as predicted by (10).

(12) a. Poju vain vääns-i, taitto-i ja leikkas-i paperi-a boy.Nom just twist-PAST.3SG folded-PAST.3SG and cut-PAST.3SG paper-SG.PART sii-tä tullut mutta e-i mi-tään. but not-3SG it-ELAT come-PASTPRTC anything-SG.PART' 'The boy just twisted, folded and cut the paper, but nothing came of it.' [entailed change; no particular goal state] (Google search for "leikkasi paperia") b. ...leikkas-i hei-dät kahtia cut-PAST.3SG she/he-PL.Acc in two '...[the illusionist] cut them in two...' [entailed change and particular goal state] (Google search for "leikkasi kahtia")

Unfortunately, (10) faces at least two significant challenges. First, some PFC predicates, like *loukata* 'injure', do not themselves specify a particular degree of change to be attained, but

fective aspect or a quantitatively indeterminate theme. For example, (3b) modified so that *pallo* 'ball' had partitive case could be interpreted as, 'Pekka was kicking the ball back'.

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often have accusative direct objects nonetheless, as in (2b) and (9). In (2b), for instance, there is no lexically specified degree of injury entailed, so the predicate does not entail an event of quantized change, but the direct object is accusative, counter to (10).

The second problem is that predicates that don't themselves entail any persistent change in their themes can sometimes have accusative objects, even in the absence of a result phrase. Consider (1). Like English *shake*, the verb *ravistaa* 'shake' does not itself entail scalar change to a particular degree. Thus, in accordance with (10), *ravistaa* typically has partitive objects, as in (1a), where the object *purkki* 'can, canister' is partitive. There are, however, certain instances in which *ravistaa* has an accusative direct object, as in (1b), and such examples are problematic for (10). Given that *ravistaa* does not entail quantized change, according to (10) we should expect its object in (1b), *matto* 'carpet', to be partitive—just like the object in (1a). Instead, contra (10), the object is accusative. Nor is there an explicit result phrase in (1b) to bail (10) out.

By the same token, however, (1b) suggests that (10) is indeed on the right track. For unlike (1a), which bears no entailment of scalar change at all, (1b), as a whole, does in fact entail such change. Owing to the well-established convention of shaking carpets to rid them of foreign material, (1b), on its default interpretation, entails that the carpets in question ended up being free of foreign material (at least to some contextually relevant extent) as a result of the shaking event described. In scalar terms, (1b) entails that the carpets traverse a scale of cleanness (or something like it) to a contextually relevant degree on that scale. Thus, (1b) all but aligns with (10); we have entailed change to a particular degree, and the object is accusative. The problem for (10) is simply that the verbal predicate *ravistaa* itself does not entail such change, as shaking does not necessarily involve any persistent change whatever. Rather, in this case, the scale and goal degree are provided not by lexical entailments but by context and convention.

The gruesome data in (13) present an analogous pattern. *Hakata* 'beat, hit repeatedly' does not entail any change in its theme, and, in line with (10), typically takes partitive direct objects, as in (13a) (direct object: *mies* 'man').² To be sure, our world knowledge suggests that beating something with an iron pipe is likely to engender change in that thing, but change is not an entailment of the predicate. The problem for (10), then, lies in the abbreviated headline in (13b), where we have the same predicate and the same direct object, but the direct object is accusative. Here, there is an entailment that the man was harmed to a particular, contextually relevant degree, whereas (13a) bears no such entailment. As with (1b), we have change to a contextually relevant degree (in this case, on a scale of physical harm) and an accusative direct object. And again the requisite degree is supplied not by the predicate itself but by context and convention: striking a person repeatedly comes with a conventionalized intended result of causing the person significant physical harm, which is realized in (13b).

(13) a. Kaksikko hakkas-i mies-tä rautaputke-lla twosome.Noм beat-PAST.3SG man-SG.PART iron pipe-SG.ADESS(INSTR) pää-hän. head-SG.ILLAT
 'The twosome beat the man on the head with an iron pipe.' [no entailed change in theme] (Google search for "hakkasi miestä")

²It should be noted that the direct object of *hakata* can be accusative even in the absence of entailed change in the special case in which the theme of the event is inalienably possessed by the agent, as in: *hakkasi päänsä pöytään* 'he banged his head against the table'. I do not at present have an explanation for this restricted type of usage.

b. ...Kahdeksan nuor-ta hakkas-i mie-hen ...
eight youth-PL.PART beat-PAST.3SG man-SG.Acc
'...Eight youths beat a man up ...'
[entailed change and particular goal state] (Google search for "hakkasi miehen")

Taking all of this together, it seems that (10) is a step in the right direction, but clearly in need of revision. The problem is in the requirement that lexical entailments do all the work in specifying the nature of the requisite change. In the next section, I provide a solution to this problem with two key features. First, I adopt a broadly Kratzerian 2004 view of the PA distinction among PFC predicates, whereby direct-object case (in particular, accusative case) has

truth-conditional force. Second, I allow this truth-conditional force to be sensitive to context

4 The Solution: Standard Change

and convention.

The basic idea that Finnish direct object case is not just a reflex of lexical entailments is not without precedent. Kratzer (2004), building on Ramchand's (1997) work on Scottish Gaelic, makes an argument along these lines. The central idea, similar to the one I will propose here, is that there is a verbal inflectional operator [telic], "that can construct telic predicates in interaction with the lexical meanings of verb stems, rather than merely selecting predicates that are already telic" (Kratzer 2004: 397). For example, Kratzer takes English *climb* to denote a relation that holds between an individual x and an event e just in case e is an event of climbing x, whether or not some culmination is reached. *Climb* on its own, then, does not entail a telic climbing event. When combined with [telic], however, the resulting relation, approximately speaking, is one that holds between x and e just in case (i) e is an event of climbing x and (ii) for every "band of equal elevation" x' of x, there is a relevant subevent e' of e such that e' is an event of climbing x'. In other words, whereas *climb* on its own is concerned with events of climbing something, *climb* + [telic] concerns events of traversing every level of elevation on something through climbing.

In Finnish, Kratzer claims, the [telic] operator is linked to accusative direct objects. More specifically, her claim is that while accusative case-marking on a direct object is uninterpretable, it can only be checked by a phonologically null verbal inflectional head bearing the [telic] operator. So, for Kratzer, accusative case-marking does not itself have truth-conditional import, but reflects agreement with a verbal inflectional head that does. As for partitive case-marking on direct objects, Kratzer claims that it, too, has a (phonologically null) verbal inflectional counterpart, but that both are uninterpretable. That is, for Kratzer, partitive case-marking on direct objects has no truth-conditional force.

Kratzer's [telic] operator is intended to reflect the view (espoused herein) that the truth conditions accompanying the use of an accusative direct object are context-sensitive, so that,

[c]ulmination conditions for verbs built from atelic stems could be inferred using general cognitive principles, rather than relying on knowledge of lexical meanings [...] Any transitive process or activity verb [...] would be expected to combine with [telic], as long as suitable measures for the success of the events described could be associated with the verb's direct object, often in interaction with contextually provided information. (Kratzer 2004: 395)

Approximately speaking, then, Kratzer's analysis might be applied to the data in (1) as follows.

In (1a), the direct object is partitive, suggesting the absence of the [telic] operator higher up in the syntax, and thus there is no entailment of telicity in the event description. With the accusative direct object in (1b), however, the [telic] operator must be present to check the case, thus we have not only an event of shaking but a telic event of shaking. And the "culmination conditions" for the telic event—in this case, becoming clean to a contextually sufficient degree—needn't be lexically specified by the predicate *ravistaa* 'shake', but can be determined via associated conventions and context, as desired. At the same time, the accusative case is only felicitous insofar as "suitable measures for success of the events described could be associated with the verb's direct object," explaining the example in (14): shaking one's hand has no conventionally associated culmination, so *ravistaa* is less amenable to having the accusative-marked *käsi* 'hand' as its direct object.

- (14) #Ravist-i-n käde-n. shake-PAST-1SG hand-SG.**Acc**
 - # 'I shook my hand (out).' (Kiparsky 1998:(55c), felicity judgment in the original)

At this level of discussion, Kratzer's analysis seems to give us what we want: it acknowledges the context-sensitivity of the PA distinction and accords with the evidence that, even holding nominal semantics fixed and ignoring cases of imperfective aspect, the lexical entailments of a verb (or in Kratzer's framework, verb stem) cannot fully determine the case of its direct object. But the preceding overview of Kratzer's analysis glosses over some significant problems for the account. Though the account faces multiple challenges (Kiparsky 2005),³ I will focus on one presented by PFC predicates, in keeping with the scope of this paper.

Kratzer (2004) offers (15) as the definition for [telic]. The operator maps a given relation R between individuals and events (i.e. for Kratzer, a verb meaning) to a relation between individuals and events, and the resulting relation holds between an individual x and event e iff R(x)(e) and an additional condition is met. The additional condition is that there is some function f that maps x to a "suitable measure" associated with x for determining the "success of the event described," such that for every part x' of f(x) there is a part e' of e such that R(x')(e'). Though its precise role is not spelled out, the predicate **measure** is presumably Kratzer's means of ensuring that for any eligible f, f(x) is a contextually suitable measure for the event.

(15)
$$[[\text{telic}]] = \lambda R \lambda x \lambda e[R(x)(e) \& \exists f[\text{measure}(f) \& \forall x'[x' \le f(x) \to \exists e'[e' \le e \& R(x')(e')]]]]$$

The purpose of the f component is to account for cases in which the theme x itself is not the measure for an event. Kratzer's example to this point is the verb stem *shoot*, which she takes to

(i) Poliisi ampu-i naise-n ja itse-ä-än.
 police.Nom shoot-PAST.3SG woman-SG.Acc and himself-PART-REFL (Poss)
 'Police officer shot woman and himself.'

³Consider, for example, the problem for Kratzer's account posed by the following headline (Paul Kiparsky, personal communication):

In this example, we get a different aspectual force for each of the two conjuncts. The first direct object, *naisen* 'woman', is accusative to indicate that the shooting ended in death. The latter direct object, *itseään* 'himself', is partitive and implicates that there was no such result for the police officer's shooting at himself. (These interpretations are confirmed by the story beneath the headline: "The woman died immediately. The man is seriously injured in the hospital.") But if [telic] must be present to check the case of the first conjunct and is to combine with the verbal predicate *ampua*, then there is no way to explain the atelic aspect for the second conjunct.

mean 'shoot at': "If you shoot at a bear," claims Kratzer, "it's not the bear himself, but possible paths leading from your gun to the animal that provide measures for success. You shoot the bear, it seems, just in case you shoot at all parts of some path leading to him" (394). In other words, for Kratzer the truth conditions of *shoot* + [telic] + obj are something like: the theme x was shot at in e, and there is some f such that f(x) is a path from the shooter to x and every part of f(x) was shot at in some part of e.

Whether or not these truth conditions are correct for English *shoot* + [telic] + obj, they are not for Finnish *ampua* 'shoot' with an accusative direct object. *Ampua* with an accusative direct object is understood to mean not just that the theme was successfully hit, but that the theme underwent a particular change as a result—most canonically, death (Kiparsky 1998).⁴ (15) provides no way to capture this. According to (15), and as depicted in (16), [telic] + *ampua* denotes a relation that holds between an individual x and an event e iff (i) x is shot at in e; and (ii) there is some contextually suitable measure f(x) such that every part of f(x) is shot at in some part of e.

(16)
$$\llbracket \text{telic} + ampua \rrbracket = \lambda x \lambda e[\text{shoot.at}(x)(e) \& \\ \exists f[\text{measure}(f) \& \forall x'[x' \le f(x) \to \exists e'[e' \le e \& \text{shoot.at}(x')(e')]]] \rrbracket$$

Nowhere in this denotation is there a requirement of change in x—let alone change to a particular goal state. Data like (13b) pose a similar problem, for according to (15), (13b) entails only that the relevant eight youths beat the man in question and beat every part of some contextually suitable measure $f(\mathbf{man})$. By Kratzer's account, then, there is no entailment of change in the man, contrary to fact. More generally, any PFC verb that does not itself entail change but is amenable to accusative direct objects presents an analogous challenge for Kratzer's account.⁵ I will now present an analysis that addresses this fundamental problem, while retaining the advantages of Kratzer's account, beginning with with the definitions in (17) and (18) (the latter based on Beavers' (2011) operator *result'*):

- (17) For any entity *x*, scale *s*, and point in time *t*, m(x, s, t), where defined, provides the degree possessed by *x* on *s* at time *t*. If *x* possesses no degree on *s* at time *t*, m(x, s, t) is undefined.
- (18) Let x be an entity, s be a scale with partial order \leq_s on the degrees of s, d be a degree on s, and e be an event with beginning time $t_{e.beg}$ and end time $t_{e.end}$. res'(x, s, d, e) iff: $m(x, s, t_{e.beg}) <_s m(x, s, t_{e.end}) \& d \leq_s m(x, s, t_{e.end})$

The definition in (18) says that for any entity x, scale s, degree d on s, and event e, res'(x, s, d, e) is true just in case (i) x possesses a greater degree on s at the end of e than at the beginning of e; and (ii) the degree on s that x possesses at the end of e is at least as great as d. With that in mind, I now define the crucial notion for my analysis, *standard change*:

⁴User Jukka Aho, on the Web site finlandforum.org, makes this point well. In response to the question, "How would you say, 'I shot a walrus's flipper'?" the user writes: "I'd say 'Minä ammuin mursua evään.'" There, *mursu* 'walrus' is partitive and *evä* 'flipper' is in the illative case. (Literally: 'I shot a walrus into the flipper'.) The user continues: "A 'complete action', where you'd get to use the genitive (accusative) case, could be something as horrible as 'Minä ammuin mursun evän verisiksi riekaleiksi.'" Translation: 'I shot a walrus's flipper into bloody shreds'.

⁵Stative predicates also present a challenge for Kratzer, who claims that the reason that *omistaa* 'own' typically takes accusative objects is that owning x means owning its parts. In contrast, she claims, verbs like *rakastaa* 'love' take partitive objects because loving x doesn't entail loving its parts. *Tietää* 'know (superficially, of the existence of, etc.)' presents a clear counterexample to the alleged pattern. Knowing something in the *tietää* sense does not entail knowing that thing's parts, analogous to the case of *rakastaa* 'love', but its objects are canonically accusative.

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(19) For any event *e* with theme *x*, *x* undergoes *standard change* over the course of *e* iff: $\exists s[\mathbf{measure}(s) \& res'(x, s, g, e)]$, where: (i) *g* is a contextually determined goal degree (*standard*) on *s*; and (ii) for any scale *s'*, **measure**(*s'*) is true just in case *s'* meets certain contextually determined criteria.

In prose, (19) says that a theme x of an event e undergoes standard change over the course of e iff there is some scale s meeting certain contextually determined criteria such that x goes from being at some degree less than g on s at the beginning of e to being at (or beyond) g at the end of the event, where g is a particular, contextually determined goal degree on s.

There are two important points concerning this definition that merit discussion. The first is the treatment of the scalar component—a variation on Kratzer's (2004) implementation of measures of telicity. The **measure** predicate allows for there to be certain constraints on the nature of the requisite scale, depending on context. Relative to the event described in (13b), for instance, one such constraint might be that any suitable scale consists of degrees of physical harm. At the same time, however, standard change does not require that the exact nature of the requisite scale be fully specified in every case. The definition allows for such flexibility in order to handle examples like (3b), where the truth-conditions primarily concern the location of the relevant ball at the beginning and end of the event described, saying little to nothing about the exact path the ball traveled along the way.

Second, in saying that *g* and the properties of *s* are "contextually determined," I don't mean to downplay the role of lexical entailments. The point here is simply that, in addition to lexical entailments, other contextual considerations are taken into account in their determination. Owing the idea of contextually relevant degrees on a scale to Kennedy (2007) and Kennedy and Levin (2008), I borrow their terminology for such degrees and refer to the contextually determined goal degree as the *standard* for the event described, hence the term *standard change*. This is not meant to be a wholesale adoption of those authors' framework or theory of standards, but a recognition that the notion I intend here is at least in spirit the same. Given this definition of standard change, I present the following generalization:

(20) **Revised Generalization** Let v be a Finnish PFC verb with denotation ϕ . Accusative casemarking on the direct object of v entails the following about the event being described eand its theme x:

(i) $\phi(x)(e)$; and

(ii) *x* undergoes standard change over the course of *e*.

Partitive case-marking on the direct object, however, entails only condition (i).

In brief, the generalization is that accusative case-marking on the direct object of a PFC verb entails standard change in the theme, whereas partitive case-marking does not. Of course, as with other context-sensitive expressions (see e.g. Roberts 2010), accusative case-marking on the direct object of a PFC predicate is only felicitous if the speaker and hearer are sufficiently confident that the hearer can determine the intended values of the contextual parameters involved in the expression—in this case, properties that must hold of the requisite scale *s* and the value of the goal degree (standard) *g*. With that in mind, let's see how this works with the data discussed thus far, beginning with (3).

The fact that the verb *potkaista* 'kick' typically takes partitive direct objects, even when the action of kicking is taken to be "completed" in the event described, accords with (20): *potkaista* itself does not entail change in its theme, and is not conventionally associated with events

of scalar change culminating in the attainment of a particular goal degree. Even if a kicking event involves the theme moving to a new location, there's generally no telling from lexical entailments, convention, or context precisely what that new location would be. Hence, using accusative case-marking on the object, which presumes that the hearer will be able to discern the requisite goal degree (corresponding to a particular goal state), is generally infelicitous for *potkaista*, and the verb typically takes a partitive direct object. This is what we find in (3a), where the entailment is simply that the ball was kicked. However, if the verb occurs with a lexically specified goal state, an accusative direct object is felicitous and entails that the goal state was met as a result of the kicking event. This is exemplified in (3b): the accusative case on the direct object entails standard change, and the adverb *takaisin* 'back', together with context, furnishes the value of the goal-degree parameter *g* (which, in this case, corresponds to being at a particular location) so that the VP as a whole entails that the ball in question was kicked and ended up back at its prior point of origin.

Like the previous generalization, (20) also readily handles the data in (12). The verb *leikata* 'cut, mow, trim' does itself entail change in its theme, but not scalar change to a particular degree. Thus, like *potkaista*, it can have a partitive direct object even with perfective aspect, where the entailment is that the theme is cut but not necessarily with a particular contextually discernible outcome, as in (12a). An accusative direct object, however, entails that the theme is cut and with a particular contextually discernible outcome, as in (12b). An accusative direct object, however, entails that the theme is cut and with a particular contextually discernible outcome, as in (12b), where the result phrase *kahtia* 'in two' supplies that outcome. In scalar terms, we have an event of standard change: it is to be understood from (12b) that the theme traversed some scale consisting of at least two degrees—one corresponding to being in one piece and the other (the goal degree) to being in two—and that the latter degree was attained by the theme by the end of the event.

Now, in the case of (3b) and (12b) the meaning of the result phrases bears most of the burden of supplying the goal-degree parameter q, and these data presented no problems for our previous generalization. But what about instances in which there is no lexical material to offer a goal degree or specify constraints on an appropriate scale? Unlike the previous generalization, (20) is designed to handle such instances as well. Consider again example (1). As noted before, ravistaa 'shake' certainly does not entail a scalar change on its own, and for most themes, it is not conventionally associated with any particular result. Thus, as with *potkaista*, the direct objects of this verb are usually partitive, as in (1a).⁶ But, as noted above, shaking a carpet does have a conventionally associated goal—that of the carpet being sufficiently clean. Accordingly, one can mark the noun matto 'carpet' with accusative case-marking as a direct object of ravistaa and be reasonably confident that the hearer will discern that the requisite goal degree lies on a scale of cleanness and corresponds to being clean to a contextually sufficient degree. That is, despite the fact that *ravistaa* cannot itself offer up the requisite goal state or constraints on a viable scale, context and convention can, as provided for by (20). Thus, we have instances like (1b), where the accusative case on the direct object, together with context, entails that the carpets in question were made clean to a contextually sufficient degree in the shaking event.

An analogous argument accounts for the data for the verb *ampua* 'shoot at' in (8) and for the verb *hakata* 'beat, hit repeatedly' in (13). In both instances, the verbs do not themselves en-

⁶Indeed, whereas a Google search for "ravist-i purkki-a" (shake-PAST.3SG can-SG.**PART**) returns 398 results at the time of this writing, a search for the same phrase with *purkki* marked accusative ("ravist-i purki-n") returns only one, and it is a false positive. In that example, the case marking corresponds not to accusative but rather to genitive case—the two forms being identical for *purkki* in the singular in such an environment. (The full VP in the example is *ravisti purkin sisällön roskakoriin*: '(he) shook the contents of the canister into the wastebasket.')

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tail change in the theme *x* (hence the partitive-marked objects in the (a) sentences) but do have conventionally associated results—namely, death and injury to a contextually significant extent, respectively. Thus, the verbs are amenable to accusative-marked objects, as in the (b) sentences, which entail that the requisite goal degrees (corresponding to death and a contextually significant extent of injury, respectively) were attained by the themes in the events described. The present account also explains the doubly troubling example in (4) along similar lines. Like *ampua* and *hakata*, verb *puukottaa* 'stab, knife' does not itself entail change in its theme, even with perfective aspect. Hence, although the headline describes what is, in a sense, a "finished action," it is not surprising to find partitive case-marking on the object *naista* 'woman'. Accusative casemarking would have entailed that the woman in question underwent a standard change over the course of the event—conventionally, death (parallel to *ampua*). With the case-marking as it stands, there is no such entailment. (And, as reported in the story from which the headline was drawn, the woman in question was not killed in the attack.)

The revised generalization also accounts for the data in (2). *Loukata* 'injure, wound, hurt', in its physical injury sense, does entail scalar change in its theme along a scale of injury (barring imperfective aspect), but it does not itself specify a particular degree of injury (goal state) to be attained. In keeping with the revised generalization, an accusative direct object entails that the theme becomes injured to a contextually determined standard degree in the event described, and a partitive direct object bears no such entailment. So in (2b), with its accusative direct object, we get the entailment that the midfielder injured his knee to a contextually determined standard degree (at least), whereas in (2a), the entailment is only that there was a "slight" injury to the foot, not necessarily to the extent that would meet the standard for injury in the context of utterance. One gets the sense that the injury was too minor to be considered a "true" injury, consistent with the adverb *hiukan* 'slightly'.

Before moving on to the next section, it is worth drawing attention to an important feature of the generalization in (20). Namely, while partitive case-marking on a direct object does not entail that the event described is an event of standard change, it also does not entail that the event described is not an event of standard change. As Kiparsky (1998) notes in reference to example (21), the sentence, with its partitive object, "is non-commital as to what happened to the bear." That there was no standard change, then, is a (defeasible) conversational implicature—had there been a standard change, an informative speaker would likely have indicated as much by marking the direct object with the accusative case. Heinämäki (1994) observes the same dynamics with respect to the non-PFC predicate *lukea* 'read': with a partitive object there is an implicature, but not an entailment, that not all of the book (or contextually relevant subpart thereof) was read.⁷

(21) Ammu-i-n karhu-a. shoot-PAST-1SG bear-SG-PART
'I shot (at) the (a) bear.' (Kiparsky 1998:(1a), abbreviated)

To summarize, I have argued for the notion of standard change-in essence, a context-

⁷Multiple related facts align with the position that partitive and accusative case-marking stand in a truthconditional hierarchy. Hakulinen and Karlsson 1979, for instance, find that partitive direct objects are significantly more frequent in Finnish than accusative ones, suggesting that the latter is the marked form. Moreover, Vainikka (1989) claims that the partitive case is the default objective case in Finnish, and Anttila and Fong's (2000) work suggests that it is the default case in Finnish partitive constructions, where it alternates with the elative case.

sensitive version of quantized change—to account for the PA distinction among Finnish PFC predicates. Like Kratzer (2004), I argued that the PA distinction is sensitive to context and is not merely a matter of lexical entailments. In particular, I claimed that accusative case-marking on the direct object of a PFC predicate contributes the entailment that the theme of the event described undergoes standard change over the course of the event. Partitive case-marking, on the other hand, bears no such entailment. Whereas PFC predicates cause trouble for other analyses, the present account handles them in a straightforward and principled manner.

5 Answers to Potential Objections

One might object to the generalization in (20) on the grounds that it leaves too much room for context to influence the values of the parameters of an event of standard change. It's certainly true that some verbs are rather choosy about the requisite scales and goal degrees that make for events of standard change. *Tappaa* 'kill' is a clear case:

(22) Tapo-i-n karhu-n. kill-PAST-1SG bear-SG.Acc 'I killed the bear [dead].'

Example (22) almost certainly would not be interpreted as 'I killed the bear clean/in half/onto the table/...'—rather, the standard change here is death. Yet, in principle, (20) allows for such interpretations. How, then, can they be ruled out?

One way to handle this would be to revise the account to include the stipulation that where the relevant predicate lexicalizes a scale and goal degree, that scale and goal degree must serve as the corresponding parameters of the entailed standard change. However, general pragmatic principles obviate the need for such a revision. The argument is as follows. Tappaa lexicalizes a scale and standard (death)-any perfective use of the verb entails that the theme dies as a result of the event described. In turn, any perfective use of the verb is an event of quantized change. Given that this is the case (barring instances involving secret codes à la "the eagle has landed") it's hard to imagine why a rational speaker would use (22) to assert some particular change C in the bear other than death. Let's divide possible contexts of utterance into two general classes: one in which the death of the bear per se is relevant, and one in which it is not. If we are in a scenario of the latter kind, the speaker of (22) would be wasting her words to begin with and be better off stating directly that C obtains. Now to the scenarios in which the death of the bear per se is relevant. If the speaker and hearer have no mutual expectations about the death of the bear leading to or correlating with C, the use of (22) to communicate that C obtains is bound to fail; the hearer would have no grounds for believing that she is expected to conclude that C obtains from the death of the bear. If the speaker and hearer mutually know that killing the bear would lead to C, then the speaker can simply rely on the hearer's capacity to infer that C obtains, requiring no deviation from the canonical truth conditions of (22). As far as I can tell, then, the circumstances that are most amenable to using (22) to assert that C obtains would be those in which the speaker and hearer have a mutually shared belief that killing the bear may well bring about C. But even then the hearer would have no way to be sure that the speaker was asserting anything other than a successful killing of the bear, and upon hearing (22), would be perfectly justified in asking (in Finnish, of course) "And?" Thus, though the accusative case-marking in (22) technically allows for an entailment of standard change in the bear other than death, general pragmatic principles seem to rule it out, at least in the vast majority of

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circumstances. More generally, and by the same reasoning, whenever we have a PFC predicate with an accusative direct object, and that predicate itself supplies a suitable scale s and goal degree g, the event of standard change entailed by the corresponding VP will nearly always be one such that s and g provide the scale and goal degree parameters. Thus, the flexibility needed to account for data like (1) and (13) does us no harm in stricter cases like (22), and there is no need to make stipulations for such cases.

Nonetheless, one might still object to the revised generalization on the grounds that some PFC verbs, like *suudella* 'kiss', seem to never take accusative direct objects. From this it may appear that we need to place tighter restrictions on the revised generalization, which at present bars no PFC verbs from occurring with accusative direct objects. But, again, pragmatic principles explain such patterns. The reason that speakers "never" use accusative direct objects with such predicates is because, with respect to those predicates, the speaker and hearer generally cannot be confident that they will converge on the requisite values for the contextual parameters of a standard change. Kissing something, for instance, could engender multiple possible changes in that thing, or perhaps no persistent change whatever, making *suudella* far less amenable to accusative direct objects than PFC verbs that, with perfective aspect, entail standard change (e.g. *tappaa*) or are conventionally associated with standard change relative to certain themes (e.g. *ravistaa*). Of course, verbs like *suudella* very readily take accusative direct objects when the nature of the entailed standard change is made clear via a result phrase, as in the following macabre example from an anonymous reviewer:

(23) Suutel-i-n häne-t kuoliaaksi. kiss-PAST-1SG he-SG.**Acc** dead-TRANS 'I kissed him to death.'

Thus, the revised generalization must provide for even verbs like *suudella* to occur with accusative direct objects, which it does.

It should be clear from this discussion that despite the context-sensitivity of the notion of standard change, one can still make principled predictions about where to expect an accusative direct object with a PFC verb. Verbs with entailed or conventionally associated scales of change for their themes are especially amenable to accusative direct objects even without an accompanying result phrase because they require minimal contextual coordination concerning the scalar component of the relevant standard change. Verbs without this property, like *suudella* and *potkaista*, tend to occur with accusative direct objects under a narrower range of circumstances, such as when a result phrase specifies the nature of the standard change.

6 Conclusion

The Finnish PA distinction, with all of its wrinkles and complexity, has to date proven too unruly to be bound by a single, concise generalization. With that in mind, I set out to account for a subset of the data—namely, those VPs whose main predicates are PFC predicates—leaving nominal semantics and imperfective aspect aside. The data clearly provide evidence that the PA distinction among these predicates is not strictly a function of lexical entailments. Instead, the distinction revolves around a special kind of change that I have termed *standard change*, whereby a theme traverses a scale satisfying certain contextually determined constraints to a particular, contextually determined goal degree. My proposal, then, was that (i) accusative case-marking on the direct object of a Finnish PFC predicate contributes the entailment that the theme undergoes standard change over the course of the event described by the VP; and (ii) partitive case-marking bears no such entailment. I further argued against the potential objection that the proposed generalization provides too much contextual flexibility; many of the constraints on the distribution of partitive/accusative case among PFC predicates can be explained by general pragmatic principles of coordination between interlocutors. It is hoped that the notion of standard change and the broader pragmatic framing of this analysis may be fruitfully applied to understanding related phenomena in other languages.⁸

There is of course much room for further research on the Finnish PA distinction. With respect to PFC predicates, for instance, while it is clear that context plays an important role in determining the distribution and entailments of VPs with accusative direct objects, it is less clear just how much contextual leeway speakers have. Certainly goal degrees are in some cases determined by context rather the simply being provided by scalar endpoints (cf. Kennedy and Levin 2008). Example (1b), for instance, does not entail that the carpets were perfectly clean at the end of the event described, just that they were clean to a particular, contextually determined extent. As for the scalar parameter, in the examples of standard change discussed herein, if the constraints on the scalar parameter were not offered by lexical semantics, then they were provided by a well-established convention, as in the case of ravistaa 'shake, cause to move' and hakata 'beat, hit repeatedly'. Are there instances of accusative direct objects being used felicitously without appeals to lexical entailments or widely established convention? That is, are there circumstances under which very local contextual considerations are enough to make clear the nature of the entailed standard change? How much do individuals vary in terms of use of and tolerance for novel or highly context-dependent uses? Under what circumstances are novel uses conventionalized?9

Looking beyond the central issues of the present work, a full account must address not only other classes of verbs and the issue of compositionality, but also accusative case-marking's effect on the interpretation of the direct object itself and its incompatibility with imperfective aspect.¹⁰ There may indeed be a single conception of boundedness or quantizedness that will capture all of the relevant facts. In any case, it is clear that a comprehensive account of the PA distinction will require close analysis of particular uses across a range of verbs and verb classes, and detailed explication of how different generalizations do or do not account for the data.

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⁸It seems, for instance, that the English directional particles like *up*, *out*, and *down* may serve much the same function as accusative case-marking on Finnish direct objects. Witness the difference between *shake* and *shake out*, *beat* and *beat up*, *cool* and *cool down*, and so on.

⁹A related matter is that it seems that in certain instances a direct object of a PFC verb may bear accusative case even without an entailment of standard change, if it is to be understood that a sort of ritual or procedure has been carried out in the event described (Arto Anttila, personal communication). Thus, for instance, a momentous event of two people shaking hands may at times be described via a VP with an accusative direct object, where the partitive is generally expected. I must leave these interesting cases for future research.

¹⁰An anonymous reviewer also points out that the analysis developed herein has not addressed the fact that the accusative case can appear on certain delimiting adverbials (see e.g. Maling 1993, Pereltsvaig 2000)—another important matter for future work.

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Elaborating on Events by means of English *by* and German *indem*

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This paper argues that English *by* and German *indem* 'in that' accommodate dual aspect types for events and thereby support their assessment under a certain conceptualization: that is, in examples such as *keep a promise by dancing*, both involved event types are 'copresent' in such a way that the dancing is conceptualized as a keeping of a promise. The proposal, which is spelled out in terms of Asher's (2011) type composition logic, captures *by*'s key traits: the global accessibility of the matrix event as opposed to the local role of the embedded event, the conceptual constraints and asymmetry of the construction, its intensional behavior, and the Anscombe intuition that it involves only one event. Finally, the core idea readily lends itself to extensions where called for; this is illustrated with a refined analysis of the German connective *indem* and its specific characteristics.

Keywords: Anscombe Thesis, event semantics, type composition logic

1 Introduction

Canonically, both *by V-ing* in English and adverbial sentences introduced by *indem* 'in that' in German describe in more precise terms the respective matrix event:

(1) a. Ben kept a promise by dancing.

(see Sæbø 2008:(21a))

b. Ben hielt ein Versprechen, indem er tanzte. Ben kept a promise in that he danced

In view of previous work (see Dowty 1979, Bennett 1994, Kearns 2003, Sæbø 2008, Schnieder 2009 on *by*; see Behrens and Fabricius-Hansen 2002, Fabricius-Hansen 2006, Fabricius-Hansen 2011 on *indem* and *by*), the following key issues emerge. Typically, the *by/indem*-phrase combines with abstract predicates, notably criterion predicates and (manner-neutral) causatives; see Sæbø 2008:127–128 for these notions and the following examples:¹

- (2) a. Criterion predicates: keep a promise, do me a favor, transgress Holy Law, ...
 - b. Causative predicates: save sb., madden sb., create a fiction, ruin my reputation, ...

How do matrix predicates and *by/indem*-phrases relate to each other and how does the relation come about? Conflicting characteristics make answering these questions a challenging task: on the one hand, (1) seems to involve only one event. This intuition is captured within the so-called Anscombe Thesis; see (3) from Schnieder 2009:650. This basically says that the keeping of the promise *is* the dancing.²

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¹Criterion predicates – the term is due to Kearns (2003) – introduce conventional criteria; in turn, the events given in the *by/indem*-phrase are conceived of as fulfilling the imposed requirements.

²According to Schnieder, the term "Anscombe Thesis" goes back to Bennett (1994); the underlying intuition originated from an example from Anscombe 1957. Schnieder (2009:649–654) discusses the wording of the thesis.



(3) If $x \phi$'s by ψ -ing, then x's ϕ -ing = x's ψ -ing.

On the other hand, there is clear evidence against the Anscombe Thesis; see Sæbø 2008 for a recapitulation of the arguments.³ First, example (4) shows that the involved event descriptions cannot be interchanged; this asymmetry would be surprising if the involved events were in fact identical. Second, event identity predicts closure upon weakening. However, while simple sentences are closed, their embedding under *by/indem* bars the relevant implication, as in (5):

- (4) # Ben danced by keeping a promise.
- (5) a. Ben danced in public. \rightarrow Ben danced.
 - b. Ben kept a promise by dancing in public. --> Ben kept a promise by dancing.

The present paper aims at a compositional analysis of by/indem that reconciles this conflict. Section 2 discusses merits and problems of Sæbø's (2008) unification-based proposal. In section 3, I will develop an alternative that builds upon Asher's (2011) type composition logic. Its upshot is that by/indem accommodate dual aspect types for events and establish their assessment under a certain conceptualization; hence, (1) is about dancing *as* a keeping of a promise. In section 4, I will focus on specific properties of *indem* in German and ponder how refinements of the core proposal can handle these. Section 5 offers a brief conclusion.

2 Sæbø 2008

2.1 Sæbø's Unification-Based Account

The key ingredients of Sæbø's account are as follows: first, building, in particular, on Bennett 1994, Sæbø (2008:132) starts out with the idea that the abstract matrix predicates are "predicates of predicates of events," which leads to the hypothesis in (6).

(6) If someone φ's by πing, then φ says that she does a ψ such that ... (for instance, ψ is something promised, or her doing ψ causes something), and ψ is π.

Accordingly, the *by*-construction builds upon an additional mediating variable ψ introduced via the matrix predicate and filled by the *by*-phrase; in turn, the whole construction denotes just one event token, namely the one of the *by*-phrase, capturing the intuition that underlies the Anscombe Thesis. Second, the relation between the involved event descriptions (for instance, the causing relation in the case of causatives) is not spelled out in terms of event tokens, but in terms of event types. This renders the construction intensional and therefore compatible with the evidence against the Anscombe Thesis. Notably, this goes hand in hand with a proposition-based notion of causation. Third, in order to develop these aspects into a compositional analysis, Sæbø relies on unification as inspired by Discourse Representation Theory.

A quick run through the analysis of the causative example in (7) illustrates the procedure.

(7) madden me by dancing

(= Sæbø's (22a))

The *by*-phrase is assumed to necessarily bind an indefinite predicate variable; this is captured via a so-called constant condition, as in (8). In turn, unification succeeds only if the matrix

³From a philosophical perspective, Schnieder (2009) offers a partly different criticism. He also sketches an analysis of *by*'s semantics in terms of "how"-explanations. His approach certainly deserves a thorough discussion. However, since it is less explicit with regard to composition than Sæbø's account and the focus of the present paper will be on compositional details, I postpone a comparison between his and my analysis till another occasion.

predicate provides such an indefinite predicate. This is exactly what underlies the hypothesis in (6). Accordingly, *madden* is equipped with an indefinite variable *P*, as in (9). Unification then yields for (7) the representation in (10).

(8) [[by dancing]] =
$$\left\langle \{\langle \Pi, \underline{constant} \rangle\}, \overline{\Pi = \lambda e'. dance(e')} \right\rangle$$

(9) [[madden me]] = $\left\langle \begin{array}{c} \{\langle e, \lambda \rangle, \\ \langle P, \underline{indef.} \rangle\}, \end{array} \right\rangle$
(10) $\left\langle \{\langle e, \lambda \rangle\}, \begin{array}{c} e_1 \\ \hline P(e) \land Bec(mad(i))(e_1) \land Cause(Bec(mad(i))(e_1))(P(e)) \end{array} \right\rangle$
(see Sæbø's (26) and (24))

(10) says that the *by*-construction in (7) as a whole denotes a set of dancing event tokens (see the corresponding λ -bound variable *e*); this captures the intuition that (7) is about just one event. In addition, an intensional causing relation relates the corresponding event type 'dance(*e*)' to the event type 'Bec(mad(*i*))(*e*₁)' provided by the matrix predicate; this accounts for the lack of closure and the asymmetry.⁴ The asymmetry is also reflected in the licensing condition of the procedure as such: in contradistinction to *dance*, the causative *madden* is a plausible candidate for lexically providing an adequate indefinite anchor.

While Sæbø's analysis accounts for basic characteristics of *by/indem* in an elegant way, the following discussion uncovers substantial shortcomings.

2.2 Problem I: Locality Effects

According to (10), the compositionally active λ -bound variable of the complex VP corresponds to the embedded event, not the matrix event. However, various diagnostics show that the complex VP is sensitive to the matrix event while the embedded event should be locally bound.

A first case in point is the combinatorics with mental-attitude adverbials such as *involuntarily* or *unintentionally*. These are VP-adjuncts that assign the highest ranked verbal argument a specific attitude towards the VP's event (Wyner 1994, Frey 2003). The examples in (11) show that the attitude relates to the matrix event while the embedded event remains opaque. If it got projected, the given implications should be valid, contrary to fact.

- (11) a. Ben involuntarily caused a dispute by raising religious questions.

 → Ben involuntarily raised religious questions.
 - b. Ben unintentionally dismissed Helen by signing the contract.
 → Ben unintentionally signed the contract.

These findings militate against Sæbø's account in two respects: the embedded event should not be the referential argument of the complex VP, and the matrix predicate should involve an event, not just a propositional relation. Notably, this consequence also threatens Sæbø's way of capturing the Anscombe Thesis.⁵

⁴Note that e_1 is the event token for the sublexical part *become mad*, but not for the matrix verb *madden* as such. The referential argument of *madden* is the underspecified one that is unified with the event token contributed by the *by*-phrase; this is why Sæbø can speak of having only one relevant event token here (as suggested by Anscombe).

⁵One might argue that evaluative or agent-oriented adverbials support a similar argument: *Unfortunately / Stupidly, Ben dismissed Helen by signing the contract.* Clearly, the evaluation may relate to the dismissal. However, it is less clear whether these adverbials relate to VPs/events; see Maienborn and Schäfer 2011.

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A second piece of evidence comes from combinatorial restrictions with manner adverbials and instrumentals such as *carefully* and *with a knife*, as in (12) and (13). Compared to their counterparts with by-phrase internal projection, their matrix projection is deviant.

- (12) a. Ben saved the deer by disinfecting its wounds carefully.
 - b. # Ben saved the deer carefully (by disinfecting its wounds).
- (13) a. Frank kept a promise by killing Jill with a knife.
 - b. # Frank kept a promise with a knife (by killing Jill).

Plausibly, these contrasts arise because the matrix event descriptions do not match the selectional restrictions imposed by the respective adverbials. However, this explanation is at odds with Sæbø's account: why are the adverbials in (12) and (13) unable to access the indefinite event variable introduced by the matrix predicate, particularly as it is projected? The indefinite variable, finally to be filled by *by*'s embedded event, should provide an adequate anchor for the adverbial even if the latter is integrated at the matrix level. This prediction is not borne out.⁶

Perceptual reports and locatives offer a third test bed. They are attractive criteria since they operate at the VP-level and are sensitive to the abstractness of verbal meanings.⁷ While, for instance, *dance* allows for direct perception, *keep a promise* and *forget* denote more abstract entities, which bar perceptional reports, as in (14). Crucially, the corresponding *by*-constructions pattern with the matrix predicates, as in (15). According to Sæbø's account, where the *by*-phrase projects its embedded event, (15a)/(15b) should be as good as (14a), contrary to fact.

- (14) a. Ben saw Martha dance.
 - b. ?? Ben saw Martha keep her promise.
 - c. ?? Ben saw Martha forget her pain.
- (15) a. ?? Ben saw Martha keep her promise by dancing.
 - b. ?? Ben saw Martha forget her pain by dancing.

Analogous restrictions on localization confirm this observation. Since the event slot of the matrix VP is determined by the verb in the *by*-phrase according to Sæbø, he cannot explain why locatives at the matrix VP-level are clearly sensitive to the matrix predicate:

- (16) a. Ben kept a promise by weeding in the garden.
 - b. ?? Ben kept a promise in the garden by weeding.
- (17) a. Ben forgot his pain by weeding in the garden.
 - b. ?? Ben forgot his pain in the garden by weeding.

A fourth and final diagnostic builds on biased anaphoric accessibilities. The example in (18) provides a case in point:

⁶One might defend Sæbø's account by arguing that the embedded event enters the matrix level as a whole (consider the unification of VPs, not Vs). Thus, verb-related manner adverbials and instrumentals cannot relate to it for independent reasons. However, this presupposes a detailed compositional set-up. I do not know whether the unification-based approach complies with this.

⁷See Maienborn 2005 and the commentaries on it in the same volume. For Maienborn, these criteria indicate a fundamental distinction between events, which are amenable to perception and localization, and statives, which bar both. I do not delve into this discussion here, so I use the criteria only to heuristic ends. For instance, the example based on the non-stative *forget* is inspired by Dölling (2005), who challenges Maienborn's perspective.

(18) A: She [maddened me]_i [by dancing]_j.
B: Yes, that_{i/(#)i} could not be overlooked.

The anaphor *that* seems to preferentially pick up the matrix event. That is, again: a referential anchor for the matrix event is needed while a merely propositional relation as proposed by Sæbø does not suffice. Furthermore, the matrix event (rather than the embedded one) should be globally accessible.⁸

2.3 Problem II: Free Variables and Constraints

Sæbø argues that his account can predict why examples such as (19) are deviant. Since the involved matrix predicates are too concrete to provide indefinite predicates, unification fails.

- (19) a. # spew all over a man and a woman by getting blind drunk [...]
 - b. ?? Fred tied his necktie / combed his hair / buttoned his shirt by ...

(= Sæbø's (33)/(18))

On the one hand, tracing the deviance of (19a) back to the lack of an indefinite predicate strikes me as too weak. According to my intuition, (19a) is out for ontological reasons: getting blind drunk cannot be conceptualized as a spewing. While one may spew because one got blind drunk, the spewing cannot in any possible way specify the process of getting drunk itself.⁹ The following examples corroborate this claim: (20a) and (21a) are clearly ill-formed. However, this cannot be explained in terms of \pm indefinite predicates since the respective matrix predicates are abstract in Sæbø's sense, as shown by (20b) and (21b), which are perfect.

- (20) a. # Ben repaired his bicycle by planning a trip.
 - b. Ben repaired his bicycle by replacing all the broken parts.
- (21) a. # Ben destroyed the falsified documents by hearing on the radio news that inquiries have been ordered.
 - b. Ben destroyed the falsified documents by burning them.

Again, conceptual constraints are at work: one cannot conceive of a planning of a trip in terms of a repairing process; analogously, a hearing of something on the radio news never amounts to a destruction of documents. Notably, the important role attributed to conceptual reasoning leaves room for less clear-cut examples. Cases in point are those in (22):

- (22) a. (#) Ben insulted all by getting blind drunk.
 - b. (#) Ben praised all by serving champagne.

In a strict sense, one can hardly conceive of getting blind drunk as an insulting, or, of serving champagne as a praising of someone. In a looser sense, these conceptualizations are possible and, thus, render (22a)/(22b) acceptable.

On the other hand, Sæbø's approach to the examples in (19b) seems to be too strong. A case in point is the manner-specific, non-abstract verb *nod*, discussed by Bennett (1994:43),

⁸I do not say that reference to the embedded event is strictly impossible. As will become clear later on, there will be an argument for the dancing in the corresponding representation. I would like to leave it open how exactly constraints on discourse structure control anaphoric links.

⁹The distinction between causal explanations and *by*-predication is also highlighted by Schnieder (2009:666–667), who adduces the nonsensical example *#to cry by hitting oneself on the toe.*

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Fabricius-Hansen (2006:50–51) and Schnieder (2009:662). Usually, one does not nod by doing something else; but if a person is disabled in a certain way, it may be conceivable that he nods "by watching himself in the mirror, conducting fast micro-experiments with various movements, and eventually hitting on the right ones to get his head to move in that way" (Bennett 1994:43). In fact, it seems to be easy to find counterexamples to (19b) such as those in (23):

- (23) a. (Bob is disabled:) He combs his hair by moving his head over a fixated brush.
 - b. Shampoonieren Sie Ihre Haare, indem Sie das Siroco mit der glatten Handfläche shampoo your hair in that you the Siroco with the flat palm in das Haar einarbeiten.
 in the hair work in

(http://www.hairfax.de/pflegeanleitungen.html, accessed on 19/09/2013)

Following Fabricius-Hansen's evaluation of Sæbø's proposal, I conclude that relative degrees of abstractness or (un)specificity are crucial, but not a static lexical feature such as \pm indefinite.

Examples with *by*-phrases that literally modify non-abstract activities and achievements, as in (24), pose another threat to Sæbø's analysis. They touch upon the interaction between inherent aspectual properties of verbs, transitions between aspectual classes, and the role modifying *by*-phrases play in their constitution.¹⁰

(24) He was forced to forfeit the medal he had won by cheating. $(= S \approx b \sigma' s (43))$

In order to reconcile this example with his approach, Sæbø argues that the *by*-phrase triggers a shift to a causative accomplishment. This introduces a DO component which provides an adequate anchor for the *by*-phrase predicate and, in turn, characterizes the referential argument of the complex VP.

In general, Sæbo's explanation suffers from a conceptual flaw. The core of his proposal builds on the assumption that *by* merely ensures the identification of predicate variables via unification. However, in order to facilitate aspectual changes, it seems to be inevitable that *by* contributes something more substantial. These assumptions are in conflict; the same worry (though with regard to another example) is articulated by Fabricius-Hansen (2006:52). One may try to save Sæbø's approach by liberalizing unification and, thus, rendering shifts obsolete. But this is at variance with the hard constraints that are exemplified by (19a), (20a), and (21a) above.

Furthermore, since the DO component forms the λ -bound variable of the complex VP, Sæbø's account predicts a change in the aspectual class on the matrix level. However, the distribution of durative vs. punctual adverbials, as in (25), indicates that there is no global change.

- (25) a. Ben had won the medal (*for an hour) by cheating (for an hour).
 - b. Ben reached the church (at 12 o'clock sharp) by speeding (*at 12 o'clock sharp).

That is, even if a shifting analysis is on the right track, it must be only locally operative; see section 4.1 for some remarks on corresponding questions with regard to *indem* in German.

2.4 Taking Stock

Regardless of its merits, Saebo's unification-based account of *by/indem*-constructions suffers from serious deficiencies. The envisaged alternative should preserve previous insights, that is,

¹⁰This is different from the examples with *nod*, *comb*, etc. above. The latter prompt the question of whether not all predicates, no matter how specific they are, allow for an even more specific description and, thus, a *by*-phrase.

capture the Anscombe Thesis, the asymmetry, and the lack of closure. But it should also comply with the following key observations: first, the matrix event description contributes the referential argument of the complex VP while the event introduced by the embedded description remains local. Second, the matrix event abstracts over the embedded one in an ontologically apt way; more concretely, the embedded event must be conceivable as one of the matrix type. Finally, the semantics of *by/indem* should leave room for potentially fine-grained lexical information that goes beyond a purely identifying function.

3 An Alternative: by/indem Accommodate Complex Event Types

The envisaged account builds on Asher's (2011) type composition logic, which supplements ordinary intensional semantics of terms with an extra layer that encodes rich typing information. This typing information plays a crucial role during composition: predication only succeeds if the types presupposed by predicates are met by the proferred types of their arguments. If type conflicts arise, the composition may either crash or resort to dynamic adaptive mechanisms. Notably, suitable accommodations and repairs are not arbitrary, but are also dependent on appropriate typing information; this roots them in the lexical system in spite of their sensitivity to dynamic conceptual knowledge. I will now apply Asher's approach to the case at hand.

3.1 Complex • Types in Asher's (2011) Type Composition Logic

Asher (2011:ch. 5–7) advocates the existence of dual aspect objects that justify complex • types. The underlying intuition is that • types are types where "both constituent types, the types of the aspects, are in some sense present" (Asher 2011:132). For instance, books are both physical and informational objects and, thus, of type INFO • PHYSICAL; lunches are both events and food and, thus, of type EV • FOOD. The selection of aspects depends on the predication, as in (26): *pick up* selects for the physical aspect of book while *master* selects for the information.

(26) Mary picked up and mastered three books on mathematics. (= Asher's (5.4))

Asher discusses at length that \bullet types do not correspond to intersective types, pair types, typetoken (or other forms of simple) ambiguities, part-whole relations, groups, or collections; see, in particular, Asher 2011:ch. 5.1–5.2.¹¹ Instead, \bullet types have a specific relational interpretation: the aspects of \bullet types are objects under a certain conceptualization, namely, they depend on the object they are aspects of, as Asher (2011:149–150) says:

[A]n aspect is, metaphysically speaking, a bare particular combined with some property or some property instance that it has [...]. A lunch object is *wholly* an event (under one aspect) and wholly food (under another aspect). [...• types] provide for a morphism to an aspect in a particular predicational environment, a morphism that [...] leads to the creation of a new object that is related to the one of • type.

In order to encode this specific dependence between aspects and objects of complex type, Asher (2011:150) introduces the relation "Object Elaboration," o-elab(x, y), which says that "x is an

¹¹To get an idea of how arguments go, a selective illustration may suffice: • types cannot be intersective because, for instance, the intersection of the types INFO and PHYSICAL (associated with *book*) would yield the absurd type; • types are not ambiguous between types and tokens either since, for instance, a lunch may involve both a particular event and food token. On problems of the pair-type hypothesis, see section 3.2.

aspect of y, or x 'elaborates' on the sort of object y is." The following analysis employs this kind of elaboration in order to model the relation between events involved in the *by*-construction.

3.2 Accommodating Complex • Types for Events

• types are not limited to single lexemes; they can also be dynamically accommodated. For the nominal domain, Asher argues that *as*-phrases within restricted predication, as in (27), are a case in point: here, John receives a • type with JUDGE as one constituent type. The JUDGE type is made accessible to the predication, which captures that it holds for John in his judge role.

(27) John as a judge is corrupt. (= Asher's (7.17b))

My proposal for the *by/indem*-construction builds on the core idea that a dynamic accommodation of • types is also feasible in the verbal domain; more concretely: I propose that *by/indem* are means of turning embedded events into complex events on which the matrix event description elaborates. That is, for instance, *keep a promise by dancing* involves a dancing conceptualized as a keeping of a promise. A corresponding lexical entry is given in (28); $\tau y^+(V)$ is short for a function that picks out the most specific type of a property V.¹²

(28) $[[by/indem]] = \lambda P \lambda Q \lambda x \lambda e: TY^+(Q) \exists e': TY^+(P) \bullet TY^+(Q).P(e')$ \land highest thematic arg.'(e') = highest thematic arg.'(e) \land o-elab'(e, e') $\land Q(x)(e)$

According to (28), the event variable e' must justify a complex • type that combines the specific types of both the embedded event predicate P and the matrix event predicate Q. As intended, *by/indem* thereby presuppose the accommodation of a complex event type for the embedded event. Correspondingly, 'o-elab' takes care of appropriately relating the involved events at the level of logical form; in short, the referential argument e of Q, namely the matrix event, is said to elaborate on the embedded event argument e' introduced by P. Finally, the condition imposed on the highest thematic arguments captures that both clauses have identical subjects.¹³

If applied to (29) and its meaning components in (30), (28) yields first (31) and then (32).

- (29) keep a promise by dancing
- (30) a. [[dancing]] = $\lambda e''$.dance' $(e'', y)^{14}$
 - b. [[keep a promise]] = $\lambda z \lambda e^{\prime\prime\prime}$.keep a promise' $(e^{\prime\prime\prime}, z)$
- (31) [[by dancing]] = [[by]]([[dancing]])
 - $= [\lambda P \lambda Q \lambda x \lambda e: \operatorname{TY}^+(Q) \exists e': \operatorname{TY}^+(P) \bullet \operatorname{TY}^+(Q).P(e') \land \text{hth. arg.}'(e') = \text{hth. arg.}'(e) \land \text{o-elab}'(e, e') \land Q(x)(e)] (\lambda e''. \text{dance}'(e'', y))$

¹²Asher handles presuppositions via parameters π that take care of adequately passing presuppositions from predicates to arguments during the composition. Since the respective merits are not crucial for the core of the present proposal, representations are greatly simplified here and presuppositions are added via a colon.

¹³Previous analyses also point out that the relation "elaboration" may be useful for relating objects and discourses, as in Behrens and Fabricius-Hansen 2002:46 and Sæbø 2008:146. In contradistinction to their suggestions, the present perspective is spelled out within Asher's type composition logic. Notably, I propose that the matrix event elaborates on the embedded one, not vice versa. The proposal's merits will be presented shortly.

 14 For simplicity, the highest argument corresponds to a free variable here. There might be better ways to integrate it. This paper does not properly deal with the compositional challenges that follow from an adequate integration of matrix and embedded subjects of *by/indem*-constructions; see section 4 for some remarks.

ELABORATING ON EVENTS BY MEANS OF ENGLISH BY AND GERMAN INDEM

- $= \lambda Q \lambda x \lambda e: \operatorname{TY}^+(Q) \exists e': \operatorname{DANCE} \bullet \operatorname{TY}^+(Q). \operatorname{dance}'(e', y) \land \operatorname{hth. arg.}'(e') = \operatorname{hth. arg.}'(e) \land \operatorname{o-elab}'(e, e') \land Q(x)(e)$
- (32) [[keep a promise by dancing]] = [[by dancing]]([[keep a promise]])
 - = $[\lambda Q \lambda x \lambda e: TY^+(Q) \exists e': DANCE \bullet TY^+(Q). dance'(e', y) \land hth. arg.'(e') = hth. arg.'(e) \land o-elab'(e, e') \land Q(x)(e)] (\lambda z \lambda e'''. keep a promise'(e''', z))$
 - = $\lambda x \lambda e:$ KEEP-PROMISE $\exists e':$ DANCE KEEP-PROMISE.dance'(e', y) \wedge hth. arg.'(e') = hth. arg.'(e) \wedge o-elab'(e, e') \wedge keep a promise'(e, x)

After application to a subject, identification, and existential event closure, this results in (33b) for (33a). Presupposition justification may succeed; so the logical form is well formed.

- (33) a. Ben kept a promise by dancing.
 - b. $\exists e: \texttt{KEEP-PROMISE} \exists e': \texttt{DANCE} \bullet \texttt{KEEP-PROMISE}.$ dance'(e', Ben) $\land \texttt{o-elab}'(e, e') \land \texttt{keep-a-promise}'(e, Ben)$

In prose: (33a) is true iff there is a keeping of a promise event e by Ben so that e elaborates on a complex dancing event e' by Ben that bears keeping a promise as one of its constituent types. That is, the dancing e' is conceptualized as a keeping of a promise whereupon this conceptualization feeds the matrix event the sentence is about. I will now comment on the merits and consequences of this analysis.¹⁵

Locality effects The compositional set-up according to (28) yields a logical form where the λ bound referential argument of the complex VP is not provided by the embedded complexly typed event, but by the simply typed matrix event. That is, (29) is about a set of keeping of a promise events that elaborate on a dancing event that justifies a complex type. Notably, the respective logical form thereby also involves a token variable for the matrix event instead of a purely event-type-based propositional relation. In contradistinction to Sæbø's approach, these features correctly predict that adverbials and perception reports operating at the matrix level are sensitive to the type of the matrix event predicate while the embedded event remains local. Moreover, the event token variable for the matrix event licenses its anaphoric accessibility.

Conceptual constraints Asher (2011:202, 207) briefly discusses restrictions on *as* phrases that are due to their \bullet type presuppositions. (34a) yields a presupposition failure since rocks bar a conceptualization in terms of the aspect ABSTRACT OBJECT. (34b), however, is well formed since books can bear the aspect PADDLE; this licenses the accommodation of the \bullet type.

- (34) a. # The rock as an abstract object is interesting.
 - b. This book as a paddle is useless. [...] (= A sher's (7.22a)/(7.20))

The conceptual constraints observed for *by/indem* can be captured in terms of analogous presupposition failures; see, for instance, (35a) (cf. (19a)) and its logical form in (35b).

¹⁵The proposal is exemplified with regard to the criterion predicate *keep a promise*. Notably, causatives such as *madden* would receive the very same analysis. Such a unified perspective is desirable: *o-elab* captures a certain ontological relation between matrix and embedded event; this builds on a common core of criterion predicates and causatives, namely their abstractness. However, it deliberately does not relate directly to differences between the ways this abstractness is encoded. Moreover, if needed (for other ends), the formalization may be amended by a decomposition of the involved predicates that reflects the distinction between different sorts of predication.

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- (35) a. # spew by getting drunk
 - b. $\lambda x \lambda e: \text{SPEW} \exists e': \text{GET DRUNK} \bullet \text{SPEW.get drunk}'(e', y)$ $\wedge \text{ hth. arg.}'(e') = \text{ hth. arg.}'(e) \wedge \text{o-elab}'(e, e') \wedge \text{spew}'(e, x)$

The presupposition cannot be met in a plausible way: getting-drunk events can never bear the aspect SPEW. In other words, one cannot conceptualize a getting-drunk event as a spewing; thus, conceivable objects of type GET DRUNK \bullet SPEW do not exist. Notably, there are of course plausible relations between getting drunk and spewing; the most prominent one is probably causal. However, the \bullet type hypothesis put forward here is not about a causal connection, but about a specific ontological form of "copresence" (recall the remarks on the \bullet type conception above). It is this copresence which is not feasible for the case at hand.¹⁶

Asymmetry and the role of layered abstraction In spite of the close relation between the involved events, the present analysis is clearly asymmetric since the embedded event and the matrix event play different roles, the former being accommodated to a complex event on which the latter elaborates. This paves the way for explaining the observation that the matrix event must abstract over the embedded one in a conceptually plausible way, as in (36) (= (1a)/(4) above):

(36) Ben {kept a promise by dancing / #danced by keeping a promise}.

Following Asher (2011:149), • type accommodation renders a "thin" object "thicker," that is, endows it with an instance of a more fine-grained property. Transferred to the • type accommodation with by/indem, this reasoning correctly predicts that the less abstract event can be endowed with a more fine-grained abstract event description, but not the other way around. Put in other words for (36): a dancing can comply with the necessary conceptual features of the more abstract keeping of a promise while a keeping of a promise cannot essentially be a more concrete dancing. The more general hypothesis is that since a less abstract event can obtain the role of a more abstract event, but not vice versa, an instance of a more abstract aspect elaborates on the type of object given by the less abstract event. It is finally noteworthy that nominalized event descriptions within *as*-phrases behave analogously. They are stylistically marked, but show the same kind of asymmetry, as in (37) and (38):¹⁷

- (37) I conceive of
 - a. {this dancing as a keeping of a promise / #this keeping of a promise as a dancing}.
 - b. {the disinfection of the deer as a saving of the deer / #the saving of the deer as a disinfection of the deer}.
- (38) a. The delivery of this JHL Flexline unit is part of the investment programme to accompany the groups' growth. [...] Christopher Stewart, group managing director sees this delivery as a keeping of a promise.

(http://iwjs.dns-systems.net/2012/01/22/hello-world/, accessed on 10/11/2013)

b. # ... sees the keeping of a promise as a delivery.

¹⁶The envisaged duality also clearly differs from coercion phenomena, which involve weaker relations (see, for instance, the classic example *enjoy a cigarette*, where an event of smoking mediates between *cigarette* and *enjoy*).

¹⁷This does not say that by/indem and as are grammatically identical. Note, in particular, that as takes as its first argument the more abstract event. In a sense, by/indem and as are mirror images of each other.

Lack of closure and intensionality By/Indem-constructions are not closed if weakened, as in (39) (= (5b)).

- (39) a. Ben kept a promise by dancing in public.
 - b. \rightarrow Ben kept a promise by dancing.
- (40) a. $\exists e: \texttt{KEEP-PROMISE} \exists e': \texttt{DANCE-IN-PUBLIC} \bullet \texttt{KEEP-PROMISE.dance}'(e', \texttt{Ben})$ $\land \texttt{ in-public}'(e') \land \texttt{o-elab}'(e, e') \land \texttt{keep-a-promise}'(e, \texttt{Ben})$
 - b. $\exists e: \texttt{KEEP-PROMISE} \exists e': \texttt{DANCE} \bullet \texttt{KEEP-PROMISE}.dance'(e', \texttt{Ben})$ $\land \texttt{o-elab}'(e, e') \land \texttt{keep-a-promise}'(e, \texttt{Ben})$

The corresponding logical forms in (40) predict this behavior in the following way. 'o-elab' relates an aspect, that is, an object under a certain conceptualization, to an object of a suitable complex type. I therefore assume that 'o-elab' is an intensional relation: whether it holds or not not only depends on the involved entities simpliciter, but also on their specific typing. Since the complex types in (40a) and (40b) are intensionally distinct, (39a) does not entail (39b), no matter whether one is the subtype of the other. This argument can be strengthened: Asher (2011:208– 209) discusses that, normally, an object of some subtype inherits the properties of the supertype, but not vice versa. He illustrates his point with the housecat Tasha: typically, Tasha inherits properties of the supertype HOUSECAT, while one would not say that the properties associated with Tasha (her specific weight, color of fur, etc.) are passed on to its supertype. Correspondingly, the characteristics of DANCE-IN-PUBLIC • KEEP-PROMISE are not normally passed on to objects of type DANCE • KEEP-PROMISE; as far as I can see, this substantiates the claim that the more specific typing information of (40a) bars a closure upon weakening.¹⁸

The Anscombe Thesis In light of the counterevidence, the Anscombe Thesis, if taken literally as a thesis about full event identity, seems to be clearly wrong; according to Schnieder (2009), this is meanwhile also the predominant opinion in the philosophical literature. In the present account, the departure from the thesis is most obviously reflected in the use of different event variables for embedded and matrix events and their crucial role in capturing the construction's characteristics. Nevertheless, the original intuition is not absurd, but still rather appealing. Why? The proposed • type approach offers an explanation. Crucially, aspects, despite involving separate terms, do not exist independently of the particular object they are aspects of (see section 3.1). That is, if one speaks of a keeping of a promise by dancing, this keeping of a promise is neither an independent object nor a part of the dancing: the dancing is *wholly* a keeping of a promise under the relevant aspect. I therefore give the following revised formulation of the Anscombe Thesis: there are different events; however, since the matrix event is an aspect of the embedded one and, thus, dependent on it in a particular ontological way, the illusive intuition arises that there is only one event. The following short digression on • types and individuation makes the underlying reasoning more transparent.

With regard to the individuation conditions of • types, Asher distinguishes two variants. If a • type object involves aspects with different individuation conditions, so-called quantificational puzzles may arise. For instance, counting books is sensitive to predication, as in (41).

¹⁸It might be puzzling why the reversed implication between (39a) and (39b) does not work either. However: first, the inheritance of properties by a subtype is only a default (Tasha, for instance, could have only three legs instead of four, although housecats usually have four legs). Second, at the level of logical form and independently of the specific typing information, (40a) is clearly stronger than (40b), given the additional predicate 'in public'; this renders an implication from (39b) to (39a) extensionally invalid.

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- (41) a. The student mastered every math book in the library.
 - b. The student carried off every math book in the library. (see

The verb *master* relates to informational objects; therefore, (41a) is true iff the student masters every math book in the library that is individuated informationally. If the library has two informationally distinct math books, but three copies of each, (41a) requires that the student master two books, but not six. For (41b), the opposite holds: since *carry off* relates to the physical aspect of books, (41b) is true in the same scenario iff the student carries off six books. However, while books may be counted via the informational or the physical aspect, they cannot be counted by using both; this crucial point is illustrated by (42) from Asher 2011:144. In the given scenario, the physical and informational objects form 10 different pairs and, if added up, 12 different entities. But if one asks for the number of books here, both counts are out.

- (42) There are on a shelf 3 copies of the Bible, 1 copy of a collection of 7 novels by Jane Austen. How many books are we dealing with?
 - a. 4 physical objects / 8 informational objects
 - b. # 10 <physical, informational> objects / #12 physical plus informational objects

This clearly indicates that • types are not interpreted in terms of pairs or sums; see Asher 2011:ch. 5.2.3, ch. 5.3 for details. Notably, the counting options show that one must decide whether one counts by one aspect or the other. This behavior directly reflects the idea that, for instance, a book is *wholly* a book under one conceptualization, no matter whether it may be individuated and counted differently under another one.

The second variant comprises cases where the aspects of a • type do not give rise to distinct individuation criteria. According to Asher (2011:159–160, fn. 25), *as*-phrases such as *John as a judge* exemplify this configuration. These involve a functional relation between the • type object and its aspects, for instance, between John and his JUDGE-aspect and vice versa; accordingly, no quantificational dissociation comes up.

It is not crucial whether *by/indem*-constructions involve a functional or a non-functional relation. I will only argue that both positions may explain the Anscombe intuition. See (43).

(43) Ben kept a promise by dancing twice.

On the one hand, one may argue that the two dancing events are parts of one bigger dancing event; from this perspective, (43) involves a functional relation between the big dancing event and the keeping of a promise. Clearly, there is no dissociation option in terms of counting and, correspondingly, no potential problem for the \bullet type treatment of the Anscombe Thesis.

On the other hand, one may decouple the counting of dancing events from the counting of the keeping-of-a-promise events. However, such a non-functional relation does not pose a threat to the \bullet type perspective on the intuition either: the Anscombe Thesis (in its modified interpretation) does not dwell on the question of whether both involved event descriptions give rise to distinct counting criteria. It merely bars – as envisaged by the \bullet type hypothesis – an independence of the respective objects. More concretely, we could speak of dealing with one keeping-of-a-promise event or two dancing events in (43). Nevertheless, it would be awkward to count the involved events by using both event descriptions simultaneously, as in (44):

(44) # Ben kept a promise by dancing twice. That is, there were three events, one keepingof-a-promise event and two dancing events.

This suffices to explain why the core intuition underlying the Anscombe Thesis comes about.
4 Refinements: indem in German

The proposed analysis covers the key characteristics of the canonical event-elaborating use of by/indem. However, this is clearly not the full story, neither with regard to details of the event-elaborating use nor with regard to other potential interpretations of the connectives. This section will not address the full range of empirical questions, but primarily aims at showing that the general set-up of the present proposal is inspiring for, or, at least, compatible with necessary refinements. The proposal is flexible for mainly two reasons: first, it is lexically driven. That is, while Sæbø's account hinges on unification as a particular mode of composition, the alternative builds on the lexical entry of by/indem and its potentially fine-grained presuppositional and proferred contents. This leaves a lot of room for adjusting application conditions; it is also compatible with lexical ambiguities. Second, the approach is compositional in spirit. Therefore, the compositionally identified target of the by/indem-modifier may have crucial effects on the interpretation. German *indem* will now serve as a test case for the suggested flexibility.

4.1 Refining Event Elaboration

So far, the combinatorics of *indem* is assumed to be constrained as follows: it relates two event predicates, their highest thematic arguments are co-referential, and the matrix event elaborates on the embedded event in a conceptually plausible way. Behrens and Fabricius-Hansen (2002), however, suggest that event-elaborating *indem* is restricted to activities and accomplishments controlled by an agent. While the authors do not flesh out their argument, the examples in (45) support the assumption. Statives (in the sense of Maienborn 2005) such as *gefallen* 'please', *wiegen* 'weigh', *ähneln* 'resemble', *auffallen* 'stand out' and constructions with the copula *be* are deviant with *indem*. The examples would be fine if *indem* were replaced by the connectives *weil* 'because' or *dadurch dass* (lit. 'therethrough that').¹⁹

- (45) a. ?? Paula gefiel allen, indem sie Marilyn Monroe ähnelte. Paula pleased everyone in that she Marilyn Monroe resembled
 - b. ?? Der Sportler war zu schwer, indem er 70kg wog. the athlete was too heavy in that he 70kg weighed
 - c. ?? Paula ähnelte Marilyn Monroe, indem sie blond war. Paula resembled Marilyn Monroe in that she blond was
 - d. ?? Ben fiel auf, indem er der einzige unverheiratete Vater war. Ben stood out in that he the only unmarried father was

The picture becomes more intricate if one distinguishes both arguments of *indem*. With regard to the internal argument, intuitions are as expected. While both examples in (46) convey similar information, only the agentive variant is fully grammatical.

(46) a. ?? Er erregte Aufsehen, indem er ein Gentleman war. he caused a sensation in that he a gentleman was

 19 I do not know whether English *by* and German *indem* pattern alike. Schnieder (2009:655–656) considers an English example analogous to (45d) grammatical; he concludes that *by* is not constrained to actions proper. (In fact, building on a narrow conception of events that excludes stat(ive)s, he suggests an analysis based on propositions or facts.) Moreover, it might be telling that *by* is sometimes translated by German *dadurch dass* instead of *indem*; see Behrens and Fabricius-Hansen 2002 for a more detailed look at *indem* vs. *by*. However, Sæbø (2008:139) briefly argues in favor of restricting *by* to agentive events. Be that as it may, fine-grained contrasts are not per se a problem for the present analysis. The lexico-syntactic traits of *by* might well differ in the details from those of *indem*.

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b. Er erregte Aufsehen, indem er sich wie ein Gentleman verhielt. he caused a sensation in that he as a gentleman behaved

The negated examples in (47) are in line with these observations. Commonly, only statives, and not actions, are considered closed with respect to negation (Maienborn 2005). Therefore, a ban on statives within the internal argument correctly predicts that (47a) is odd. (47b) is grammatical, but it presupposes that Ben's not coming to the party amounts to a controlled action (similarly to examples such as *Ben gladly did not go to the party*, where, following Maienborn and Schäfer 2011:1398, the mental attitude adverbial relates to the controlled omission of an action). Accordingly, the relation to the matrix predicate is not one of mere state or fact.²⁰

- (47) a. ?? Ben verletzte sie, indem er die Sicherheitsvorkehrungen nicht beachtete. Ben injured her in that he the safety regulations not observed
 - b. Ben verärgerte sie, indem er nicht zur Party kam. Ben upset her in that he not to the party came

The external argument of *indem* seems to be more flexible. The examples in (48) indicate that the combination of a stative external argument with a non-stative internal one is felicitous; compare the contrast to (45a) and (45d). The same holds for (49); its English counterpart is discussed by Fabricius-Hansen (2006:52). Finally, recall (24) (one of Sæbø's examples) with a non-agentive achievement in matrix position. This is fine in German as well, as in (50).

- (48) a. Paula gefiel allen, indem sie sich wie Marilyn Monroe verhielt. Paula pleased everyone in that she as Marilyn Monroe behaved
 - b. Ben fiel auf, indem er sich wie ein Gentleman verhielt. Ben stood out in that he as a gentleman behaved
- (49) Wir ehren ihn, indem wir uns von seiner Arbeit faszinieren lassen.we honor him in that we by his work fascinate let
- (50) Er hat die Medaille gewonnen, indem er betrogen hat. he has the medal won in that he cheated has

In order to capture these facts, one may either ease the restrictions on the external argument or adhere to the agentive constraint, but allow for type coercion. As mentioned in section 2.3, Sæbø suggests the second route; similarly, Fabricius-Hansen argues with regard to the English counterpart of (49) that the *by*-phrase licenses a shift from an emotional attitude with an experiencer to an activity controlled by an agent. Recall, however, that Sæbø's analysis involves a global change, which is at variance with locality effects. Fabricius-Hansen does not spell out her analysis, but the same problem arises. The locality effects can be replicated in German. For instance, if *indem* projected its internal argument to the matrix VP, *indem*-modifiers with a prototypical activity should considerably enhance direct perception reports, contrary to fact, as in

- (i) a. ?? He upset her by the fact that he did not come to the party.
 - b. * Er verärgerte sie, indem es der Fall war, dass er nicht zur Party kam. he upset her in that it the case was that he not to the party came

 $^{^{20}}$ Schnieder (2009:655) mentions an English example analogous to (47b); he considers it further evidence against event-based approaches to English *by*; see footnote 19. I doubt that the English case exemplifies a propositional or factive reading. At least, sentences involving a clear reference to facts are rather odd in both English and German:

(51a). Similarly, (51b) is out because the activity-sensitive durative adverbial does not match the achievement at the matrix level.²¹

- (51) a. ?? Wir hörten sie den Komponisten ehren, indem sie seine berühmtesten we heard them the composer honor in that they his most famous Kompositionen spielten. compositions played
 - b. * Er hat zwei Stunden lang die Medaille gewonnen, indem er betrogen hat. he has two hours long the medal won in that he cheated has

The type-logical approach to *indem* is well equipped for both an underspecification and a coercion analysis. According to the first option, the first argument of *indem* requires an event controlled by an agent while the second argument is underspecified allowing for all aspectual classes. This information can be directly encoded within a refined lexical entry for *indem*, which yields a well-formed representation only if *P* conveys a subtype of NON-STATIVE AGENTIVE EV:

(52) $[[indem]] = \lambda P \lambda Q \lambda x \lambda e: \operatorname{Ty}^+(Q) \exists e': \operatorname{Ty}^+(P) \sqsubseteq \text{ NON-STATIVE AGENTIVE EV} \bullet \operatorname{Ty}^+(Q).$ $P(e') \wedge \text{ hth. arg.}'(e') = \text{ hth. arg.}'(e) \wedge \text{ o-elab}'(e, e') \wedge Q(x)(e)$

The underspecification approach has key advantages: it is fairly simple; in particular, the locality effects follow automatically. Furthermore, the presuppositional asymmetry directly reflects the fact that the construction calls for some form of conceptual abstraction by the matrix events. This allows these matrix events not to be actions proper. In turn, the respective subjects are flexible in terms of agents and experiencers or holders as well.

If, however, one wants to stick to the stricter agentive constraint and capture deviating cases by reinterpretation, the type-logical approach also has much to offer. In fact, coercion phenomena are at the heart of Asher 2011. They are modeled in terms of polymorphic types that license the interpolation of terms that bear the adequate type. Following this view, the type presuppositions of *indem*'s second argument could be augmented by a polymorphic type that makes accessible an adequate activity component via the compositionally given non-agentive type. Notably, Asher extensively discusses problems of local accommodation (as opposed to global effects). For instance, *quick cigarette* denotes a set of physical objects, notwithstanding that *quick* enforces the interpolation of an event (Asher 2011:233–234). One would have to motivate a similar adaptation for *indem* in order to capture the locality effects. Spelling out such an analysis is beyond the scope of the present paper. Compared to the underspecification approach, it is computationally costly; what is more, I am unsure whether the interpolation of an additional activity besides the one given by the internal argument is in fact intuitively plausible. I therefore cautiously conclude that it is more promising to assume asymmetric selectional restrictions.

²¹In (51a), the verb *spielen* (instead of *faszinieren lassen*) contributes the embedded event because it is an indisputable candidate for direct perception. I will also add one further piece of evidence against a global change. Traditionally, activities and states are distinguished by the subinterval property. If a global change were at work, the subinterval property should fail to hold for indefinitely small subintervals of events that are denoted by *ehren*-VPs with *indem* while it should hold in cases where *ehren* is not accompanied by an *indem*-sentence. According to my intuition, however, the subinterval property of *ehren* is fairly independent of the fact that embedded events (for instance, *eine Komposition spielen*) may unfold in terms of discernable subintervals.

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4.2 Compositionality: On the Interaction between Attachment Site and Interpretation²²

Behrens and Fabricius-Hansen (2002) and Fabricius-Hansen (2011) adduce examples with *indem* that differ from the typical event-elaborating use discussed so far because the respective matrix and subordinate clauses are related via the so-called "Accompanying Circumstance" relation:²³

(53) a. Ist der Erpel geneigt, diesen Antrag anzunehmen, so hebt er das Kinn und sagt, indem er den Kopf etwas von der Ente wegwendet, sehr schnell "räbräb, räbräb!" (KOL1)

'If the drake is inclined to accept the proposal, he lifts his chin and says, INDEM he turns his head slightly away from the duck, very quickly ["rabrab, rabrab!"].'

b. Meine Tochter ist schon gegangen! brachte er endlich mühsam hervor, indem er seinen Blick nach den Dächern der Stadt hinüberrichtete. (DWDS)
'My daughter is already gone! he finally ground out, INDEM he turned his gaze toward the roofs of the city.'

(see Behrens and Fabricius-Hansen 2002:(5); Fabricius-Hansen 2011:(16b))

In order to capture this variance, one may resort to lexical ambiguity. In view of the lexicalist framework pursued here, such idiosyncracies are perfectly possible. More principled explanations are nevertheless desirable. In the following, I will sketch a corresponding attempt.

The basic assumptions are as follows: first, the *indem*-modifiers in (53) do not target the event denotation of the matrix VP, but some term of the extended verbal projection; in other words, they have a compositionally different anchor than in the event-elaborating use. Notably, research on modifiers widely agrees that their interpretation is sensitive to attachment sites.²⁴ Second, plausible candidates are times, worlds, or situations. Let it be situations – understood as parts of worlds – that provide a topical component against which a sentence's predication is evaluated; see Kratzer 2010 for a corresponding introduction to (a version of) situation semantics. Notably, these topical situations are not events, but rather broader multi-dimensional

²³For reasons of space and readability, I do not provide glosses here, but translations. The authors also mention archaic temporal or causal uses of *indem*, which I will not discuss here.

 24 See more generally Maienborn and Schäfer 2011. Fabricius-Hansen (2011:21–22) also suggests that the different readings of *indem*-modifiers depend on their semantic targets. However, her brief remarks do not include anything explicit for the case "Accompanying Circumstance." I will not make precise here how *indem*-sentences are syntactically projected; again, clear answers require a more involved discussion. There are at least two questions: first, how do *indem*-sentences behave in terms of ±syntactic integration within the matrix configuration. See Reich and Reis 2013 for an overview. Second, it might be true that both elaborating and accompanying *indem*-sentences are equally licensed in the German so-called Nachfeld. However, it would not necessarily follow that their semantic targets are also identical. In fact, in Bücking 2012, I have argued that modifiers at the right edge of nominal projections may have distinct semantic targets despite their being integrated within the same extraposed domain.

²²This section only touches upon one compositional aspect of *indem*. There are more. Behrens and Fabricius-Hansen (2002), for instance, suggest that English *by* and German *indem* behave differently with regard to matrix negation scope. I am not fully convinced by their judgments; however, the issue deserves a detailed discussion that is beyond the scope of the present paper. Another important question that relates very directly to compositionality results from the fact that, from a syntactic perspective, *indem* selects an inflectionally fully specified verbal projection as its internal complement. This is not trivially compatible with the assumption that *indem* takes an event property as its first argument, as in the lexical entry above. However, the readings I focus on in this paper (event elaboration, "Accompanying Circumstance") build on subject and tense identity. Plausibly, this indicates that the full syntactic specification of the embedded clause does not matter for semantics; in other words, we are not forced to take the *indem*-sentence as an autonomous proposition. I admit, though, that the technical challenges that result from an adequate projection of the corresponding features are not dealt with properly here.

frames the events are parts of. Under these premises, one can conjecture that accompanying *indem*-modifiers accommodate a complex type with a topical situation as one of its constituent types. That is, the second argument of *indem* is not filled by the matrix event but by the matrix topical situation. Clearly, one must adjust *indem*'s presuppositions in order to license this option. This can be assured by explicitly allowing application to the type sITUATION; notably, the different uses are still based on the same lexical entry. Taken together, the example (53b) receives the rough logical form in (54), where \leq relates situations to their parts.

(54) $\exists s:situation \exists e:grind-out \exists e':turn-gaze-to \bullet situation.$ turn-gaze-to'(e', y, *ir*[city roofs(r)]) \land o-elab'(s, e') \land e \leq s \land grind-out'(e, y, "My ...")

(54) says that the embedded event involves as one aspect the topical component of the whole sentence; in turn, this topical aspect elaborates on the embedded event. Therefore, the turning of the gaze is not conceived of as a grinding out (which would amount to the nonsensical event-elaborating interpretation), but the conceptualization relates to the sentence's topic situation. This makes sense: intuitively, the *indem*-modifiers in (53) add additional information to the broader situation the matrix event is part of. That is, the embedded event "accompanies" the topic situation by specifying one of its (temporal, causal, ...) dimensions. Moreover, using *indem* seems to convey that this additional information is not integrated by mere intersection, but by some form of inherent connectivity. The \bullet type analysis tracks exactly this kind of copresence. In short: I hypothesize that event-elaborating *indem* yields complex events with event aspects, while accompanying *indem* accommodates a complex type that directly builds in the situational context the sentence is about.²⁵

I admit that this analysis is far from full-fledged; semantic, ontological, and syntactic aspects call for specification. In particular, one would like to know more about 'o-elab' in those cases where it relates (dimensions of) situations and events. The proposal may, however, stimulate further research on pinning down the specific contribution of accompanying *indem* without resorting to a separate lexical entry.

5 Conclusion

This paper has been concerned with the compositional semantics of event-elaborating *by* in English and its German counterpart *indem*. Based on a critical evaluation of Sæbø's (2008) unification-based approach, I have argued in favor of treating *by/indem* as means of turning embedded events into complex events on which the matrix description elaborates. That is, *keep a promise by dancing* involves a dancing that is conceived of as a keeping of a promise.

The implementation of this core idea builds upon Asher's (2011) type composition logic. More specifically, *by/indem* dynamically accommodate dual aspect objects; their constituent types are contributed by the matrix and embedded event. The \bullet type conception underlying dual aspect objects renders the embedded and the matrix event dependent on each other. However, the assignment of respectively separate terms paves the way for tracking their compositionally distinct roles. The approach thereby captures putatively conflicting key characteristics of *by/indem*: the locality of the embedded event, the locution's conceptual constraints, its asymmetry and intensional behavior, and the Anscombe intuition that it is about just one event. Finally,

²⁵Notably, the accommodation of the complex type remains local, analogously to the event-elaborating use. This predicts that the add-on brought in by the *indem*-modifier does not change the topic situation. This matches the intuition: the *indem*-sentence does not set the frame, but rather joins the topic parasitically.

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I have suggested that the proposal's core is readily amenable to refinements where necessary; German *indem*, its constraints and its options beyond the elaborating use have served as a case in point.

While Asher focuses on complex types for ordinary individuals, the present analysis argues that the approach can be applied fruitfully to events and their often elusive interrelations.

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On the Diachronic Semantics of Resultative Constructions in French

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This paper presents a novel study of resultative secondary predication constructions in Old and early Middle French (12th-15th centuries). We show that the Old French period saw the emergence of new resultative structures that did not exist in Latin. Thus, contrary to claims in the literature (i.e. Stolova 2008, Kopecka 2009, Iacobini and Fagard 2011, among others), we argue that the development of the Modern French resultative system should not be thought of as a "slow drift" from the Latin system to the modern system. Rather, the evolution of resultatives in the Gallo-Romance family should be characterized as passing through three distinct grammatical stages: (i) the Latin stage containing prefixed prepositional resultative constructions; (ii) the Old French stage, which shows a completely different pattern of resultative predication featuring unprefixed prepositional resultatives and weak (i.e. non-aspect changing) adjectival resultatives; and (iii) the Classical French/Modern French stage, in which resultative secondary predication is largely absent. Furthermore, we propose that the parallel diachronic behaviour of adjectival and prepositional resultatives in the history of French constitutes an argument in favour of a unified grammatical analysis of these two constructions. We suggest that the compositional semantic process that is common to both of these constructions throughout time is result-state modification, not telicization, as is generally assumed in the literature.

Keywords: resultative constructions, compositional semantics, Old French, Latin, syntactic change

1 Introduction

This paper presents a diachronic investigation into the syntax and compositional semantics of a particular class of telic verb phrases (VPs): **resultative secondary predication constructions**. The resultative constructions that we will focus on in this paper are divided into two subclasses: **adjectival** resultatives (A-ResPs) and **prepositional** resultatives (P-ResPs). A-ResPs are constructions in which transitive VPs are combined with an adjective that describes the state of the direct object at the end of the event, as in (1). These constructions uniformly have a telic interpretation/construal, as shown by the fact that they can be felicitously followed by temporal adverbials such as *in an hour*.

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- (1) a. John beat the metal **flat** (*in an hour*).
 - b. The tractor dragged the logs **smooth** (*in an hour*).
 - c. Mary shot the thief **dead** (*in 2 seconds*).

In languages like English, the VP base from which A-ResP constructions can be built can be either telic, as in (2c), or atelic, as in (2a)/(2b).

(2)	a.	*John beat the metal <i>in an hour</i> .	(atelic VP base)
	b.	*The tractor dragged the logs <i>in an hour</i> .	(atelic VP base)
	c.	Mary shot the thief <i>in 2 seconds</i> .	(telic VP base)

The second subclass of resultatives that we consider are P-ResPs: in languages like English, atelic *manner of motion* VPs, shown in (3), can be combined with locative PPs such as *under the bridge, behind the curtain*, and *inside the cave* to create a telic directional interpretation, as in (4). For example, the sentence in (4a) can be used to describe an event in which the bottle starts off somewhere that is not under the bridge, does some floating, and ends up underneath the bridge after 5 minutes.

- (3) a. *The bottle floated *in 5 minutes*.
 - b. *John danced in 5 minutes.
 - c. *John walked in 5 minutes.
- (4) DIRECTIONAL INTERPRETATION
 - a. The bottle floated under the bridge in 5 minutes.
 - b. John danced behind the curtain in 5 minutes.
 - c. John walked inside the cave in 5 minutes.

English verb phrases like *float under the bridge, dance behind the curtain,* and *walk inside the cave* also have an atelic locative interpretation, as in (5). However, since it is only the telic directional interpretation that characterizes the P-ResP construction, we will largely set aside this interpretation in the rest of this paper.

- (5) LOCATIVE INTERPRETATION
 - a. The bottle floated under the bridge for 5 minutes.
 - b. John danced behind the curtain for 5 minutes.
 - c. John walked inside the cave for 5 minutes.

As shown by the examples (1) and (4), some languages, like English, have both A-ResPs and P-ResPs; however, some languages, such as Modern French (MF), lack both of these constructions Bergh 1940, Vinay and Darbelnet 1958, Talmy 1985, and subsequent work. As shown in (6), the vast majority of Modern French manner verbs disallow telic directional interpretations with locative PPs, and adjectival resultative constructions are (almost laughably) ungrammatical in this language, as in (7).

 La bouteille a flotté sous le pont *en 5 minutes. The bottle has floated under the bridge in 5 minutes 'The bottle floated under the bridge *in 5 minutes.'

(7) *Jean a martellé le métal **plat**. Jean has hammered the metal **flat**

In the literature on the cross-linguistic expression of motion and result, the contrasts between English and Modern French are generally taken to be reflexes of an important typological difference between the Germanic and Romance families: languages like English that allow such constructions are often called (after Talmy 1985, 2000) **satellite-framed**, and languages like French that do not allow them are called **verb-framed**.

The observation that there exists cross-linguistic variation in the grammatical inventory of resultative constructions leads naturally to the observation that there also exists diachronic variation in this aspect of the grammar. For example, while Modern French lacks the kind of resultatives described above, Latin (the language from which French developed) allows P-ResPs (Talmy 1985, Acedo-Matellán 2010, Iacobini and Fagard 2011, among others). In particular, Latin can combine manner verbs with locative prepositional prefixes (like *ad*- 'at') to form directional telic VPs, as in (8).

 (8) Caprarum-que uberibus ad-volant goat.GEN.-and udders.DAT.PLUR ad-fly 'And they fly onto the udders of the goats.' (Plin. Nat. 10, 115, in Acedo-Matellán 2010:100)

Examples such as (8) show us that the grammatical elements that construct and interpret ResP constructions (for example: productive verbal prefixation and the presence of an abstract grammatical property/properties that allow such prefixes to contribute a telic interpretation to the VP) changed from the Latin period to the Modern French period. That Latin's ResP constructions were lost in the development of the Modern Romance languages (especially in the history of French, Spanish, and Catalan) is well-known, and, in fact, the general consensus in the literature is that there was a slow "drift" from the Latin system (with ResPs) to the MF system (without ResPs); see Stolova 2008, Kopecka 2009, Iacobini and Fagard 2011. This being said, there has been very little in-depth study of resultative predication in intermediary stages of the language (i.e. Old French, Old Catalan, etc.). Thus, the first main contribution of this paper is to present a novel synchronic study of resultative secondary predication constructions in Old and early Middle French (12th-15th centuries). Based on this inquiry, we argue against the "slow drift from Latin to Modern French" hypothesis. In particular, we show that the OF period saw the emergence of new ResP structures that did not exist in Latin, and we argue that the development of the Modern French ResP system should be characterized as passing through three distinct grammatical stages: (i) the Latin stage containing P-ResPs such as (8); (ii) the Old French stage, which shows a richer pattern of resultative predication (described in section 3); and (iii) the Classical French/Modern French stage, in which resultative secondary predication is largely absent in the language.

The second main contribution of our paper concerns the grammatical foundations of resultative secondary predication. In particular, we address the following theoretical question concerning the compositional semantics of ResPs: *Do the construction and interpretation of adjectival and prepositional resultatives involve the same grammatical elements (i.e. parameter settings, functional items, or composition rules, etc.)?* This is a question that has received a considerable amount of attention in the formal syntax and semantics literature, and we find therein two main views on this topic: the first view, which is argued for in works such as Higginbotham 2000,

Sample typology of ResPs						
	Resultatives	English	Korean	Javanese	French	
	Adjectival	\checkmark	\checkmark	×	×	
	Prepositional	\checkmark	X	\checkmark	×	

Talmy 2000, Snyder 2001, Beck and Snyder 2001, Zubizaretta and Oh 2007, Gehrke 2008, among others, and which we might call the **unified** view, proposes that there exists a close grammatical relationship between A-ResPs and P-ResPs. Furthermore, the majority of the advocates of the unified view propose that languages which allow ResPs have a single property that enables atelic manner VPs to be telicized through the addition of a secondary predicate (prepositional or adjectival). A prediction of this view is that, a priori (unless there are other obscuring grammatical factors at play), we should find a robust co-occurrence of both A-ResPs and P-ResPs cross-linguistically.

The second view found in the literature, argued for in works such as Son 2009, Son and Svenonius 2008, and which could be called the **non-unified** view, proposes that there is a less clear grammatical relationship between A-ResPs and P-ResPs; that is to say, the grammatical correlation between A-ResPs and P-ResPs is more subtle than assumed and that cross-linguistic variation is determined lexically, by the very meaning of verbs and by the inventory of available lexicalizations of functional material in the nano-syntax. One argument in favour of this view is that a survey of the inventory of resultative secondary predication constructions across many languages shows that there is no clear correlation between the presence of adjectival resultatives and their prepositional counterparts. For example, as shown in Table 1, some languages, like Korean, have A-ResPs and no P-ResPs, while some languages, like Javanese, have P-ResPs but no A-ResPs.

In the body of the paper, we will see that A-ResPs and (un-prefixed) P-ResPs emerge together from Latin to Old French, and furthermore, Burnett and Troberg 2013 show that A-ResPs and P-ResPs die out at about the same time from Old French to late Middle French. We therefore argue that the parallel diachronic behaviour of A-ResPs and P-ResPs is a strong argument in favour of the unified grammatical analysis of these constructions. On the other hand, we also show that Old French adjectival resultative predication and prepositional resultative predication have different aspectual properties. In particular, we argue that OF adjectival resultative predication cannot telicize an atelic VP (unlike OF P-ResPs). Thus, we propose that the grammatical process that is common to A-ResPs and P-ResPs is result-state modification, not result-state creation.

The paper is organized as follows: in section 2, we briefly describe the state of resultative secondary predication in Modern French, and, in section 3, we give a description of the inventory of ResP constructions in Old and Middle French. Then, in section 4, we compare the Old French ResP system to the Latin ResP system and argue that they show a typologically different pattern. Finally, section 5 summarizes the main empirical patterns described in this work and presents some concluding remarks on the cross-linguistic patterns of clustering of resultative constructions.

Table 1

2 Resultative Predication in Modern French

It is well-known that, in Modern French, neither atelic VPs, as in (9), nor telic VPs, as in (10), can be combined with an adjective phrase to form a resultative construction. Furthermore, "intransitive" A-ResPs (such as the English *I danced myself tired*), as in (9c), are likewise ungrammatical.¹

- (9) a. *Jean a battu le métal **plat**. Jean has beaten the metal **flat**
 - b. *Les chevaux ont trainé les bûches **lisses**. The horses have dragged the logs **smooth**
 - c. *Je me suis dansé **fatigué**. I REFL am danced tired.
- (10) a. *Jean a essuyé la table **propre**. Jean has wiped the table **clean**
 - b. *Jean a abattu le voleur **mort**. Jean has beat down the burglar dead

As observed by Kopecka 2006, among others, French (like other Romance languages, see Folli and Ramchand 2005 for Italian and Fábregas 2007 for Spanish) allows a set of verbs to occur with prepositional secondary predicates, giving a telic directional interpretation. These are the so-called *directed manner of motion* verbs. Although this set of verbs varies from language to language (and, based on our investigations, even from speaker to speaker), in French, it contains at least the verbs *courir* 'run' and *sauter* 'jump'. As shown in (11), although bare VPs formed with these predicates have no directional telic interpretations, they can acquire such interpretations once combined with locative PPs, as in (12).²

¹Interestingly, a particular subset of weak A-ResPs are acceptable in French, namely, those formed with verbs of colouring like *peinturer* 'to paint' and *teindre* 'to dye'.

- (i) a. Marie a peinturé le mur bleu. Marie has painted the wall blue. 'Marie painted the wall blue.'
 - b. Marie s'est teint les cheveux **noirs**. Marie REFL-is dyed the hair **black** 'Marie dyed her hair black.'

There are arguments that the sentences in (i) are instances of a different (although very similar) type of secondary predication from the kind studied in this work. One such argument points out that even in languages that otherwise prohibit A-ResP, like the Slavic languages, A-ResPs with *dye* are allowed, as shown in the example (ii) from Bulgarian.

 (ii) Bojadisah si kosata černa. (Bulgarian: Roumyana Pancheva (p.c.)) dye.1sg REFL hair black
 'I dyed my hair black'

We therefore simply note the existence of this construction, leaving its analysis to future work on the compositional semantics and typology of A-ResPs.

²Although the French preposition \dot{a} is sometimes translated into English as directional *to*, it is, in fact, an unambiguously locative preposition in French with the meaning 'at':

(i) Le chat est/reste à la maison. The cat is/stays at the house 'The cat is/stays home.'

- (11) Atelic MM verbs
 - a. Jean a couru pendant 30 minutes/*en 30 minutes. Jean has run for 30 minutes/*in 30 minutes 'Jean ran for 30 minutes/*in 30 minutes.'
 - b. Jean a sauté pendant 2 secondes/#en 2 secondes. Jean has jumped for 2 seconds/#in 2 seconds
 'Jean jumped for 2 seconds/#in 2 seconds.' (*in 30 min* only ok if *in = after*)
- (12) TELIC MM VERB + PP
 - a. Jean a couru à la maison en 30 minutes. Jean has run at the house in 30 minutes 'Jean ran to the house in 30 minutes.'
 - b. Jean a sauté dans la piscine en 1 seconde. Jean has jumped in the pool in 1 second 'Jean jumped into the pool in 1 second.'

However, this pattern is not general in the language. Other manner of motion verbs, those that we might call *pure* manner-of-motion verbs (*float, dance, wiggle, crawl, fly, walk*, etc.), do not give rise to telicity alternations (for most speakers) in prepositional secondary predication constructions.

(13)	a.	Jean a marché à la maison *en 30 minutes.
		Jean has walked at the house *in 30 minutes.
		'Jean walked at home *in 30 minutes.'
	b.	La bouteille a flotté dans la caverne *en 2 minutes.
		The bottle has floated in the cave *in 2 minutes.
		'The bottle floated inside the cave *in 2 minutes.'
	c.	L'oiseau a volé dans la caverne *en 5 secondes.
		The bird has flown in the cave *in 5 seconds.

'The bird flew inside the cave *in 5 seconds.'

We therefore conclude that P-ResPs are not productive in Modern French, certainly not in the way that they are in English, where almost any manner-of-motion verb may appear in the goal-of-motion construction. Only a small set of manner-of-motion verbs can occur in what appears to be a goal-of-motion construction. In the next section, we present new data concerning ResPs in Old and Middle French,³ and we will argue that the ResP system of this stage of the language is much less restrictive than Modern French and looks more like the system in languages like English.

3 Resultative Predication in Old and Middle French

As observed by Troberg 2011, manner-of-motion verbs in Medieval French can combine with a locative PP to form a telic goal of motion construction. We find these constructions in our corpus

³Unless otherwise stated, the examples presented in this section come from two electronic corpora: the *Textes de français ancien* (TFA) corpus (12th-13th centuries) and the corpus associated with the *Dictionnaire de moyen français* (14th-16th centuries). The quantitative studies were done on the *TFA* corpus.

with such verbs as *voler* 'to fly', *trotter* 'to trot', *cheminer* 'to make one's way', and *marcher* 'to walk/march', and as shown in (14). Recall that this possibility is absent from the grammar of Modern French.

(14)	a.	il vole sur les rainceaulx ou sur les branches.
		he flies on the branches or on the branches
		'he flies onto small tree limbs or branches.'
		(Le Menagier de Paris, 163; DMF)
	b.	Et puis après nous troterons en guerre.
		And then after we trot.FUT into war
		'And then after we will trot off to war.'
		(de La Vigne, <i>La Ressource de la Chrestient</i> , 133; DMF)
	c.	en passant par la chambre et cheminant aux nopces
		in passing by the room and making.his.way at.the wedding
		'while passing by the bedroom and making his way to the wedding'
		(Cent Nouvelles Nouvelles, 122; DMF)
	d.	le chevallier se leva [É], et marcha hors de son pavillon
		the knight REFL raised [] and walked out of his tent
		'the knight got up [É] and walked out of his tent'
		(de la Marche, Mémoires, t. 2, 183; DMF)

In support of the claim that the sentences in (14) are indeed *goal of motion* constructions (i.e. that they all involve directional interpretations of **locative** PPs), we demonstrate that all the PPs in (14) are not restricted to a directional meanings, but can also have a locative interpretation with manner verbs, as shown in (15).

- (15) a. si aucun oysel vole sur icelui endroit, incontinent chet mort à terre. if certain bird flies on this place immediately falls dead to earth 'if any bird flies over this place, it immediately falls dead to the ground.' (Simon de Phares, Astrologues, 87; DMF)
 - b. et cevauçans en France nuit et jour and riding in France night and day 'and riding in France day and night.' (Froissart, *Chroniques*, 569; DMF)
 - c. Ne qu'on puet au firmament Sans eles voler nor that'one can at.the firmament without wings fly 'Nor can one fly in the heavens without wings' (Guillaume de Machaut, *Les Lays*, 388; DMF)
 - d. chevauchierent devant **hors de l'avant-garde** rode.3PL ahead out of the-vanguard 'they rode ahead, apart from the vanguard' (Froissart, *Chroniques*, 329; DMF)

The two interpretations of sentences with manner verbs and locative PPs can be distinguished by morphological means: the telic goal of motion construction involves an unaccusative syntactic structure, as in (16), whereas the atelic construal of the VP involves an unergative syntactic structure, as in (17).

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- (16) a. Les aeles de vertus avoit [...]. Donc Marie est volee en haut, En la the wings of virtue had so Marie aux fly.PST.PTCP in high in the region ou est chaut region where is hot 'She had wings of virtue [...]. So Mary flew up into the region where it is hot' (*Bestiaire marial*, c.1333, 181; TFA)
 - b. Mais tot li chevalier ensamble i sont coru por lui rescorre. But all the knights together there aux run.PST.PTCP for him rescue 'But together the knights quickly ran there in order to rescue him.' (*Vengeance Raguidel*, 1200, 33; TFA)
- (17) a. Et quant il **avoit** tant volé que toz li monz le tenoit a merveille and when he AUX much fly.PST.PTCP that all the world him held at wonder 'And once he had flown around enough so that everyone marvelled at him' (Queste del Saint Graal, 1225, 131, in TFA)
 - b. Tant a coru et porchacié, so.much AUX run.PST.PTCP and pursue.PST.PTCP
 'So much did he run and chase' (Saint-Cloud, *Roman de Renart Branche 7*, 5835; TFA)

The auxiliary alternation that we see in OF is familiar from goal of motion constructions in other languages such as Dutch and Italian, where the resultative construction is an unaccusative construction, as in (18), and the non-resultative construction is unergative, as in (19).

- (18) TELIC UNACCUSATIVE
 - a. dat Jan in twee uur naar Groningen is gewandeld that Jan in two hour to Groningen AUX walk.PST.PTCP 'that Jan walked to Groningen in two hours' Dutch (from Zubizaretta and Oh 2007:2)
 - b. La palla è rotolata sotto il tavolo in un secondo/*per un secondo. The ball AUX rollPST.PTCP under the table in one second/*for one second. 'The ball rolled under the table in one second/*for one second.' Italian (from Folli and Ramchand 2005:92)
- (19) Atelic unergative
 - a. dat Jan naar Groningen twee uur lang **heft** gewandeld. that Jan to Groningen two hour long AUX walk.PST.PTCP 'that Jan walked in the direction of Groningen for two hours.' **Dutch** (from Zubizaretta and Oh 2007:3)
 - b. La palla ha rotolato sotto il tavolo per un secondo/*in un secondo. The ball AUX roll.PST.PTCP under the table for one second/*in one second. 'The ball rolled under the table for one second/*in one second.' Italian (from Folli and Ramchand 2005:92)

In addition to a goal of motion construction, as observed by Buridant 2000, Dufresne et al. 2003, and Burnett and Tremblay 2009, Old French allows another type of P-ResP formed with intransitive prepositional elements (i.e. particles). Examples of the Old French verb-particle construction are shown in (20).

- (20) a. Garde le bien, tant que tu soies ariere revenus en Cornuaille. Keep it well, until that you are back returned in Cornwall 'Keep it well until you return to Cornwall.'
 (Trispr p. 237, in Burnett and Tremblay 2009)
 - b. il descendent del pals et viennent en la cort aval they descended from the palaces and came into the courtyard down 'they descended from the palaces and came down into the courtyard.' (Artu p. 194, in Burnett and Tremblay 2009)
 - c. et le reversa jus a terre.
 And him re.spill down to ground
 'and he dumped him down to the ground.'
 (Froissart, *Chron. D.*, 387, in DMF)
 - d. Et lors i envoia Lancelos avant messages por dire qu'il and then there sent Lancelot forward messengers for to.tell that-he venoit;
 was.coming
 'And then Lancelot send forth messengers there to tell that he was coming;' (Mort le roi Artu, p. 126; TFA)

As the examples above demonstrate, the particle and the main verb do not form a syntactically atomic cluster and can be separated, for instance, by a subject or a PP. Furthermore, a particle and a transitive verb could be separated by the direct object, as shown in (21).

(21) le mers reportoit le nef ariere the sea re.bring the ship back 'the sea pushed the ship back.'
(Clari, p. 74, in Dufresne et al. 2003)

In sum, Old French appears to allow the full range of P-resultatives that languages like English do, and this situation constitutes a stark contrast to the situation found in Modern French.

Contrary to both Latin and Modern French, Old French allows adjectival resultative secondary predication constructions.⁴ Some examples of A-ResPs found in our corpus are shown in (22)

(22) Et le despoillirent tout **nuz**. a. and him plucked all naked 'And they plucked him completely naked.' (La Passion d'Autun, 106; DMF) Que Tricherie abat jus b. plate. that Deception beats down flat 'That deception beats down flat.' (Pizan, *Livre de la mutacion*; DMF) geta mors en mi Andeus les c. la pree. two them threw dead in middle the field 'He beat both of them dead in the middle of the field.' (Anon. Aiol, 45; TFA)

⁴See Troberg and Burnett 2014 for a detailed treatment of A-ResPs in Medieval and Modern French.

- d. Li rois se taisi tout **quois**. the king REFL all quiet 'The king quieted himself quiet.' (Froissart, 846.18593; MCVF)
- e. tute quarree la fendi all square it cut 'he cut it completely square' (Marie de France, *Lais*, 183; TFA)

The examples in (22) show a number of verb+adjective combinations: *despouiller nu* 'to pluck naked'; *abatre plat* 'to beat down dead'; *geter mort* 'to kill dead (by beating)'; *se taire coi* 'to quiet quiet'; *fendre carré* 'to cut square'. However, we might wonder whether such constructions are truly productive in the language or whether they are simply fixed idiomatic expressions. We argue that A-ResPs are indeed productive in Old French. Although productivity is more difficult to assess for a construction in a dead language than in a living language, we can observe that there are many distinct attested verb+adjective pairings, something that would be unexpected if the construction were not productive. For example, if we look at an adjective that is particularly common in our corpus, such as *mort* 'dead', we find A-ResPs formed on the basis of many predicates such as *abatre* 'to beat down', *cravanter* 'to crush', *acravanter* 'to crush', *jeter* 'to throw', and *ruer* 'to throw/chuck', as in (23).

- (23) a. Que mort l'a abatu et craventé. that dead him has beat down and crushed 'That he beat him down and crushed him dead.' (Anon., Aiol, 39; TFA)
 - b. Et le prïeus nous avés mort jeté.
 and the priest us had dead thrown 'And the priest had killed us dead.'
 (Anon., *Moniage Guillaume*, 135; TFA)
 - c. Mort l'a **acrevanté** le nobille guerrier dead him have crushed the noble warrior 'The noble warrior crushed him dead' (*Chanson de Roland*, 285.3930; MCVF)
 - d. u il ainceis l' ot mort rué where he thus him has dead thrown 'where he thus beat him dead' (Anon., *Gormont et Isembart*, 34)

Furthermore, if we consider a verb, such as *abatre* 'beat down', that frequently appears in an A-ResP construction, we can observe that this verb can co-occur with many distinct adjectives such as *mort* 'dead', *plat* 'flat', *pasmé* 'senseless', and *estendu* 'streched out', as in (24).

(24) a. Toute plaine sa lanche mort l'abati.
all full his lance dead him beat down
'With the full force of his lance, he beat him down dead.'
(Anon., Aiol., 91)

b.	Et tout plat a terre l'abatent
	and all flat at ground him-beat
	'And they beat him completely flat to the ground'
	(de Boron, Roman de l' Estoire dou Graal, 25; TFA)

- c. Enmi l'encloistre l'abati tout pasmé.
 in middle the cloister him beat all senseless
 'He beat him down completely senseless in the middle of the cloister.'
 (Anon., *Moniage Guillaume*, 33; TFA)
- d. Tout estendu l'abatent all extended him beat
 'They beat him down and left him spread out on the ground' (Anon., *Aiol.*, 202; TFA)

Now that we have established the existence of A-ResPs in Old French, we can consider whether, in this area of the grammar, Old French displays the typological profile of English, which allows a wide range of adjectival resultatives, or whether the construction in Old French is more restricted. Following the influential work of Washio 1997, we distinguish between two subclasses of A-ResPs: strong resultatives and weak resultatives. We will call an A-ResP construction a **strong** resultative just in case its main VP, when used bare, has no telic interpretation.⁵ For example, since the English VPs *hammer the metal, drag the log*, and *beat the door* all have no telic construal, the English constructions in (25) are strong resultatives.

- (25) Strong resultatives
 - a. John hammered the metal **flat**.
 - b. The horses dragged the log **smooth**.
 - c. Sarah beat the door **closed**.
 - d. Mary shook the box **empty**.

Other examples of strong resultatives in English are the "intransitive" resultatives (*to run your feet raw/to run yourself tired*). Since the grammatical bare VP (*to run*) is only atelic and the corresponding secondary predication construction is telic, by our definition, these constructions are also instances of strong resultative predication. In summary, strong resultative predication has the following property:

(26) Strong resultative secondary predication changes the inner aspect of the VP from atelic to telic.

Correspondingly, we will call an A-ResP construction a **weak** resultative just in case its main VP, when used bare, has at least one telic interpretation. Some VPs in English have only a telic interpretation, as shown in (27a). When they combine with an adjectival secondary predicate, the adjective modifies the end-state provided by the telic VP, as in (27b).

⁵This is not quite Washio's description of the strong/weak distinction; in his 1997 paper, he describes strong A-ResPs as resultatives in which "the meaning of the verb and the meaning of the adjective are completely independent of each other" (p. 7), and weak A-ResPs are those resultatives that are not strong (p. 8). Unfortunately, this description is somewhat vague, so it is difficult to apply Washio's criteria to examples in new languages (like Old French) in a systematic manner. However, based on our own work with native speakers of Japanese (the language studied by Washio), we observe that it is possible to cash out his intuition about the relation between the main verb and the result-state describing adjective in the aspectual terms proposed here (in (26) and (30)).

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- (27) a. John killed the burglar *for 5 seconds/in 5 seconds.
 - b. John killed the burglar **dead** *for 5 seconds/in 5 seconds.

Many other English VPs have both a telic and an atelic construal,⁶ as shown in (28).

- (28) a. John wiped the table for 20 minutes/in 20 minutes.
 - b. John swept the house for 20 minutes/in 20 minutes.
 - c. John shot the burglar for 5 seconds/in 5 seconds.
 - d. John kicked the door for 5 seconds/in 5 seconds.

In English, the VP in its telic interpretation⁷ can be combined with an adjective which can then modify the result state of the telic event described by the main VP.

- (29) a. John wiped the table **clean** *for 20 minutes/in 20 minutes.
 - b. John swept the house **clean** *for 20 minutes/in 20 minutes.
 - c. John shot the burglar **dead** *for 1 second/in 1 second.
 - d. John kicked the door **closed** *for 1 second/in 1 second.

In other words, weak resultative secondary predication has the following property:

(30) Weak resultative secondary predication does not change the inner aspect of the VP; it creates telic VPs from telic VPs.

Whether or not a language allows both strong and weak A-ResPs is a point of typological variation. For example, Washio 1997 argues that Japanese differs from English in that it only allows weak (in our perspective: non-aspect-changing) resultative predication. For example, the VP *yukao haita* 'swept the floor' has a telic construal, as shown in (31), and, correspondingly, A-ResPs are allowed, as in (32).

- (31) John-ga 30 pun-de yuka-o hai-ta. John-NOM 30 minutes-in floor-ACC sweep-PAST 'John swept the floor in 30 minutes.'
- (32) John-ga 30 pun-de yuka-o **kirei-ni** hai-ta. John-NOM 30 minutes-in floor-ACC **clean** sweep-PAST 'John swept the floor clean in 30 minutes.'

⁶See Kearns 2007 for a discussion of the distribution of the phenomenon of variable telicity in English.

⁷An argument that A-ResPs are formed from underlying telic VPs comes from the interpretation of resultatives formed from semelfactive verbs such as *shoot* and *kick*. As observed by Comrie 1976, when VPs with these verbs are construed telically, they describe punctual actions (achievements). On the other hand, when they are construed atelically, these VPs describe repeated punctual actions. When they appear in an A-ResP construction, they are obligatorily interpreted as punctual. As observed by Beavers 2008, the atelic repetitive construal of *shoot* requires the PP *to death* to form a resultative construction.

- (i) John shot the burglar **to death** with 5 shots in 2 minutes.
- (ii) a. #John shot the burglar **dead** with 5 shots.
 - b. #John kicked the door **closed** with 5 kicks.

However, if we take a VP that has no telic construal, such as *kinzokuo tataita* 'beat the metal' (33), as Washio shows, A-ResPs are not permitted, as in (34).

(33)	John-ga	30 pun-kan/*30	pun-de	kinzoku-o tatai-ta.
	John-NON	، 30 minutes-for/*	30 minutes-	in metal-Acc beat-рАsт
	'John bea	t the metal for 30	minutes/*in	30 minutes.'

(34) *John-ga kinzoku-o **taira-ni** tatai-ta. John-NOM metal-ACC **flat** beat-разт

Furthermore, "intransitive" A-ResPs are also impossible in Japanese.

- (35) Washio 1997:20
 - a. *karera-wa kutu-no soko-o **borboro-ni** hasit-ta. they-тор shoe-gen sole-ACC **threadbare** run-PAST Intended: 'They ran the soles of their shoes threadbare.'
 - b. *boku-wa zibun-o **kutakuta-ni** odot-ta. I-тор self-Acc **tired** dance-PAST Intended: 'I danced myself tired.'

Returning to the question of the strength of adjectival resultatives in Old and Middle French, we argue that, in this part of the grammar, Old French is, in fact, more similar to Japanese than to English: in our corpora, all the examples of A-ResPs that we have found are built from VPs that have a telic interpretation. As an illustration, consider the atelic/telic verbal pair *batre/abatre* 'beat/beat down'. While VPs with *batre* are generally atelic, as in (36), VPs with *abatre* have only a telic interpretation, as in (37).

- (36) feru et **batu** l'avoient que ja avoient del dos la Tant li so much hit and beat him-had that immediately him-had from the back the flesh char ronpue jusqu' as os; at the bone ripped until 'They had hit and beat him so much that they soon tore the flesh of his back to the bone:' (C. de Troyes, Erec et Enide, 133; TFA) ont feru par tel vertu que du (37) Il ľ cheval l' ont abatu.
- (57) If a factor of the force that from that horse him have beat down 'They hit him with such force that they beat him down from the horse,' (Anon., *Roman de Thèbes*, 51; TFA)

When we compare the number of occurrences of A-ResPs with *abatre* versus those with *batre*, we can see a sharp contrast; while we find a significant number of A-ResPs formed from the telic VP, as in (45), there are no A-ResPs formed with the atelic VP. These results are displayed in Table 2.

In order to expand on this observation, we conducted a corpus study of the distribution A-ResPs with telic and/or atelic verbal bases. In particular, we carefully selected two series of verbs that, in general, had very similar meanings, yet differed with respect to the availability of telic interpretations. More specifically, we compared the possibility of forming an A-ResP with

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Table 2

Occurrences of (a)batre in the TFA corpus

	Occurrences	A-ResPs
Abatre	532	45
BATRE	320	0

Table 3

Distribution of adjectival resultatives

TELICITY	Verb	Occurrences	RESULTATIVES
Telic	abatre	532	45
	geter	887	29
	ruer	87	5
Atelic	batre	320	0
	bouter	353	0
	heurter	181	0
	trainer	66	0

the atelic (activity or semelfactive⁸) verbs in (38) and the telic (accomplishment or achievement) verbs in (39).

- (38) ATELIC VERBS:
 batre 'to beat'
 bouter 'to beat'
 heurter 'to bang/knock'
 trainer 'to drag'
- (39) TELIC VERBS: abatre 'to beat down' geter 'to throw' ruer 'to throw'

As shown in Table 3, while we find A-ResPs formed from verbs that give rise to telic VPs, there are no occurrences of A-ResPs with VPs that are (always or mostly) interpreted as atelic. Furthermore, we have not found any examples of intransitive ResPs (unselected objects or "fake reflexives") in our corpora. We therefore conclude that Old French allows only weak A-ResPs.

4 Resultative Predication in Latin

Although Latin has no more native speakers, the question of adjectival and prepositional resultative predication in this language was recently investigated in a quantitative manner by Acedo-Matellán 2010. Acedo-Matellán presents a large corpus study of Classical Latin A-ResPs, and so we present his results here. Basing his study on previous work by Boas 2003 on resultative predication in English, Acedo-Matellán takes Latin translations of 23 of the adjectives that Boas 2003 found frequently occur in A-ResP constructions and checks to see if they appear in resultative secondary predication constructions with 70 manner verbs. In this study, he did not

⁸Note that since some of these verbs are semelfactives, in principle, they could have a punctual telic interpretation. However, in our corpus, they are predominantly used as repetitive atelic verbs.

find a single example of a (strong or weak) A-ResP. Acedo-Matellán therefore concludes that Latin behaves like Modern French in that structures such as (40) appear to be ruled out in Latin.⁹

 (40) *Ovidia poculum vacuum bibit. Ovidia.NOM goblet.Acc empty.Acc drink
 Intended: 'Ovidia drank the goblet empty.' (Made-up ungrammatical example from Acedo-Matellán 2010:180)

We now consider the status of prepositional resultatives in Latin. Again, we take the data associated with this language from the work of Acedo-Matellán (i.e. Acedo-Matellán 2006 and Acedo-Matellán 2010). He observes that, in his corpus, goal-of-motion constructions with bare (i.e. unprefixed) manner of motion verbs are rare. In fact, he shows that such constructions are generally limited to the verbs *curro* 'run' and *salio* 'jump' as in (41). For example, in the Classical Latin corpus, he found 8 telic VPs formed with bare manner-of-motion verbs,¹⁰ 4 of which are with *run* or *jump*. Recall that these verbs continue to license P-ResPs in Modern French, despite the lack of productive resultative predication in the language.

(41) BARE GOAL-OF-MOTION IN LATIN

a.	Non statim ad C. Aquilium [] cucurrisses ?
	not at once at C. Aquilius.ACC run.PRF
	'Wouldn't you have run up to C. Aquilius at once?'
	Cic. Quinct. 53; cited in Acedo-Matellán 2010:188

b. E terra=que ex-orta repente arbusta salirent.
 out earth.ABL=and out-rise suddenly bush.NOM.PL leap
 'And branching trees would suddenly leap out of the turf.'
 Lucr. 1, 184; cited in Acedo-Matellán 2010:188

However, there is another set of sentences that show the defining characteristics of P-ResPs in Latin: those containing prefixed manner-of-motion verbs. Examples of telic directional interpretations with manner-of-motion verbs and the prefixes *ex-* 'out', *abs-* 'away', *de-* 'down', *prae-* 'before', and *in-* 'in' are shown in (42).

- (42) LATIN GOAL-OF-MOTION CONSTRUCTION
 - a. Serpentes ova solida haurient, [...] atque putamina **ex**-tussiunt. snakes eggs.Acc whole.Acc swallow, [...] and shells.Acc **out**-cough 'Snakes swallow the eggs whole and expel the shells through coughing' Pliny. *Nat.* 10, 197. cited from Acedo-Matellán 2010:179
 - Inspectum vulnus abs-terso cruore.
 examine.PTCP wound.NOM.SG away-wipe.PTCP blood.ABL.SG
 'That the wound had been examined after wiping the blood off.'
 Liv. 1, 41, 5; cited from Acedo-Matellán 2010:97

⁹Of course, with this kind of methodology, it is always possible that a couple of stray examples of A-ResPs were missed. However, as shown in section 3, our very similar study of A-ResPs in Old French has revealed that these constructions are far from rare in the language, and thus we consider Acedo-Matellán's 2010 negative result to be significant in light of our positive result for 12D15th century French.

¹⁰The telicity of the VP was established via the presence of appropriate time adverbials (like *subito* 'suddenly'), complementizers, or PPs (like *intra tres dies* 'in three days'). See Acedo-Matellán 2010:187) for discussion.

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c.	Repente ex equis de -siliunt
	suddenly out horses down -jumped
	'Suddenly they lept down from their horses'
	Liv. 22, 48, 2; cited from Acedo-Matellán 2010:189
d.	Qui ubi ad -equitavit portis
	who.NOM as soon as at ride doors.DAT
	'This one, as soon as he had ridden up to the gates'
	Liv. 22, 42, 5; cited from Acedo-Matellán 2010:189
e.	XXX dierum spatio prae -navigaverint.
	thirty days span.ABL before -sail
	'It took thirty days to sail past their territory.'
	Plin. Nat. 6, 97; cited in Acedo-Matellán 2010:189
f.	Draconem repente ir -repsisse ad eam
	snake acc suddenly in- olide at her acc

snake.Acc suddenly **in**-glide at her.Acc 'That, suddenly, a snake glided in towards her' Suet. Diuus Augustus 94, 4; cited in Acedo-Matellán 2010:189

In other words, Latin locative¹¹ prefixes can combine with an atelic manner of motion verb to form a VP that has a telic directional interpretation. Thus, we conclude (with many authors, including Acedo-Matellán 2010) that Latin allows P-ResPs, provided that the locative element is expressed as a prefix on the verb.

5 Conclusion

In this paper, we traced the evolution of resultative secondary predication constructions from Latin to Modern French, and, in doing so, we presented new data on ResPs in Old and Middle French. We summarize the proposed shape of the evolution of ResP constructions from Latin to Modern French in Table 4, where the * indicates the prefixation requirement.

Based on the results of our diachronic study, we conclude that, contrary to the commonly held position in the literature, the evolution of the Modern French system should *not* be thought of as a slow drift from the Latin system to the Modern French system. Rather, the Old and Middle French system shows the development of a completely new ResP system which is then

¹¹Note that although when they appear prefixed onto manner of motion verbs, they create directional interpretations, there are good reasons to believe that the prepositional elements that appear in (42) are inherently locative elements. For example, as shown by Acedo-Matellán 2010, they can combine with stative verbs (i), in which case they show a locative interpretation.

(i) Senex ab-est.
old man away-is
'The old man is missing.'
Plaut. Cas. 882; cited in Acedo-Matellán 2010:98

Furthermore, although the Latin goal of motion construction involves a prepositional element appearing as a prefix, these morphemes are also homophonous with more clearly locative prepositions in the language.

(ii) quia **ab** tergo erant clivi, because ab back were hills
'because behind them were hills, Liv. 2,65,2; cited from Luraghi 2010 (p.7)

4					
Resultatives	Latin	Old French	Modern French		
Adjectival					
Strong	×	×	×		
Weak	×	\checkmark	×		
PREPOSITIONAL	\checkmark^*	\checkmark	×		

Table 4The rise and fall of (productive) ResPs in the history of French

lost at the end of the Middle French period. Furthermore, as discussed in Burnett and Troberg 2013, unprefixed P-ResPs and weak A-ResPs appear and disappear at (roughly) the same time in the language, which suggests a correlation between the existence of P-ResPs and A-ResPs in French; they share a common grammatical property. On the other hand, there is clearly a lack of correlation in the case of Latin. These facts, along with the variation we see in the set of verbs that can occur in goal-of-motion constructions supports the non-unified approach to the relationship between P-ResPs and A-ResPs. Our study also reveals that Old French adjectival secondary predication is not aspect-changing, unlike prepositional resultative secondary predication. Based on this result, we suggest that a more subtle grammatical property shared by A-ResPs could be result-state modification, not culmination creation.

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Using Descriptions

Daniel Gutzmann Eric McCready

Referential uses of descriptions have been extensively studied from both semantic and pragmatic perspectives. This paper proposes a new treatment of this phenomenon which uses the multidimensional tools developed to account for what now goes under the label of expressive or use-conditional meaning. The basic idea is to treat the "descriptive content" of referential descriptions as use-conditional. We show that doing so allows a satisfying explanation of their meaning and use. From the semantic side, the theory brings out interesting parallels to pronous, appositive constructions and theories of proper names; from the pragmatic side, it allows an explanation of the cooperative aspects of misdescriptions.

Keywords: descriptions, pronouns, appositives, proper names, multidimensional semantics, use-conditional meaning, communicative strategies

1 The Attributive vs. Referential Distinction

In a classic 1966 paper, Donnellan introduces the difference between two uses of descriptions, namely what he calls the *attributive use* and the *referential use* of definite descriptions. The difference is best illustrated by an example.

(1) **The murderer of Smith** (is insane.)

On the attributive use of (1), the speaker uses the definite description to state that whoever is the murderer of Smith is insane. The speaker does not necessarily need to know who that individual is, and hence does not need to have a specific individual in mind of whom she wants to predicate insanity. In contrast, on the referential use of (1), the speaker wants to refer to a specific person and uses the description as a means to establish this reference. Crucially, the truth of the descriptive content seems to be crucial for the attributive case, whereas it seems secondary in the referential use. In Donnellan's (1966:285) words,

the referential use of the definite description is merely one tool for doing a certain job—calling attention to a person or thing—and in general any other device for doing the same job, another description or a name, would do as well. In the attributive use, the attribute of being the so-and-so is all important, while it is not in the referential use.

Despite being introduced almost 50 years ago, there is still no consensus on how to account for Donnellan's attributive vs. referential distinction (see, amongst many others, the contributions in Reimer and Bezuidenhout 2004 or the recent discussion in Elbourne 2013:chap. 5). There

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have been many suggestions of very different characters, including, but not exhausted by, the following proposals: Indexical or underspecification accounts try to find a minimal core of both readings and let context do the work to derive the two different uses (Donnellan 1966, Reimer 1998). Some proposals assume a plain semantic ambiguity between two kinds of determiners (Peacocke 1975, Devitt 2004), while others assume that one reading is the basic literal reading while the other is derived from it by pragmatic considerations (Grice 1969, Kripke 1977). Some recent proposals further assume that the differences between the readings can be traced back to different syntactic structures (Elbourne 2013, Neale 2004). In addition to this multitude of proposals, it is also not clear how the distinction between attributive and referential descriptions relates to the debate between Russellean quantificational analyses and Strawsonian presuppositional approaches to definite descriptions, as, for instance, some of the mentioned approaches to referential descriptions, while others do not.

Reasons of space keep us from attempting to scrutinize all these different proposals, their conceptual foundations, and how they relate to each other. Instead, we want to revisit Donnellan's distinction in the light of recent progress made in formal semantics (and pragmatics) in the analysis of expressive or use-conditional meaning. We will explore an alternative treatment of referentially used descriptions by using the multidimensional tools developed to account for use-conditional meanings in the recent literature (Kaplan 1999, Potts 2005, 2007, McCready 2010b, Gutzmann 2012, to appear).¹

By taking this route, we aim to accomplish three things. First, we want to illustrate the usefulness of these approaches by extending them beyond the cases for which they have been developed. That is, by an application to descriptions, we want to show that these approaches have an empirical reach that goes beyond the usual suspects like expressive adjectives, discourse particles, or honorifics. Second, we believe that this new approach can shed some new light on Donnellan's conceptualization of referentially used descriptions and situate his remark within a broader formal semantic theory. This project leads to the third goal: to gain new insight into the communicative strategies associated with use-conditional meanings.

In the following, we will refer to referentially (attributively) used definite descriptions just as referential (attributive) descriptions, or RDs (ADs) for short. The paper is structured as follows. In Section 2, we motivate a multidimensional approach to RDs by going back to Donnellan's (1966) original conceptualization and by focusing on cases of so-called misdescriptions (Neale 2004:sect. 3.6). In order to spell-out these considerations formally, we introduce the formal apparatus in Section 3, before we apply it to an analysis of RDs in Section 4. The development of the use-conditional analysis will also lead us to explore the relation of RDs to other phenomena like pronouns and appositives. As we will see, our approach will enable us to give a unified analysis of referntial expressions. In Section 5, we will then consider some of the communicative strategies that are connected with the use of RDs, and thereby try to further motivate our analysis. Section 6 concludes.

¹For the sake of keeping the analysis streamlined, we will for the most part assume a simple lexical ambiguity regarding the definite determiner *the* that is responsible for the attributive and referential article. However, this is not meant as an empirical claim (which, we believe, would likely be false), but just a simplification we have to employ due to space limitations. However, using more complex denotations and type shifting operations, one can arrive at a more principled distinction between the two readings of definite determiner that does not rely on postulating a lexical ambiguity. See section 4.3 for some suggestions.

2 Multidimensionality and Misdescriptions

As we already alluded to in the introduction, Donnellan (1966) gives a very distinct character to attributive and referential descriptions. In the attributive case, it is important that the description's content is true of what the description refers to. That is, according to him, "the definite description might be said to occur essentially, for the speaker wishes to assert something about whatever or whoever fits that description" (Donnellan 1966:285). In contrast, in the case of RDs, the definite description is merely used as a tool in order to accomplish reference to a specific individual or object. Whether its content is actually true of that referent becomes secondary. Therefore, we call RDs "reference vehicles": once you arrive at the reference, how you got there does not matter. This property of RDs and how they differ from attributive descriptions becomes most apparent in cases of so-called misdescription. Coming back to (1), Donnellan (1966:286) discusses a case in which Smith actually had not been murdered, but committed suicide. Both the attributive and referential use of the murderer of Smith in this situation presuppose – in a non-technical sense - that there is a murderer of Smith. However, as Donnellan reasons, the outcome of this unfulfilled presupposition in this situation is quite different. In the case of an AD, where the applicability of the content itself establishes the referent, there is no referent in this case and hence no predication can take place. However, as he notes, "in the [referential] case, where the definite description is simply a means of identifying the person we want to talk about, it is quite possible for the correct identification to be made even though no one fits the description we used" (Donnellan 1966:286). That is, even if no one actually murdered Smith, the RD the murderer of Smith can still manage to refer to, say, Jones, the person that is suspected of murdering Smith. This reference may even be recovered in some cases if the hearer does not share the assumption that Jones is Smith's murderer. Thus, RDs differ from ADs in that what they presuppose about their referent is not a presupposition in the technical Strawsonean sense as its failure does not lead to reference failure (and the resulting truth-value gaps.)

However, though the reference may successfully be established even in such a case of misdescription and what matters for the truth of the assertion is whether the referent, Jones, is insane, we still have access to the descriptive content and can still judge whether it applies to Jones or not. That is, in cases of misdescription, we are facing contrary intuitions. As Neale (1990:91, his emphasis) puts it:

We feel an uneasy tension when we are presented with such cases. As several authors have noted, we want to say that *S* did something right but *also* that *S* did something *wrong*. After all, the description he used *failed to fit* the person *S* wanted to "talk about," and to that extent the speech act was defective.

Conceptually, this tension can be formulated as follows, given the assumption that a sentence can express more than one non-conjoined proposition (Bach 1999), which can be achieved by allowing sentences to introduce content in more than one dimension. In the case of RDs, assuming that we have two different dimensions according to which a RD can be evaluated, we get the following.

- (2) First dimension: propositional contentDoes the main predication hold for the individual to which the speaker refers?
- (3) Second dimension: description contentDoes the content of the description hold for that referent?

In case of (1), we then have the following two meaning dimensions.

- (4) The murderer of Smith is insane.
 - a. *First dimension:* Jones is insane.
 - b. Second dimension: Jones is the murderer of Smith.

Crucially, as we have seen, the reference to Jones may work even if Jones is not the murderer, which means that we can evaluate these two dimensions independently from each other. That is, given the two dimensions of content in (4), we have four possible combinations for our example.

- (5) $2 \times 2 = 4$ possible values
 - a. (1,1) Jones is insane and he is the murderer of Smith.
 - b. (0,1) Jones is not insane but he is the murderer of Smith.
 - c. (1,0) Jones is insane but he is not the murderer of Smith.
 - d. (0,0) Jones is neither insane nor is he the murderer of Smith.

This observation raises an important point against treatments of RDs which make use of presupposition to distinguish them from ADs (under a non-Russellean presuppositional analysis). One of the defining properties of *presuppositions* (in the technical sense) is that there is a dependency between presuppositional and propositional content: the latter *presupposes* (in an intuitive sense) the former. The details of how this dependency is spelled out formally of course depends on the particular choice of theory, but the empirical generalization that if the presupposition is not satisfied, it should have a noticeable effect on the propositional content (see Sudo 2012 for a recent exception). Hence, in contrast to the four possibilities in (5), we can only have three sensible cases for sentences like (6).

- (6) Peter knows that Jones likes Martini.
- (7) $2 \times 2 1 = 3$ possible values
 - a. $\langle 1, 1 \rangle$ Peter knows that Jones liked Matini and Jones likes Martini.
 - b. (0,1) Peter does not know that Jones liked Matini and Jones likes Martini.
 - c. $\langle *, 0 \rangle$ (Jones does not like Martini.)

That is, even if presuppositions can be conceived as introducing multidimensional content, they induce what can be called *hierarchical* multidimensionality in the sense that the ordinary truth-conditional content depends on the truth of the presupposed content. In contrast, RDs exhibit what can be called *parallel* multidimensionality.

Multidimensional content, especially that of the parallel kind, has received a lot of attention in the last few years, especially in the form of what is called *expressive* and *use-conditional* content (Gutzmann 2013). Substantial progress has been made in developing formal frameworks to account for this kind of multidimensional semantic content. Given that RDs introduce content at multiple levels or dimensions, it seems natural to look to these theories for an analytical framework. Before we turn to the specific empirical task, let us briefly outline the formal system that we will apply to RDs in the remainder of this paper.

3 Hybrid Semantics

As illustrated in the last section, the truth of the description's content is not what is important in the use of RDs as long as the description suffices to establish reference. However, there is also the intuition expressed by Neale that in cases of misdescriptions, one may still sense that the speaker has *used* an inadequate expression. This distinction between truth (conditions) and use (conditions) is most clearly expressed in a influential manuscript by David Kaplan, who notes that "[f] or certain expressions of natural language, a correct Semantic Theory would state **rules of use** rather than something like a concept expressed." (Kaplan 1999:6, our emphasis). However, Kaplan's aims are more modest and conservative than those of proponents of radical "meaning as use" theories, as he wants to use this perspective on *use conditions* as a supplement to truthconditional semantics, not as a replacement. That is, this perspective leads to a multidimensional semantics, which can be called *hybrid semantics* (Gutzmann 2012), as it employs both truth *and* use conditions to capture the meaning of natural language expressions. Take, for instance, a sentence containing the expressive adjective *damn*.

(8) The damn dog howled.

An utterance of such a sentence gives rise to (roughly) the following truth and use conditions.

- (9) a. "The damn dog howled" is **true** if the dog howled.
 - b. "The damn dog howled" is **felicitously used** if the speaker feels negatively about the dog.²

Crucially, these two conditions give rise to two independent evaluations. For instance, we can judge (8) to be true, but nevertheless infelicitous if the dog howled but the speaker has no negative attitude towards it. In principle, it is also possible for an utterance to be false but nevertheless to be felicitous. In practice, however, this is not as common due to the contribution of sentence mood that, in the hybrid-semantics framework, also contributes use-conditional content (Gutzmann 2012), which in the case of assertions commits the speaker to truth of the utterance content (Searle 1969). However, if the speaker sincerely believes what she asserts, one can judge her utterance to be felicitous even though it is false.

3.1 Use-Conditional Propositions

Let us have a closer look at the structure of these two conditions given above. While (9a) corresponds to the traditional "condition τ ", (9b) gives rise to a parallel condition that may be analogously called "condition υ ".

(т)	1) "Snow is white"	(U)	1) "Oops!"	
	e) is true ,		2) is felicitously used ,	
	3) iff snow is white.		3) iff the speaker observed a minor mishap.	

In both conditions, a natural language expression (line 1) is connected with a condition (line 3) that captures its meaning. What differs is the kind of connection, what Kaplan (1999) calls the "mode of expression" (line 3). While in (T), it is truth that connects the expression with the

²At least, under stereotypical conditions of utterance; it is possible to interpret the adjective as expressing a positive attitude as well under the right circumstances. See McCready (2012) for discussion.

condition, it is felicitous use in case of (U). However, despite this difference, when applying the condition to see whether and expression is true or felicitously used, one has to check whether the condition is the case or not, thereby introducing a component of correspondence to facts in the world even into the use-conditional schema in (U). Crucially, as Kaplan argues, this means that all the standard tools of formal semantics are available even for use-conditional meaning components. The only difference is that use-conditional expressions are directly tied to the utterance context. We therefore use sets of contexts rather than sets of worlds to model what we call use-conditional propositions.³

- ||The damn dog howled|| $^t = \{w: \text{ the dog howled in } w\}$ (10)
- ||The damn dog howled||^{*u*} = {*c*: *c*_{*S*} feels negatively about the dog in *c*_{*w*}} (11)

We call expressions like (8) that have content in both dimensions, as shown in (10) and (11), hybrid expressions. Hybrid expressions can consist of non-hybrid expression that compose to complex hybrid expressions, as is the case in (8), but can also be found on the lexical level. Cases in point are negatively conotated nouns like cur or honorific predicates in Japanese (McCready 2010b). Compositionally, we therefore need a system that composes these two meaning dimensions in the correct way and ensure that we end up with two independent values at the end of the semantics composition. A first, highly influential attempt to such a system is available in Potts 2005. Subsequent work has however, shown that that system, called \mathcal{L}_{CI} , is too restrictive and cannot deal with all the observed data (Amaral et al. 2007, Gutzmann 2011, 2012, McCready 2010b). For the purposes of this paper, however, the original \mathcal{L}_{CI} seems sufficient and hence we will just employ it; although it is neither the most recent technology nor fully empirically adequate, motivating and presenting the required extensions would go far beyond the scope of this paper.

3.2 Composition Rules

For Kaplan (1999), the distinction between truth-conditional and use-conditional content is a matter of semantic convention. Therefore, it is natural to assume that what kind of content an expression contributes is lexically specified. Semantically, this then boils down to encoding the distinction between truth- and use-conditional content as a difference in semantic types.⁴

- (12)Truth-conditional (tc) types (13)Use-conditional (uc) types
 - *e*, *t*, *s* are basic tc-types. a.
 - b. If σ , τ are tc-types,
 - then $\langle \sigma, \tau \rangle$ is a tc-typ.

- - *u* is a basic uc-type. a.
 - b. If σ is a tc-type and τ is a uc-type, then $\langle \sigma, \tau \rangle$ is a uc-type.

Having implemented the distinction between truth- and use-conditional content in the types enables one to set up composition rules that reference them. Hence, it becomes possible for the two kinds of types to compose according to different rules. In addition to truth-conditional application (14), which is basically ordinary functional application restricted to truth-conditional

³We use superscripts on the interpretation function when we talk about just a single meaning dimension.

⁴Use-conditional types are called *CI types* in Potts 2005 and *expressive types* in Potts 2007. Even though there are subtle conceptual differences between these terms, this debate does not bear much on the topic of this paper.

expressions, there is a new rule for use-conditional application (15). Its main function, besides applying a use-conditional function to a truth-conditional argument, are to isolate useconditional content from the further derivation (as indicated by the bullet " \bullet ") and to pass the truth-conditional up the semantic tree unmodified.



The isolated use-conditional content is later collected from the parse tree by a mechanism called *parse tree interpretation* which searches the entire semantic tree for isolated use-conditional propositions and places them in the second meaning dimension.⁵ The root node of the tree fills the first meaning dimension. For a variant of (8), the semantic composition and interpretation can then be given as follows.



Equipped with this basic apparatus, we can now focus again on definite descriptions and apply the formal tools of \mathcal{L}_{CI} to develop an hybrid, multidimensional analysis of RDs.

4 A Use-Conditional Approach to RDs

The basic idea for a hybrid, use-conditional approach to RDs is to locate the content of the description in the use-conditional dimension. By doing so, the truth-conditional content remains unaffected of whether the description's content holds for the referent or not. That is, as already sketched in (4) on page 58 above, an RD contributes two things to the overall meaning of an utterance. To the truth-conditional dimension, it contributes just the individual to which the speaker refers, which then serves as the argument for the remaining truth-conditional content. In the use-conditional dimension, it expresses that the content that makes up the RD, that is, the content of the NP in simple cases, holds of that referent.

(17) (referring to Jones) [_{RD} The murderer] is insane.

⁵This part of Potts's system is rather controversial, as it seems to be connected with some issues of compositionality (Barker et al. 2010). However, as these issues are fixable, we will again stick to the original version in the main text and refer the reader to Portner 2007 or Gutzmann 2012, to appear for compositional reformulations.

TC: Jones is insane. UC: Jones is a murderer.

In order to formalize this basic idea by means of \mathcal{L}_{CI} , we assume that RDs have an additional argument slot for the referent. This argument is provided by a covert individual variable or index (similar to those used in Elbourne 2005):

(18) $\left[_{DP} \left[_{D'} \text{ the}_{ref} \left[_{NP} \text{ murderer} \right] \right] 3 \right]$

Semantically, we then assume that the determiner in RDs functions as a type-shifter \star which shifts the content of the NP from a truth-conditional to a use-conditional predicate.

(19)
$$\|the_{ref}\| = \star = \lambda f_{(e,t)} \lambda x. f(x) : \langle \langle e, t \rangle, \langle e, u \rangle \rangle$$

This type shifter is basically just the use-conditionalized version of Potts's (2005) COMMA operator that is used in his analysis of appositives.

When the NP, after being shifted by the determiner, is applied to the referent contributed by the individual variable, it yields a use-conditional proposition which ends up in the second meaning dimension. The rule of use-conditional application in (15) ensures that the variable is returned unmodified. This is shown in the derivation in (20). From this tree, we get the 2-dimensional interpretation in (21).



Here, crucially, the free variable is a directly referential expression. Its value must be contextually resolved by the hearer; this process is technically formalized as a dependency on the variable assignment function. This is pretty much like how overt pronouns work (e.g. Beaver 2004, Büring 2005). Thus, our analysis takes referential descriptions to be semantically analogous to pronouns introduced together with use conditions on their referents.

4.1 RDs, Pronouns, and Appositives

The use of individual variables to account for the indexical-flavoured, referential character of RDs is not the only connection that our approach establishes to pronouns. Under an influential stream of approaches to the interpretation of pronouns (Heim 2008, Sauerland 2004, Büring 2005), pronouns are not only analyzed as variables, but their ϕ -features also impose use conditions on its referent. Even if those conditions are often phrased in presuppositional terms, it is clear that they do not behave like classic presuppositions, as they lead to parallel multidimensionality (Sudo 2012). This can be taken to motivate a use-conditional approach to ϕ -features

(McCready 2010a). Spelling this out in form of a semantic tree highlights the parallelism between pronouns and RDs that our analysis draws.

According to this analysis, then, free pronouns can be seen as minimal versions of RDs that bring their own lexical content instead of incorporating an NP. Alternatively, one can consider RDs as rich pronouns that can carry rich lexical content that goes beyond what the grammar can provide with ϕ -features alone.⁶

In addition to pronouns, appositive constructions also feature a semantic "split" between a referent and an additional, independent predication on it. Hence, it is no surprise that our *- operator works like Potts's (2005) COMMA operator, which he assumes to be active in appositives.

- (24) $\|\text{COMMA}\| = \mathbf{comma} = \lambda f_{(e,t)} \lambda x. f(x) : \langle \langle e, t \rangle, \langle e, u \rangle \rangle$
- (25) appositives = individual + COMMA(NP)

Jones, a murderer

jones : e• murderer(jones) : ujones : e comma(murderer) : $\langle e, u \rangle$ |Jones a murderer

Besides the type-shift being induced by COMMA, we can think of appositives as being like RDs with overt referents in form of proper names, or, alternatively, we can conceive RDs as being similar to appositives but with covert anchors.

This picture also opens up the possibility of an alternative analysis of "definite appositives" as in (26). In contrast to standard indefinite appositives in (27), such appositives can also precede their anchor.

(26)	a.	Jones, the murderer	(27) a.	Jones, a murderer
	b.	the murderer Jones	b.	*a murderer Jones

We can now analyze definite appositives as RDs as an alternative to the standard analysis in terms of the Pottsian approach to appositives. In contrast to standard RDs, which apply to a covert individual index, definite appositives apply to the anchor noun. Under this analysis, definite appositives are essentially RDs with explicit referents.

⁶This analysis of (some) DPs being essentially pronouns plus extra content is mirrored in Patel-Grosz's (2014) analysis of epithets.

(28) $[_{DP} [_{D'} \text{ the } [_{NP} \text{ murderer }]] \text{ Jones }]$

At least for the prenominal case, this seems appealing, as the appositive structure then is uniformly postnominal.

Another interesting outcome of this analysis is that it predicts that RDs can be stacked very much like appositives. This is so, formally speaking, because the referential index of an RD is passed up the semantic parse tree unmodified, so that it can serve as the argument for additional RDs. This prediction is indeed borne out by the data.

(29)the murderer, the linguist, the blonde guy



(30)
$$||(29)|| = \langle x_9, \{ * \text{Intracted}(x_9), * \text{Intract}(x_9), * \text{District}(x_9) \} \rangle$$

Our analysis hence provides a unified analysis of RDs, pronouns and appositives, treating each as variants of a kind of referential construction that combines a referential expression with a use-conditional predication.

It is worth pointing out a relation between our analysis of referential descriptions and how DPs are handled in dynamic semantics or DRT (Groenendijk and Stokhof 1991, Kamp and Reyle 1993). In such theories, DPs introduce discourse referents – objects which can be picked up as anaphoric antecedents by subsequent pronouns - which are themselves interpreted modeltheoretically as variables. Any predications associated with the DP, such as the content of descriptions, or appositives, or even indefinite descriptions, are treated as introducing independent conditions on the discourse referent, as are conditions introduced via later predications once anaphora is resolved. The formal similarity with our theory should be clear. The difference is that, for us, referential descriptions are treated as introducing variables which are then associated with use-conditional content, rather than "ordinary" content. Still, the similarity makes it appear that the theory will easily be translatable to a dynamic setting.

4.2 Some Notes on Proper Names

So far, we have treated proper names (PNs) as directly denoting individuals, as for instance in (25) above. However, the connection we just drew to DRT suggests an alternative treatment of proper names that brings them more in line with the proposed analysis of RDs and pronouns. In DRT, PNs introduce (new) discourse referents (in the form of variables) together with the

condition that a predicate associated with the name holds of that variable. Transferring this to our terminology leads to an analysis in which PNs introduce individual indices together with a use-conditional predication.⁷ On this view, *Jones* would get the semantic representation $x : e \bullet \mathbf{jones}(x) : u$, which looks like a referential description. We can take this analysis a step further by unifying the syntactic structure of PNs to the one proposed for RDs, which can be done by making two additional assumptions: first, that "bare" PNs are just truth-conditional predicates, and, second, that referentially used PNs are disguised RDs that are covertly introduced by the referential definite article or, semantically speaking, by the *-operator.

(31) $[_{DP} [_{D'} \varnothing_{ref} [_{NP} Jones]] 3]$ (32) $||(31)|| = \langle x_3, \{\star jones(x_3)\} \rangle$

Neither of these assumptions seems particularly implausible. First, it is well known that PNs can be used just like other nominal predicates.

(33) a. In my class, {every Jones/every girl} is very smart.b. Peter is not {an Einstein/a girl}.

Second, when used referentially, PNs can occur with overt definite articles in many languages without any change in meaning, for instance, in many varieties of German.

(34) Der Erik trinkt Martini. the Erik drinks martini 'Eric is drinking Martini.'

If this path is pursued to its conclusion, it leads to a further unification of the referential devices discussed so far. First, appositives come even closer to RDs, as they are not analyzed as being anchored to an individual anymore. Instead, nominal appositives are, on the new view, taken to consist of a stacking of two use-conditions on a single individual variable.

(35) Jones, a murderer
$$x_2$$

* murderer $(x_3) : u$
* jones $(x_3) : u$

Secondly, since even PNs are decomposed into a referential variable and a use-conditional predication upon it, an interesting consequence of this approach to PNs is that the only genuinely referential expressions turn out to be individual indices or variables. Again, this is very similar to how reference is handled in theories like DRT (Kamp and Reyle 1993) where *discourse referents*, in the form of variables, do all the referential work and even PNs are understood as imposing *conditions* on them. However, as already mentioned above, discussing all the consequences of

⁷See Rami 2013 for a philosophical motivation of such an approach.

this interesting parallelism to dynamic approaches, much less all the syntactic, semantic and philosophical implications of an approach along the line of (32) is beyond the scope of this paper, so that, for now, we have to leave for further research the question of whether a hybrid analysis of PNs is genuinely viable.

4.3 The Definite Article and Ambiguity

The analysis so far assumes that there is a lexical ambiguity in the definite article and that the referential variant does all the work of shifting the truth-conditional content provided by the NP to a use-conditional predication. However, none of these assumptions is essential to our approach as long as we end up with the key distinction between referential and use-conditional components.We would therefore like to at least briefly mention two alternative approaches that seems to be promising routes for further investigation.

As has been argued on both theoretical and typological grounds, personal pronouns and definite articles can be unified, based on conflation of the grammatical features of person and definiteness (see, e.g., Lyons 1999 or, more recently, Am-David 2013). Some evidence for such a move is provided by the fact that cross-linguistically, pronouns and articles have similar expression, as well as by the existence of what Lyons (1999:142–145) calls *personal determiners*. These are personal pronouns that are used like articles, as in the following examples.

- (37) a. We murderer like Martini.
 - b. Ich Mörder mag Martini. (German)
 I murderer like Martini
 '*I murderer like Martini.'
 - c. Ngarka njuntu ka-npa purlami. (Walpiri, Lyons 1999:142) man you.sg Aux 2sg shout '*You man are shouting.'

There are some language specific restrictions on this article-like use of personal pronouns. While English is rather restricted, allowing first and second personal determiners only in the plural or in reduced exclamatives like *You murderer!* (though there seems to be speaker variation with respect to at least some of these types), German or Walpiri are unconstrained in this respect. Language may also differ with respect to whether they impose restriction on specific lexical forms of the pronouns or articles. For instance, while *the* in English must subcategorize for a NP and hence cannot be used as an actual pronoun, the definite article in German doubles as a bare demonstrative personal pronoun.

- (38) a. *The is the murderer.
 - b. Der ist der Mörder. (German)
 the is the murderer
 '*The is the murderer'

These considerations lead us to an alternative approach of RDs in which the referential article is treated as a "genuine" personal pronoun and is given the same analysis. That is, it consists of a referential part in the form of a variable together with the use-conditions imposed by its ϕ -features.⁸

⁸Since the ϕ -feature are carried by the deteminer may vary between languages and since we do not wish to
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(39)
$$||the_2|| = \langle x_2, \{\Phi(x_2)\} \rangle$$

With this premise, it becomes unnecessary to assume an additional individual index inside the DP, as the variable is provided by the pronoun/article. The shift of the NP denotation from a truth- to a use-conditional predicate, as done by the \star -operator, is then triggered by the fact that without it, the semantic derivation would collapse on the sentence level.

(40) The murderer is insane.



An analysis along these lines provides us with a better rationale for inserting the \star -operator than simply assigning it to the determiner; at the same time, the analysis of the determiner itself is justified by independent considerations.

Furthermore, if we assume that there are both pronominal determiners and "ordinary" ones, we have a place to implement the distinction between referential and attributive descriptions. The former involve the pronominal *the*, which receives the same analysis as a personal pronoun, while the latter involve a proper determiner, which does not introduce a variable (nor any use-conditional content), so the derivation can proceed without the need to introduce a type-shift. Depending on what kind of approach to the attributive article one prefers, one would then get the Russellian or Strawsonian reading. Thus, RDs consists of a pronoun plus a type-shifted NP, while ADs consist of a proper determiner plus a plain NP. Though we have had to leave out many details here for space reasons, we find this direction a promising one for future research.

An alternative approach to spelling out the distinction that is not based on the analysis of the definite article as a pronoun in the case of RDs makes use of the structural difference we assumed above: RDs are referential because they contain a covert individual variable that does the referential work, while ADs do not. However, instead of also assuming a lexical ambiguity for the article, we can start with an ordinary determiner denotation and utilize a more sophisticated type-shifter, which then can transfer the determiner denotation into what the simpler *-operator in (19) gave us. Let us spell this out for a Strawsonian analysis of the definite article, but a similar shift should be available for the Russellian approach.

(41) a. $||the|| = \mathbf{the} = \lambda f . \iota x(f(x)) : \langle \langle e, t \rangle, e \rangle$ b. $\heartsuit = \lambda D \lambda f \lambda x . \star f(D(\mathbf{IDENT}(x)))$ c. $\heartsuit \mathbf{the} = \lambda f \lambda x . \star f(x) : \langle e, u \rangle$

In the case of RDs, the insertion of this shifter is triggered by a type clash that is induced by the additional individual variable.

make any claims about what the features of English *the* are, we just use Φ to denote the contribution of its features.



If the variable is not present, as we have assumed is the case in ADs, this move is unnecessary, as there is no type clash. The derivation can thus proceed as usual, so that we end up with the attributive reading.

(43) [The murderer] the (murderer) :
$$e$$

the : $\langle \langle e, t \rangle, e \rangle$ murderer : $\langle e, t \rangle$

Thus, there is a way to implement the RD-AD-distinction in terms of use-conditional content on either of the analyses we have proposed. The two possibilities differ with respect to where the type-shift occurs, though in both cases it is triggered by a type clash. Further research is needed to determine which of the two analyses of RDs we have presented turns out to be more plausible, but in either case our broader point about the use-conditional analysis of the referential-attributive distinction can be maintained.

5 Misdescriptions and Cooperation

So far, we have developed a hybrid analysis of RDs and sketched how this analysis relates to pronouns, appositives and proper names. We also discussed an alternative analysis of the definite article as a pronoun and sketched two ways to spell out the ambiguity between referential and attributive descriptions.

But the question remains of why there should be this ambiguity in descriptions at all. What is the utility of having referential descriptions in natural language? On the assumption that there is a communicative rationale for the devices that language makes available, referential descriptions must be useful. In fact, we think there are good pragmatic reasons to allow for the possibility of referential descriptions, and that examination of these reasons gives some insight both into the nature of descriptions and the nature of expressive content itself. In this final section we want to look a bit more at the underpinnings of the analysis we have proposed, though the specific details of the analysis do not depend on anything to be said here.

Consider the kind of situation in which referential descriptions are usually deployed. These are situations in which use of a bare pronoun (or free variable in our analysis) would be inappropriate. It is often the case that the context fails to determine a referent for some pronominal. The additional content may be necessary in order to find one. Providing this content benefits both speaker and hearer, for the speaker presumably would like to have her intended content recovered (an assumption codified in terms of utilities in standard game-theoretic analyses of cooperative communication, as in Benz et al. 2006); but here the description is something that is directly useful for the hearer in his attempt to recover the hearer's intended meaning.

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(44) *For the hearer:* establishing reference

The content of an RD may be needed for the hearer to resolve the free variable.

Still, despite the necessity to provide the RD content in order for the hearer to get the right referent for the variable, it still might be that the content of the description is not appropriate, in that it does not genuinely apply to the intended referent. There may also be pragmatic consequences to using false descriptions in an attributive way which do not arise in the case of RDs, depending on how one construes the use of inappropriate use-conditional content. If so, it would certainly be to the speaker's benefit to make use of them to avoid possible penalties.

(45) For the speaker: hedging, saving face

The speaker is able by use of the RD to avoid negative consequences of using an incorrect description (to be justified).

The communicative advantage of using the description in the referential case then has the dual character usual in pragmatics, where utility accrues both to the speaker and to the hearer. If this basic picture is correct, cases of "misdescription" thus can again provide evidence for an use-conditional analysis. The rest of the paper is devoted to spelling out this picture.

Let us first briefly look at an example. Consider the sentence in (46).

(46) **The man with a martini** (is the murderer.)

If the martini glass actually contains water, the descriptive content is false, that is, its use conditions are not fulfilled and its use therefore not warranted from a factual point of view. But without the additional content the RD provides, the resolution of the variable may be impossible for the hearer. There may just not be enough clues for the interpreter to decide what is referred to. Still, the description is *false* from a truth-conditional perspective: any consequences of falsehood will apply. But, given a use-conditional semantics, the speaker has said nothing false with (46). Her utterance is (merely) not used feliciously, and perhaps not even that.

A sentence is false if its meaning does not match the state of the world. That is rather straightforward, and is incorporated into semantic theory in various familiar ways. When is a sentence inappropriate? This question is somewhat more hazy, and is perhaps not systematically addressed in the literature. At least two senses of the word seem viable candidates: appropriate in the sense of conveying true information, and appropriate in the sense of furthering joint communicative goals. The results given by these two senses are not identical.

To see this, consider the several distinct cases that can be separated out with respect to (1). First suppose that speaker and hearer both know that the martini glass contains water. It seems that, here, (1) is obviously inappropriate: although the use of (1) will allow computation of the correct reference, there are descriptions available (e.g. *the man drinking water from a martini glass*) which both allow reference and are descriptively correct from a truth-conditional perspective. The use of the misdescription thus must be intentional and is likely to generate a further implicature through a process something like Gricean flouting (Grice 1975), for example that the speaker wants to emphasize the drinker's odd container choices.

There are also two kinds of information-asymmetric misdescription: for (1), first are those in which the speaker does not know that the glass contains water but the hearer does, second are those in which the hearer is confused about the content of the glass but the speaker knows it contains water. Finally, there are cases in which both conversational participants mistakenly believe that the martini glass contains martini. In all these cases, the descriptive content is inappropriate in the first sense, but possibly appropriate in the second, as the goal of the interaction – to point out the murderer – is furthered. The inaccurate content of the description itself seems to count as *misleading* rather than speaking falsely (Saul 2012), because the primary goal of the content of the description is to guide the hearer in reference resolution rather than to describe. This is one reason we called referential descriptions reference vehicles above. We will call these latter three cases *unintentional misdescription* to distinguish them from the first type.

It is interesting to observe that in the first two cases of misdescription it is further required that the individual who knows the actual facts is aware that the other does not know them, for otherwise the communication may fail. In fact, the situation is likely a bit more complex. It is not sensible for the speaker to use a false description if she does not believe that the hearer has a false belief about the referent (given a desire for correct resolution), and the hearer will not arrive at the right reference if he believes that the speaker has a different belief about the referent than she actually has. Ultimately, the characterization of the beliefs that underlie cases of misdescription are quite complex. We will not attempt a full characterization here as our goal is to provide an argument for an expressive treatment of RDs; the upshot is that, in three of four possible cases, there is a sense in which a misdescription can be appropriate though false, for despite its factual inaccuracy, it still assists in achieving the broader goals of the interaction.

It seems reasonable to conclude that the result of "wrong expression" is a kind of pragmatic infelicity weaker than genuine falsehood. Asserting falsehoods is by definition an uncooperative discourse move and a violation of Gricean Quality. Such violations have definite consequences for future interaction. In some cases, or given repeated infractions, one may lose the trust of one's interlocutor, so that one's later utterances are ignored, disbelieved, or even believed to be false (cf. McCready 2014). Once this trust is lost, the overall utility of communicative interactions decreases drastically, in a way similar to what has been shown for the general case of interactions where utilities are mutually dependent in the literature on cooperativity in repeated games (e.g. Alexander 2007). But uttering use-conditional content in situations where it is not literally "true" (when construed descriptively) can still count as cooperative, because, at least for the cases under consideration, cooperativity can be evaluated in a way that privileges other aspects of communication than directly conveying information about the world.

Thus, using inappropriate use-conditional content is likely a lesser violation than using false truth-conditional content, in that it can be cooperative where falsehood cannot. The analysis of the content of referential descriptions as use-conditional thus captures the observation of Neale 1990 quoted above — "[in misdescription cases] we want to say that *S* did something right but also that *S* did something *wrong*" — via the parallel multidimensionality associated with use-conditional content, and the broader appropriateness conditions for its use. It is worth noting that considerations of this kind also do not arise with presupposition. Presuppositions, while not asserted, target truth-conditional content via the information present in the common ground. The felicity conditions on their use are concerned with the presence or absence of such information (or, in cases of accommodation, on whether their content can be added to the common ground without the requirement of revision, cf. Gärdenfors 1988). They appear to lack the flexibility of use-conditional content. If this reasoning is correct, this is a further reason to prefer pragmatic accounts in terms of use conditions to accounts which take referential descriptions to involve presupposition.

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6 Conclusion and Outlook

This paper has presented a use-conditional perspective on referential uses of descriptions. After briefly summarizing the facts relating to attributive and referential uses of descriptions and some previous theories of them, we turned to our own theory. On our view, referential descriptions denote a variable interpreted much like a pronoun, and the "description" portion of the definite description is use-conditional. We spelled out this view in a multidimensional semantics for use-conditional content. This lead us to with a unified analysis of various referential devices, which can be viewed as introducing a referent and some predication of that referent. We then turned to a consideration of how cases of misdescription with referential descriptions can be cooperative, which we then took to suggest that a canonical characteristic of use-conditional content might be a potential for cooperative misuse.

We see several clear avenues for future work. First and most obviously, the assimilation of proper names to RDs, pronouns, and appositives which we sketched above needs further investigation, especially regarding its syntactic and philosophical consequences. For the second direction, we proposed that use-conditional content often, or perhaps always, admits uses which are cooperative yet "false" in a use-conditional sense of this term. We gave the example of honorifics, which can be used felicitously even when there is no attitudinal basis for honorification. If this is indeed a general property of use-conditional items, there would be deep implications for the theory of use-conditional and expressive content. More generally, it seems a worthwhile project to investigate the relations between truth, felicity, and expressivity in cooperation. Further, the analysis in this paper has, we hope, shown that it is useful in both empirical and theoretical senses to extend the domain of use-conditional analysis beyond the obvious cases. This last domain of inquiry might be the most potentially fruitful of all; we hope to pursue it in future work.

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A Corpus Study of Pseudogapping and Its Theoretical Consequences

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This paper presents the results of a large-scale investigation of the use of NP-remnant pseudogapping (PG) in the COCA corpus. Discourse conditions on the use of noncomparative and comparative PG are discussed. It is shown that the data raise problems for mainstream generative analyses involving remnant-raising and an alternative interpretive analysis is suggested. The question of whether PG is a subcase of VPE is discussed.

Keywords: pseudogapping, ellipsis, corpus analysis, antecedent mismatches, discourse pragmatics, usage preferences

1 Introduction

Pseudogapping (PG) is a construction similar to Verb Phrase Ellipsis (VPE) in that it is characterized by an ellipsis behind an auxiliary. But, contrary to VPE, the auxiliary is followed by a complement (the 'remnant'), which corresponds to a complement of the antecedent, as illustrated in (1).¹ It appears both in comparative (cf. (1b,c)) and noncomparative (cf. (1a,d)) structures. As these examples show, the ellipted material does not necessarily form a constituent, nor even a continuous subsequence of the antecedent.

- (1) a. "It doesn't <u>bother</u> me," I said untruthfully. "Well, it <u>does</u> bother <u>me</u>," he growled, and I let it rest. (Fic)
 - b. We'll let you know if it <u>deals</u> with the heat and humidity as well as it <u>did</u> the frigid <u>slop</u>. (Mag)
 - c. [...] all treat him with deference due a social superior, as they <u>do</u> his wife, (Acad)
 - d. [...] the whole room <u>seemed like a great relief</u> to me and I knew it <u>must</u> seem like a great relief to him, too. (Fic)

Following Kuno 1981, most syntacticians working in transformational frameworks (e.g. Jayaseelan 1990, Lasnik 1999, Gengel 2013) have claimed that PG is a subcase of VPE, where the

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¹To clarify the intended interpretation of the examples, the antecedent is <u>underlined</u>, the pre-elliptical auxiliary is <u>double underlined</u> and the remnant is <u>wavy underlined</u>; in some examples, the ellipted material is struck out in the putative ellipsis site. This is not intended to represent a syntactic analysis. Unless otherwise mentioned, all of the examples cited in the paper are taken from the COCA (Corpus of Contemporary American English, http: //corpus.byu.edu/coca/, see Davies 2008-), a large corpus of American English (450 million words), evenly divided into 5 registers (Acad(emic), Fic(tion), Mag(azine), News(paper), Spok(en)), with approximately 90 million words each.



remnant is moved out of the VP before deletion of the VP under identity by VPE.² In Miller 1990, a nontransformational approach, I proposed an interpretive analysis, extending to PG the VPE-as-proform analysis of Schachter 1978 and Hardt 1993. This line of analysis has been explored further by Hoeksema 2006, as well as by Kubota and Levine 2014, who develop a Hybrid TLCG analysis, which is similar in spirit to the analysis suggested here.

In what follows, I will provide corpus data on pseudogapping, based on an extensive corpus investigation of the COCA, which resulted in over 1700 occurrences of PG. I will first briefly discuss the way the data were collected and classified and set out some of the central properties of the actual usage of PG, including discussion of the discourse conditions under which it is felicitous. I will then address the relevance of the corpus data for the various proposed syntactic analyses of PG, suggesting that they favor an interpretive analysis rather than a syntactic analysis in terms of ellipsis. In particular, I will show that putative remnant movement does not respect island constraints or connectivity. In a final section, I will provide some preliminary discussion of what the corpus data bring to bear on the question of whether PG and VPE are the same construction, suggesting that the differences between them might be explained away as resulting from independent discourse factors.

2 Collecting the Data

The COCA is tagged for parts of speech but it is not parsed, so that one cannot directly search for specific syntactic structures such as PG. Heuristic strategies had to be set up in order to find them. For this study, I concentrated on the central case of PG, namely, PG with NP-remnants. Since what characterizes this case is the presence of an NP complement after an auxiliary, strategies were devised to detect such configurations. Specifically, the following sequences were systematically checked: (i) auxiliaries followed by an object personal pronoun (except for *you* which does not have a distinct object form and consequently leads to massive noise from Subject-Auxiliary Inversion);³ (ii) auxiliaries followed by *you* and either punctuation or *too, as well,* or *at all*; (iii) auxiliaries preceded by a subject pronoun and followed by *you*;⁴ (iv) auxiliaries preceded by a subject pronoun or a noun and followed by an article, a determiner (quantificational or otherwise), an adjective, a noun, or a possessive (dependent or independent).⁵

Because these searches lead to a lot of noise, especially in the case of *do*, among which actual examples of PG were selected manually, I am certain to have missed some examples that could have been found by these strategies, due to lapses of attention. There are also certainly examples of PG which could not be found by these searches (e.g. because of unusual NP patterns or unusually placed adverbs or parentheticals), though they can be assumed to be relatively

²More recent analyses involve LF-copying and other variants. Distinctions between these various analyses will not be relevant here and I will henceforth subsume them all under the term 'deletion'.

³*It* shares this property with *you*, but, as is well-known, *it* does not occur as a remnant in PG because it cannot be stressed. This property was confirmed by searches on *it* of the type described in (ii) for *you*.

⁴Because 86% of pronominal remnants other than *you* in our data are followed by punctuation or *too/as well/at all* and 91% of PG cases in our data have a pronoun subject, one can assume that the great majority of *you* remnants were found by combining both of these search strategies.

⁵The auxiliaries *have* and *be* raise specific problems. Because of their very frequent use with a wide variety of NP complements, it was impossible to search for general PG patterns. I have conducted searches for comparative pseudogappings for these auxiliaries, but have not included them in the numerical findings presented here, as they would have skewed the proportions of comparative and noncomparative PG.

rare.⁶ Overall, I believe that the sample of 1415 occurrences that I have compiled contains the great majority of the cases of NP-remnant PG in the COCA. However it is clear that pronominal subjects and remnants are less likely to have been missed than full NPs. Consequently, except for a possible minor bias in favor of pronominal subjects and remnants, the data can be assumed to be relatively representative of the COCA overall and, presumably, of current American usage.

3 Central Properties of NP-Remnant PG

A first observation that should be made concerns the distribution of NP-remnant PG in comparative and noncomparative structures. The present study found that 96.7% of occurrences were comparative. Table 1 provides a breakdown by register. The large sample studied here thus exhibits an even stronger bias than previous studies by Hoeksema 2006 (87% of the PGs in his corpus of 227 occurrences were comparative) and Sharifzadeh 2012 (90% were comparatives). Furthermore, it is clear that this difference in frequency of occurrence correlates with other features which differentiate comparative and noncomparative PG, which will now be discussed.

3.1 Noncomparative NP-Remnant PG

The COCA data provide 47 occurrences of noncomparative PG. Given the limited number of occurrences, it was tempting to combine these data with the 37 occurrences of noncomparative PG collected by Levin 1986, leading to a total of 84 cases. In the numerical analyses for noncomparative PG, I will systematically provide two figures, separated by a slash. The first of these indicates the figure for the COCA, the second for the combined COCA and Levin data.

Noncomparative PG is typical of the spoken register The breakdown by register provided in Table 1 is misleading since it does not take into account the fact that most noncomparative PGs outside the spoken register occur in reported speech. Spoken and reported speech combined contain 87.2%/91.7% of the occurrences of noncomparative PG while only 12.8%/8.3% of cases of noncomparative PG occur in narrative segments of fiction and non-fiction prose.⁷

The subject of the PG is almost always a personal pronoun Table 2 provides a breakdown of noncomparative PG by subject of the pre-elliptical auxiliary. There is a striking dominance of pronominal subjects and especially of *it*, which by itself accounts for about half of the occurrences (we will see that this is in stark contrast with the comparative PGs, where 89% of the subjects are pronouns). Pronouns, and especially *it*, are known to require a very highly accessible antecedent (cf. Ariel 1990). In the single case found with an NP subject (a case of nonfiction prose), given in (2), the referent of *Mom* is highly accessible in the context of the topic of the

⁶This was corroborated by a series of searches likely to uncover comparative PGs which could not be found by the above strategies and which led to no new occurrences.

⁷It should be noted that noncomparative PG is apparently less acceptable than comparative PG in general. Hoeksema 2006 reports an acceptability study on PG and finds an average acceptability of 8.4 out of 10 for comparative NP-remnant PG and of 4.6 for noncomparative coordinate cases. Ongoing acceptability experiments I am conducting corroborate this finding, with a greater loss of acceptability for full NP subjects than for pronominal subjects (as expected given the following discussion). The reasons for the lesser acceptability of noncomparative PG are as yet unknown, but it might simply be an artefact of the written presentation of the stimuli in the acceptability experiments. It may be that subjects have trouble imagining appropriate intonation patterns (which would make the sentences completely acceptable) and thus find the sentences unnatural. Checking this idea would require acoustic stimuli.

Register	Total PG	Noncomp	Comp
Acad	146	0 (0%)	146 (100%)
Fic	430	18 (4.2%)	412 (95.8%)
Mag	414	10 (2.4%)	404 (97.6%)
News	224	1 (0.4%)	223 (99.6%)
Spok	201	18 (9%)	183 (91%)
Total	1415	47 (3.3%)	1368 (96.7%)

 Table 1

 Comparative vs. noncomparative NP-remnant PG by register in the COCA

Table 2	
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Subjects in noncomparative NP-remnant PG

Subject	he	Ι	it	she	they	we	you	Total pro	NP
COCA	5	7	22	2	4	0	6	46	1
	(10.6%)	(14.9%)	(46.8%)	(4.3%)	(8.5%)	(0%)	(12.8%)	(97.9%)	(2.1%)
COCA+Levin	7	12	44	3	7	0	10	83	1
	(8.3%)	(14.3%)	(52.4%)	(3.6%)	(8.3%)	(0%)	(19.9%)	(98.8%)	(1.2%)

'family as a unit' especially given the immediately previous mention of Dad.⁸

(2) That notion is naively anachronistic in an age when the family as a unit of cultural consumption hardly exists: Dad <u>watches</u> ESPN, Mom <u>does</u> <u>Lifetime</u>, Little Bro works his Game Boy Advance, and Kid Sis is a Powerpuff Girl. (Mag)

It is important to keep in mind that these results are not as spectacular as they might seem, given that the noncomparative PGs are mostly spoken register or reported speech. Indeed, Francis et al. 1999 found that 91% of the subjects (out of 31,021 declarative sentences) in a part of the Switchboard Corpus (a corpus of telephone conversations) were pronominal. Thus, though the strictly spoken data from the present corpus of PG has 100% pronominal subjects, this is only 9% more than what was was found for subjects of declaratives overall in the Switchboard study.

Beyond being pronominal, the subject of the PG is, in general, coreferent with the subject of the antecedent clause. This is true in 38 out of 47 cases in the COCA data and 73 out of 84 in the COCA+Levin. Among the cases which are not coreferent, all (except for (2) cited above) fall into one of two patterns. The first, noted by Levin 1986, is the mirror pattern, as in (3a), where the referents of the subject and object of the antecedent clause appear in reverse order in the PG (4/5 cases). The second is the parallel pattern, as in (3b), where the subject and the dependent possessive in the object of the antecedent clause are coreferent, and the same is true of the PG, except that the object is reduced to an independent possessive, typically resulting in an I-mine combination (4/5 cases). These two configurations have in common that they make the referents in contrast more accessible (there are only two in the mirror pattern, and the referents are linked pairwise by parallel possessive relations in the parallel pattern) as opposed to four

⁸Jim Donaldson (p.c.) points out that (2) might in fact not be a case of PG at all, but rather a use of main verb *do* (as made clear by the fact that *watches* can be replaced by *does* in the antecedent: *Dad does EPSN*, *Mom does Lifetime*). If that is the correct analysis for this example, the corpus exhibits 100% pronominal subjects.

Remnant	COCA	COCA+Levin	Remnant	COCA	COCA+Levin
me	17 (36.2%)	33 (39.3%)	NP.dem	1 (2.1%)	4 (4.8%)
mine	10 (21.3%)	12 (14.3%)	NP.Ø	3 (6.4%)	5 (6%)
you/yours	4 (8.5%)	10 (11.9%)	NP.some	1 (2.1%)	2 (2.4%)
Other pron	4 (8.5%)	5 (6%)	NP.the	2 (4.3%)	4 (4.8%)
Total pron	35 (74.5%)	60 (71.4%)	NP.their	1 (2.1%)	1 (1.2%)
N.prop	2 (4.3%)	3 (3.6%)	NP.other	0 (0%)	1 (1.2%)
NP.a	2 (4.3%)	2 (2.4%)	Total NP	4 (25.5%)	7 (28.6%)
NP.any	0 (0%)	2 (2.4%)	Pron+Ana NP	41 (87.2%)	71 (84.5%)

Table 3Remnants in noncomparative NP-remnant PG

independent referents in (2).

- (3) a. I ain't scared of your gun. I got a gun, too. I can <u>shoot</u> you before you <u>can</u> <u>me</u>, (Spok)
 - b. Yes, you my [=might, PhM] <u>love</u> your baby and your toddler <u>to death</u>—I <u>did</u> <u>mine</u> but that doesn't mean to say a child can fulfill all the needs of an adult. (Spok)

Noncomparative PG remnants are typically pronominal and/or anaphoric and form a contrastive focus with the corresponding complement of the antecedent Table 3 provides a breakdown of the remnants of noncomparative NP-remnant PG. 74.5%/71.4% of the remnant objects are pronominal, among which the first person singular *me* and *mine* are highly dominant. This finding is much more surprising than the case of subjects, as Francis et al. 1999 found only 34% pronominal objects in their sample of the Switchboard. Beyond this, it turns out that among the 24 cases of NP remnants, 10 are anaphoric, being headed by pro-N *one*, a Ø noun, or a repeated head noun. In all, 87.2%/84.5% of remnants are thus anaphoric. Furthermore, the nonanaphoric NP remnants are highly accessible in the discourse context.

One of the central characteristics of noncomparative PG is that it has to have a contrast between the remnant and the corresponding complement of the antecedent.⁹ This correlates with the preponderance of first person singular remnants (and to a lesser extent of second person remnants), since contrast with the speaker (and to a lesser extent the addressee) are typically very relevant to her/him. More generally, for NP remnants, it is usually the case that the object of the antecedent has an obvious hyperonym within which it forms a contrastive pair of hyponyms with the remnant (e.g. two TV channels as in (2) cited above, or a contrastive pair of politicians, or a contrastive pair of electronic appliances, viz. a Web-TV vs. a big-screen PC) so that evocation of the object of the antecedent makes the remnant inferrable. We will see below that all these properties are in stark contrast with those of comparative PG.

Discourse conditions on noncomparative PG As was just mentioned, PG always involves contrastive objects, as illustrated in (4a). I will call these cases Obj-choice, following the terminology of Miller and Pullum 2014 (i.e. the symmetric of Subj-choice VPE—as in He knows the answer and she does too, but with contrasting objects rather than subjects). It can also involve

⁹One example found in the COCA violates this restriction and is presumably a speech error: "NOVAK: Doesn't worry you? DALEY: No, it doesn't me at all." (Spok).

double contrast (viz. the 'mirror' and 'parallel' cases discussed above), as in (4b), and thus be both Subj-choice and Obj-choice. It can furthermore involve secondary Aux-choice, as in (4c), which has a contrast between *can* and *will*, and (4d), which has a contrast in polarity ((3a) illustrates a case where there is a triple contrast on subjects, objects, and auxiliaries). PG cannot be simply Aux-choice, as shown by the infelicity of the variant of (4d) given in (4e). Only VPE is acceptable in that case, as in (4f) (cf. also footnote 9).

- (4) a. Your weight affects your voice. It <u>does</u> mine, anyway. (Mag)
 - b. [...] we want to treat your POWs with dignity and we hope that you do ours as well. (Spok)
 - c. I can't read most of these lyrics, but I will some. (Spok)
 - d. "It doesn't <u>bother</u> me," I said untruthfully. "Well, it <u>does</u> <u>me</u>," he growled, and I let it rest. (Fic)
 - e. "It doesn't bother me," I said untruthfully. #"It <u>does</u> you," he growled.
 - f. "It doesn't bother me," I said untruthfully. "It does," he growled.

These considerations make it possible to tentatively propose the following discourse conditions on noncomparative PG:

Type 1: Object choice

FORMAL CHARACTERISTICS: The subject of the antecedent is identical to that of the PG construction but the object is distinct, and stressed if it is a pronoun.

DISCOURSE REQUIREMENT: Both the referent of the remnant and a particular open proposition p(x) must be highly salient in the discourse context, and the point of the utterance containing the PG must be limited to identifying something or someone satisfying p(x)and such that it forms a contrastive focus with the referent of the correspondent of the remnant in the antecedent.

Type 2: Subject and object choice

FORMAL CHARACTERISTICS: The subject and object of the antecedent are distinct from those of the PG construction, and both are stressed if they are pronouns.

DISCOURSE REQUIREMENT: Both the referents of the remnant and subject and a particular doubly open proposition p(x, y) must be highly salient in the discourse context, and the point of the utterance containing the PG must be limited to identifying a pair satisfying p(x, y) and such that they form a pair of contrastive foci with the referents of the correspondent of the remnant and the subject of the antecedent.

Noncomparative PG is typically endophoric Miller and Pullum 2014 discuss Subj-choice exophoric VPE and argue that it is exceedingly rare (as opposed to Aux-choice VPE) because the nonlinguistic context is usually unable to make open propositions salient. Since the discourse conditions on PG that have just been proposed also require a salient open proposition, we can expect exophoric PG to be exceedingly rare as well. One example of this type was found in the COCA, which might be considered to be a speech error. The context is obviously a cooking demonstration. Presumably Maggipinto's intention is to convey the fact that you can *use* tangerines in the recipe as well. The question is the extent to which the previous discourse and extralinguistic context can make salient the open proposition 'you can use *x* in this recipe'.

(5) Ms-MAGGIPINTO: It looks very glamorous, doesn't it? CURRY: It does. Now, it has tangerines? Ms-MAGGIPINTO: Those are mandarin oranges. CURRY: OK, mandarin oranges. Ms-MAGGIPINTO: Yes, you <u>can</u> tangerines, though. CURRY: OK, and you have what, beets? Ms-MAGGIPINTO: Those are beets. (Spok)

3.2 Comparative NP-Remnant PG

Register As shown in Table 1 above, the 1368 examples of comparative NP-remnant PG occur in all registers but are especially frequent in fiction and magazines. They typically do not exhibit the somewhat marked status of noncomparative PG (this corroborated by their much greater frequency of occurrence in the corpus and by the acceptability experiments mentioned in footnote 7). The comparative cases can be divided into two broad classes, those involving comparison of degrees as in (6a) and those involving comparison of manner (6b) or factual identity (6c) (the difference between the latter two is not always easy to establish, as shown by (6d)).

- (6) a. It <u>hurt</u> me as much as it <u>did</u> her. (SPOK)
 - b. You must treat him as you would me. (FIC)
 - c. Let Thomas' confirmation serve to remind you, as it <u>did</u> me, that the fight is far from over. (MAG)
 - d. You're not much better, Noah. I took you in, just as I did him. (FIC)

Subjects of comparative NP-remnant PG Table 4 provides basic data on subjects in comparative PG. Several properties are worth noting. Pronominal subjects continue to dominate strongly. More specifically, in the spoken register, 97.8% of the subjects are pronominal, a figure very similar to that of the noncomparatives, and again significantly higher than that of Francis et al. 1999. The average for the written registers is 89.8%. Biber et al. 1999 provide comparable data for the overall use of pronouns vs. full NPs in written registers, finding 65% pronominal subjects in fiction, 25% in newspapers, and 20% in academic. Thus the presence of pronouns as subjects in written register PG is massively more frequent than would be expected, even more so than for noncomparative PG. On the other hand, the pronouns found most frequently are not the same. Whereas *it* was the subject of almost 50% of noncomparative PGs, it represents only 19.7% of comparatives. What dominates here is the use of the pronoun *you* as a generic, as illustrated in (7). Notice that in this type of example, the remnant is an indefinite NP with determiner a(n), \emptyset , or *any*. This configuration is very frequent, especially in the magazine register and the fact/manner comparatives and, by itself, it accounts for close to 25% of the comparative PG data.

- (7) a. <u>"Treat a loan from a relative or friend as you would</u> any business loan," advises Baltimore financial planner Jay Perry. (Mag)
 - b. Use the same criteria to select a healthy nut tree as you would a fruit tree. (Mag)

Remnants of comparative NP-remnant PG Table 5 provides information on remnants in comparative PG. The most immediately striking property of these data is the contrast in the proportion of pronoun vs. NP remnants, namely, approximately 13.5% vs. 86.5% (as opposed to 74.5% vs. 25.5% for noncomparatives), so that we observe a complete reversal of proportions. Even in the spoken register, we find only 23.6% of pronominal remnants, as opposed to 76.4% of full NP remnants. More specifically, indefinite NPs (in particular NP.a, NP.Ø and NP.any) are very

Table 4

Subjects in comparative NP-remnant PG

Ι	you	it	they	other pronoun	total pronoun	full NP	total
124	310	269	219	321	1243	125	1368
9.1%	22.7%	19.7%	16%	23.5%	90.9%	9.1%	100%

Table 5

Remnants in comparative NP-remnant PG

me/mine	you/yours	other pron	total pron	N.Prop	NP.a	NP.Ø	NP.any	NP.the	other NP	total NP
84	30	70	184	59	429	226	109	218	143	1184
6.1%	2.2%	5.1%	13.5%	4.3%	31.4%	16.5%	8%	15.9%	10.5%	86.5%

highly represented, especially in the fact/manner comparatives. As mentioned above and illustrated in (7), these often combine with generic *you* subjects, producing comparisons with generic situations. On the other hand, definite NP remnants are more frequent in the degree comparatives, because there is a greater tendency to compare degrees between uniquely identifiable entities. Among the pronominal remnants, the first person singular is dominant (almost 50% of the occurrences), showing a similar tendency to the noncomparatives.

Discourse conditions on comparative NP-remnant PG Though the comparative remnant and the complement of the antecedent are often cohyponyms of a hyperonym which is made easily accessible by the mention of the latter (as was the case in examples (7), where the hyperonyms are *loan* and *tree*) this need not at all be the case: remnants can represent entirely new and unpredictable information, as in (8), contrary to what we saw for noncomparatives.

- (8) a. Feeding Las Vegas' one-armed bandits <u>does</u> as much <u>for</u> your biceps as it <u>does</u> <u>your</u> bank account. (Mag)
 - b. But the minor league instructors [...] came back <u>talking breathlessly about</u> the kid the way a tourist <u>would</u> the Grand Canyon. (Mag)

These examples make clear that in comparative PG, contrary to noncomparative, there does not have to be any kind of contrast between the referents of the subject and remnant of the PG clause and their correspondent in the antecedent (though, of course, they cannot be coreferent). Rather, they must simply be comparable.

Another difference between noncomparative and comparative PG concerns contrasting subjects. As mentioned above, in the noncomparative case these typically involve mirror or parallel configurations, which make the contrasting referents more accessible (cf. (3) above). There is no such constraint on comparative PG: the corpus contains 176 examples of comparative PG with different subjects out of 1368 (12.9%), only one of which is a mirror configuration. The greater flexibility of comparative PG in this respect is probably a consequence of the parallelism imposed by the very nature of the comparative construction, which helps make clear how the subjects and objects of the antecedent and elliptical clauses align. The ease of processing linked to this obvious parallelism may explain why PG is much more acceptable and frequent in comparatives.

To conclude, I should mention the existence of a subtype of comparative PG which, to my knowledge, has never been pointed out, namely, cases where the antecedent has no overt object corresponding to the remnant. There are 13 occurences of this type in the corpus, two of which are given in (9). In (9a) the antecedent has a null anaphor as object, the reference of which is provided explicitly in the discourse context. This is the most usual case, as opposed to (9b) in which the antecedent can simply be considered intransitive.

- (9) a. Let the peas dry on a tray in the house for a few days, then store and label in airtight jars out of direct sunlight as you would any other bean or pea. (Mag)
 - b. My echoes are no longer tormentors but friends, and when one of them dies (as, inevitably, they have begun to) I mourn a little, as I <u>would</u> a sister. (Fic)

4 Some Consequences for Syntactic Analyses of PG

4.1 Raising of Remnant Analyses

As mentioned in the introduction, most syntacticians working in the Principles and Parameters and Minimalist frameworks have proposed that PG is a subcase of VPE where the remnant has been moved out of the VP before ellipsis. This kind of analysis was first advocated by Kuno 1981 and was developed by Jayaseelan 1990, who proposed that the remnant was affected by Heavy NP Shift (HNPS). Lasnik 1999 provides convincing criticism of this analysis, centering on the fact that pronouns make excellent PG remnants whereas they do not undergo HNPS. He proposes instead that the remnant raises by *A*-movement to spec of Agr_o. This analysis makes four central predictions. The first is that remnants must be direct objects; the second is that remnant movement should obey constraints on *A*-movement, in particular island constraints; the third is that the form of the remnant, in particular its case (or preposition, if it is a PP), should be identical to that which it would have in a nonelliptical context; the fourth is that there should be an appropriate syntactic antecedent in the context. I will discuss these in turn.

Remnants must be direct objects Citing Levin 1986, Lasnik notes a potential objection to this constraint, namely, that objects of prepositions can be PG remnants ('deprepositionalized' PG in Levin's terms). He proposes that this is made possible by reanalysis and that there should be a "consistent correlation between pseudogapping and pseudopassive" (Lasnik 1999:145). He also notes that more extreme cases of reanalysis, such as *take advantage of*, also support PG.

The data from the present corpus make these proposals very difficult to sustain as there are numerous cases where reanalysis is not supported by any of the usual criteria, in particular the possibility of a prepositional passive. This is illustrated in (10).

- (10) a. In other words, <u>walk into</u> a seafood market as you <u>would</u> <u>a fresh flower market</u>, with your eyes, nose, ears and hands all on full alert. (News) [Compare: #The market was walked into.]
 - b. It [= the wind] <u>blows through</u> me as it <u>would</u> <u>an abandoned house</u>. (Mag) [Compare: #The house was blown through.]
 - c. For example, if people wish I would sound like I used to sound, then it <u>says</u> more <u>about</u> them than it <u>does</u> <u>me</u>. (Spok) [Compare: #I was said something about.]

All in all, there are 115 'deprepositionalized' remnants in the corpus (i.e. 8.1%), many of which

are more or less implausible candidates for reanalysis.¹⁰ Furthermore, in some cases, as in (10c), there is an unconstrained direct object between the V and the preposition making reanalysis completely impossible.

Beyond these cases, there are numerous examples where the remnant corresponds to a complement of an embedded verb with no plausible reanalysis possible, as illustrated in (11):

- (11) a. [...] he could no more <u>imagine himself contradicting</u> the man striding on ahead of him than he <u>could</u> <u>his grandfather</u> (Fic)
 - b. Health care providers acknowledge they may have a much harder time stopping the regulations than they would any bills in Congress. (News)
 - c. [...the custodians] will instead <u>seek to acquire</u> it [= Rodchenko's monochrome] as they <u>would</u> <u>any other picture</u> lest their collections otherwise betray a gap in [...] (Acad)

Finally, searching for adjective initial NP remnants showed that there were in fact 13 PGs with copular verbs and predicative AP remnants among the comparative PGs, as illustrated in (12). (Levin 1986 suggests that these are acceptable, contra Lasnik 1999:142.)

- (12) a. Tortilla soup <u>tastes as good</u> cold as it <u>does</u> <u>hot</u>. (Mag)
 - b. [...] which sounds as seductive as it <u>does</u> sincere. (Mag)
 - c. Ang Lee seemed as embarrassed as he <u>did</u> thrilled to be named best director. (Spok)

Remnant movement and island constraints A central prediction of any analysis based on movement of the remnant is that usual island constraints should be respected. In the case of Lasnik's proposed A-movement analysis, A-movement constraints should be obeyed. More recently, Gengel 2013 has argued that A-bar movement is involved, specifically Focus Movement. Under this analysis, A-bar-movement constraints should be respected. However, once again, the data collected show that there are numerous instances where this is not the case.¹¹ The examples in (13) illustrate this for various types of islands. Each example is followed by variants which show that A-movement and/or A-bar-movement of the remnant are impossible.¹²

(13) a. According to current ideas, the frothiness of space <u>retards the arrival of</u> a burst's highest-energy photons more than it <u>does</u> the lowest-energy photons. (Mag) [Complex NP Constraint (CNPC): *the photons which it retards the arrival of; *The photon was retarded the arrival of.]

¹⁰Besides the three cited in (10), the following can be found: agree with, appear to, ask for, bite into, care about (2 cases), cling to, commiserate with, cram into, depend on, do for, eat at, feel about, feel like, fly into, flirt with, forget about, get in and out of, go after, go beyond, go through, go into and go through, go to, grab onto, interfere in, hold onto (2 cases), jump into, knock on, know about, look like, make of, move on in, move through, know one's way around, plan around, play at, pore over, react to, relate to, revolve around, ride at, settle over, share with, sit at, sit on, stand behind, stick in, tee up for, throw NP around, tinker with, walk into, work at, work for, work with (2 cases), and zero in on. It should also be noted that the frequency of deprepositionalized PG in the corpus seems much higher than that of prepositional passives. Though I have been unable to find data on present-day English, Seoane Posse 1999 finds that 2.3% of passives are prepositional in the period 1640-1710.

¹¹Culicover and Jackendoff 2005:274-5 note similar problems for raising analyses of gapping.

 12 I have used relative clauses to illustrate *A-bar*-movement as it is known that they are less degraded by island violations than *wh*-questions. Some kinds islands are known to be less unacceptable or to lead to variable judgments, specifically the types illustrated in (13e) and (13f).

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- b. [...] the voting preferences of black women much more closely <u>approximated the</u> <u>pattern of</u> black men than they <u>did</u> <u>white women</u>. (Acad) [CNPC: *people who they approximated the pattern of; *Those people were approximated the pattern of.]
- c. Meeting with the committee members was perhaps the most important thing I would do during my transition, and they would <u>examine what</u> I wore as intensely as anything else—as they would any woman who met with them, it occurred to me. (Mag) [*Wh*-island: *a woman who you would examine what wore; *She was examined what wore.]
- d. Bring the same kind of carry-ons (diapers, medications, toys, etc.) when traveling by train as you would by air; you're allowed two per person. (Mag) [Adjunct island: *a means of transport which I brought the same kinds of carry-ons when traveling by; *The train was brought the carry-ons when traveling by.
- e. [...] we'll walk with them and we'll <u>make</u> them <u>exercise</u> like you <u>would</u> a boxer on a treadmill, [...] (Spok) [Object of causative or perception verb island: %someone who you will make exercise; *A*-movement is possible: He was made to exercise.]
- f. <u>give</u> these smaller newspapers <u>your best efforts</u>, of course, just as you <u>would</u> a <u>large-circulation national magazine</u>. (Acad) [First object of double object construction island: %something which she gave her best efforts; *A*-movement OK: The newspapers were given ...]

All in all, I have gathered 60 cases of island violations of these types (of which 20 CNPC violations), so that such violations appear in approximately 4.2% of the occurrences in the corpus. This seems too great a rate to make it plausible to consider them as speech errors. All the more so that they clearly do not have the flavor of island violations. My feeling is that they range between perfectly acceptable and slightly sloppy, rather than ill-formed. It should be recalled that all of the examples cited, and most of those collected, have in fact appeared in print. The variants with true island violations given after the examples are far more unacceptable (most of them are simply unintelligible). Thus, any theory claiming that these cases of PG violate the same constraints as those which rule out the variants would be confronted with a major problem in trying to explain why there is such a great difference in acceptability between them.

Nonconnectivity in remnant form One of the most intuitively appealing predictions made by syntactic theories of *A-bar* movement is that the moved element will show up with the same form as it would have had without movement, namely, so-called 'connectivity' effects: a prepositional or case-marked complement is realized with the usual preposition or case when it is fronted. In the case of PG, theories involving *A-bar* movement of the remnant thus predict that the remnant should exhibit connectivity effects.

In this connection, consider (14a):

- (14) a. Ask Doll, who <u>spoke</u> as much about his schoolboy career ending as he <u>did</u> <u>of the</u> <u>season in general</u>: "I don't want it to end." (News) [Compare: He spoke as much about his career as he did about/#to Peter.]
 - b. He cared as much about his career as he did about/#of/#for the season in general.

In (14a), the remnant appears with the preposition *of*, whereas the correspondent of the remnant in the antecedent has *about*. To begin with, it should be noted that it is not possible in general

to switch prepositions in this manner without affecting acceptability. This is shown by the unacceptability of the *of* variant in (14b) where *care* has been substituted for *speak*. I tentatively suggest (as I did in Miller 1990:(38) for a similar invented example) that acceptability depends on a combination of two factors, namely the semantic relation of the remnant to the predicate and the possible subcat frames of the antecedent verb. Specifically, if a given verb has two subcat frames which allow for syntactically distinct objects, a discrepancy between the two frames, in the antecedent and PG clause respectively, will be all the more acceptable that the semantic relation of the complements in question to the verb is similar. For instance, *speak* allows PP[about], PP[of], and PP[to] complements. In the case of the first two of these, the semantic relation of PP[about] and PP[of] in the attested example (14a) is acceptable, whereas the combination of PP[about] and PP[to] in the variant is unacceptable. In the case of (14b), *care* does not allow a PP[of] complement, so that the syntactic side of the constraint makes it infelicitous. It does allow a PP[for] complement, but not with the same semantic relationship as its *about* complement, so that, in this case, the semantic side of the constraint makes it infelicitous.

It is unclear how the differences in acceptability presented in (14) can be accounted for under a remnant raising analysis. Consider the putative structures for the variants of (14a):

- (15) a. he [VP spoke t_i] [PP_i about the season in general] (antecedent of (14a))
 - b. he [VP spoke t_i] [PP_i of the season in general] (elliptical clause of (14a))
 - c. he [VP spoke t_i] [PP_i to the public in general] (elliptical clause of (14a))

If the VP in (15b) is to be deleted under identity with that of (15a), then the content of the trace t_i must be identical in both VPs. As a consequence, the trace must not contain any information about the specific preposition occurring in the raised remnant. But if that is true, how can one rule out deleting the VP in (15c) under identity with that of (15a), and thereby obtaining the unacceptable variant of (14a) with *to*?

In a similar vein, consider (16), in which the antecedent has give with a [-NP NP] complementation, whereas the elliptical clause has a [-NP PP[TO]] complementation. Remnant raising leads to non-identical VPs as shown in (17a) and (17b), so that it is unclear how deletion under identity could apply. On the other hand, the proposal sketched here potentially explains the acceptability of (16), as the remnant and its correspondent in the antecedent are both possible complements of give and have the same semantic relation to it: they are both recipients.

- (16) "[...] It's hard enough to take two hours out of my day to put out a legal fire" much less give the matter the same attention he would to something that's actually going to generate some cash for the company. (Mag) [Compare: he gave the matter the same attention he would give to something that's actually going to ...]
- (17) a. $[_{VP} give [_{DP} the matter] [attention]] \Rightarrow [_{VP} give [_{DP} t_i] [attention]] [_{DP_i} the matter] (Antecedent of (16))$
 - b. $[_{\text{VP}} \text{ give [attention]} [_{\text{PP}} \text{ to the matter}]] \Rightarrow [_{\text{VP}} \text{ give [attention]} [_{\text{PP}} t_i]] [_{\text{PP}_i} \text{ to the matter]}$ (Elliptical clause of (16))

It should be emphasized again that it is not an option to consider that the category of the trace can be ignored. Indeed, this would incorrectly predict that (18b) should be able to mean (18a).

(18) a. He kicked Jay more than he kicked at Joe.

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b. #He [VP kicked [NP t]] [NP Jay] more than he did [VP kicked [PP t]] [PP at Joe].

It thus seems that analyses based on remnant raising feeding deletion under identity either undergenerate by predicting that examples like (14a) and (16) are ungrammatical, or overgenerate by predicting that (18b) and the unacceptable variants of (14) are well-formed.¹³

Absence of an appropriate linguistic antecedent Beyond the island and connectivity problems, the deletion under identity approach relies on the hypothesis that there is an appropriate linguistic antecedent in the context. It turns out, however, that this is not always the case. As with VPE and other elliptical phenomena, it is necessary to follow Cornish 1999 in making a difference between the antecedent-trigger (the segment of text that allows one to recover an appropriate antecedent) and the antecedent itself, which Cornish defines as the discourse-model representation making interpretation of the ellipsis possible, which is inferred from the antecedent-trigger. Consider the following examples:

- (19) a. "The kids, we, all come here together," said Tommy Foday, a double amputee who at 50 was the oldest of the group. They all <u>called him Pa Tommy</u>, just as they <u>would</u> any village elder in Sierra Leone. (News)
 - b. Type in your PIN, just hit those buttons like you would a phone. (Spok)
 - c. EPA urged the Corps "to <u>work directly with the affected communities as well as</u> <u>seek professional assistance in</u> this matter as they <u>would</u> <u>any other environmental</u> <u>issue</u>." (Acad)

In (19a), one might first think that the antecedent is 'call x Pa Tommy', but of course this makes no sense at all. The actual antecedent is 'call x Pa y', where y is x's first name. The antecedent clause explicitly provides an antecedent-trigger, which is underlined, but the actual antecedent is obtained by non-grammatical inference. Similarly, in (19b) the intended interpretation is not that one 'hits a phone', but rather that you should use the system in the same way you would use a phone, namely, hitting the *buttons* of the phone. Finally, in (19c), clearly the intended interpretation is 'the Corps would act with respect to any other environmental issue by working directly with the communities affected by the issue and seeking professional advice on the issue'. The intended antecedent is of course easy to infer from the previous clause, but is nowhere present in the appropriate syntactic form.

To the extent that cases like these are grammatical, and I do not see any reason to consider that they aren't, they raise tremendous problems for any analysis that requires any form of syntactic and/or semantic identity. They seem to require an analysis of the type proposed in Miller 1990 and Hardt 1993 where the auxiliary is treated as a proform, and general proform resolution processes find an appropriate antecedent. Of course, as I noted at the time, such an approach considerably overgenerates. It is beyond the scope of this paper to investigate

¹³In the corpus one finds six cases where an accusative remnant shows up instead of an expected possessive, as in *The music gets you feeling good, you start cracking some drinks, pretty soon there's some girls there and the music, it sets your soul on fire. It does me, anyway.* (Mag) [Compare: *It does mine, anyway*]. These seem at first sight to be instances of violations of connectivity. However, cases like these appear to be all the more acceptable that, in the event denoted by the PG clause, affecting the possessor results in a situation similar to affecting the possessed (thus, setting someone's soul on fire, in the intended metaphorical sense, is essentially the same thing as setting the person on fire). As pointed out by an anonymous reviewer, this actually suggests an alternative analysis, where one assumes that the nonelliptical variant of the PG clause is simply *it sets me on fire*, removing the apparent connectivity violation.

precisely how this can be dealt with, but I suggest that an appropriate solution might be found by a combination of (i) semantic conditions of the type sketched above in the discussion of remnant nonconnectivity; and (ii) processing constraints involving preferences for parallelism (cf. Dubey et al. 2005 and Frazier and Clifton 2001).¹⁴

4.2 Base-generated Interpretive Analyses

Kubota and Levine 2014 develop a Hybrid TLCG analysis of PG, arguing that it allows a synthesis of the transformational and nontransformational approaches. In a nutshell, the flexibility of constituency in the system allows analyses where both the syntax and semantics of the ellipted material are explicitly represented as a constituent in the derivation of the antecedent clause (this is even possible when the antecedent forms a discontinuous sequence, as in (16) above). The difficulty for this approach, however, is to avoid overgeneration by constraining flexibility (so that not just anything can be ellipted) without at the same time ceasing to generate well-formed cases. It remains to be seen how far in this direction the analysis can be extended. I believe, for instance, that the system will have trouble making the relevant differences among the cases of connectivity violation discussed above, cf. (14)-(18). It will also have a problem with the cases without appropriate syntactic antecedents. A detailed discussion goes beyond the scope of this paper. However, the categorial approach is superior to the remnant raising approach because it is at least capable of producing all of the acceptable sequences. The resulting overgeneration could then be reigned in by semantic and processing constraints of the type sketched section.¹⁵

5 Is Pseudogapping a Subcase of VPE?

Some authors (e.g. Levin 1986, Hoeksema 2006) have argued that PG and VPE exhibit too many differences to make it reasonable to analyze them as instances of the same construction. While it is clearly true that they cannot be exactly the same construction, it is not clear that there is a greater difference between PG and VPE than between the different subconstructions traditionally grouped together under the VPE label. Given the similarities between PG and VPE, the question arises of the extent to which it might be possible to consider them as subconstructions of a more general VPE construction, explaining away the differences on the basis of a better understanding of their discourse uses. In this section, I will address some of the most commonly noted differences between PG and VPE, but will only be able to provide a very preliminary and somewhat speculative discussion, in particular because the details of the usage of the sub-

¹⁴Since writing the initially submitted version of this paper, Thoms (to appear), a new remnant raising analysis, has come to my attention. Taking Thoms' analysis fully into account would have required major revisions of the present paper, which were not possible. It should be noted, however, that one of the significant advances of the paper is that it provides distinct analyses for noncomparative and comparative PG, treating the former as a more restricted variant of stripping. The latter idea is apparently quite compatible with the results reported here, specifically the contrastive focus status of the remnants. Thoms' syntactic analysis predicts that only noncomparative PGs should be subject to island constraints (though the details of how comparative PGs escape them are not fully worked out), something which appears to be true, but which I would suggest should be accounted for on discourse grounds. The nonconnectivity problems, which appear both in comparative and noncomparative PG, might be addressed by postulating null prepositions (Thoms, p.c.). However, cases without appropriate syntactic antecedents clearly remain a problem.

¹⁵Following the line or research summed up in Frazier 2013, an alternative approach to all the data discussed in this section would be to consider that the cases which are apparently problematic for the remnant raising analysis are in fact ungrammatical, but repaired ('recycled', to use the terminology of Frazier and her colleagues). It is beyond the scope of this paper to explore the potential advantages and disadvantages of such an approach.

constructions of VPE are not sufficiently known to allow well-supported conclusions. Bos and Spenader 2011 provide some information, but as their study is based on the *Wall Street Journal*, it is not representative of registers with very different properties, such as the spoken register.

PG occurs mainly in comparative environments As shown in Table 1, this is clearly true. In fact, as mentioned, the larger corpus studied here shows an even stronger bias in favor of comparatives than noted in previous studies. And, contrary to VPE, noncomparative PG is almost exclusively a spoken register phenomenon. But these differences in distribution may not be as relevant as one might initially think, for several reasons. First, VPE itself very frequently occurs in comparative structures (Bos and Spenader 2011 find 31% of cases, far less than for PG, but still far more than the percentage of comparative clauses overall). Second, as is the case with PG, the properties of VPE are significantly different in comparative and noncomparative structures. For instance, it was noted by Levin 1986:3 that noncontrastive adjuncts are dispreferred after VPE (an observation corroborated by psycholinguistic experiments reported in Miller and Hemforth 2014). However, it appears that this is not true in comparative VPE.

PG prefers to have the same subject as its antecedent, as opposed to VPE Both Levin and Hoeksema argue that PG exhibits a preference for having the same subject as its antecedent and, in this, differs from VPE. The COCA corpus data confirms the preponderance of same subject PG: 79% of the cases are same subject cases. However, Miller 2011 found that 83% of his sample of 122 occurrences of VPE from the COCA had the same subject as their antecedent. If this result is representative of the COCA in general, the alleged difference disappears.

PG does not allow voice mismatches whereas *VPE* does Merchant 2008 claims that contrary to VPE, PG does not allow voice mismatches and attributes this to a difference in the target of deletion in the two cases, namely, in VPE the target is a node lower than [voi(ce)], whereas with PG the target contains [voi(ce)]. It is important to note that he qualifies this in a footnote, suggesting that there might be variation in the target of deletion for PG, an idea which is again mentioned in Merchant 2013, citing other studies that have claimed that voice-mismatch is possible in PG. The data from the corpus suggest that the situation is more complex. Indeed, it contains 10 occurrences (out of 1415) of PG with voice mismatches, among which those in (20):

- (20) a. A whole poached wild striped bass should be <u>taken to the table</u> as you <u>would</u> a <u>Thanksgiving turkey or a crown roast of pork</u>, with a twinkle of extravagance. (News)
 - b. I mean for her to be <u>dressed</u>—and addressed—as we <u>would</u> <u>Becky Sharp</u>, or <u>Ophelia</u>, or Elizabeth Bennet, or Mrs. Ramsay, or Mrs. Wilcox, or even Hester Prynne. (Mag)
 - c. These savory waffles are ideal for brunch, <u>served</u> with a salad as you <u>would</u> a <u>quiche</u>. (Mag)

This should be compared to the data of Bos and Spenader (p.c.), who find no examples of voice mismatch with VPE in the 487 occurrences of their sample of the *Wall Street Journal*. It thus seems at first sight that voice mismatches are actually more frequent with PG than with VPE. This conclusion requires significant qualification.

To begin with, contrary to VPE, mismatches are only found in comparative PG. With noncomparative PG they are systematically very degraded. In the light of the discourse conditions on felicitous voice mismatch with VPE proposed by Kertz 2010, 2013, the absence of

voice mismatches with noncomparative PG can be easily explained, given the discourse conditions on noncomparative PG proposed above. Indeed, Kertz argues that voice mismatches are only acceptable in cases of what I have called Aux-Choice VPE (specifically without additional Subj-Choice). Otherwise, they lead to violations of an information-structural constraint on contrastive topics. Since, as discussed above, noncomparative PG can never be simply Aux-Choice, the unacceptability of mismatches can be expected to follow from a similar constraint. The question then arises of why Aux-choice comparative VPE structures do not seem to allow voice mismatches (as noted by Kertz). If we consider (20a) above, turning it into VPE with a contrasting subject clearly strongly reduces its acceptability: *??A poached bass should be taken to the table as an excellent butler would.* It thus appears that the presence of the remnant plays a crucial role in making these acceptable: it provides a correspondent to the subject of the antecedent which is absent in the VPE variant. The topic clearly warrants further research.

PG does not occur cataphorically, contrary to VPE Though cataphoric uses of PG are very hard to construct, there is one example in the COCA, which does not seem to be a speech error:

(21) Behind them, disguising her desire, one catches a poignant glimpse of the youthful, shaved-headed Cather. As it <u>did me</u>, work rescued Willa Cather. (Fic)

Bos and Spenader 2011 found four cases of cataphoric VPE in the 487 examples of their corpus, which suggests a significant difference in frequency. A preliminary investigation of cataphoric VPE in the COCA suggests a possible account for this discrepancy: cataphoric VPE appears to be almost always Aux-choice. As PG is never Aux-choice, this might explain the difference.

PG involves a single auxiliary Levin 1986 and Hoeksema 2006 mention that though sequences of auxiliaries are possible with VPE, they are hard to attest with PG (though Levin did collect one example: *I processed everybody's* [check] but *I must <u>not've</u> yours*. Levin (1986), p.18, ex. (34)). This may again be due to the impossibility of simple Aux-choice PG. Indeed a simple search on the COCA suggests that VPE with multiple auxiliaries is almost never Subj-choice. Namely, searching for the sequence "could|would have too." (the most frequent context for Subj-choice VPE) in the COCA provides only two examples of Subj-choice *would have too* and none of *could have too*, whereas searching for "could|would too." gives 47 examples of Subj-choice *would have and would have and would have are much more frequent* (several hundred of each).

PG does not occur with infinitival to *contrary to VPE* It is a striking fact that VPE is possible after infinitival *to*, but that PG is not. This seems to be a robust property: to my knowledge not a single attested example of PG with *to* has been found in corpora, and constructed examples are hopeless (e.g. **She may not visit you but she has to me.*) However, it is possible that this is once again linked to a conspiracy of discourse factors. A quick look at the COCA suggests that almost all cases of VPE with *to* are Aux-choice. Beyond this, it may also be the case that VPE after *to* in comparatives is dispreferred more generally. In the following examples from the COCA, *to* is followed by *do* (this is one of the rare contexts where nonfinite auxiliary *do* is possible in American English, as opposed to British English, where it has a broader variety of uses). The variants where *to* is removed appear to be degraded:

(22) a. Here Santayana, like Dickens, delights in the existence of ordinary humanity as

Emerson never quite manages to do. [Compare: ?as E. never quite manages to.]

- b. Rather, they should respond by taking the opinion's reasons seriously and exploring those reasons' implications—as this Article hopes to do. [Compare: ?as this Article hopes to.]
- c. maybe he would have overcome public censure and gained acceptance for the possibility of being both Mohawk and Christian, as later converts to Protestantism apparently were able to do. [Compare: ?were able to.]

6 Conclusion

This study presents preliminary conclusions based on a first analysis of the corpus data. Some questions have been left almost completely unanswered, such as why noncomparative PG is apparently less acceptable than comparative PG. For other problems, only a sketch of an analysis has been provided. This is the case for the statement of the discourse conditions on PG, as well as for the details of the way in which the overgeneration of the suggested auxiliary-asproform analysis can be reigned in by semantic constraints and processing preferences. On all these questions, it will be necessary to further investigate the corpus materials gathered and to conduct psycholinguistic experiments to test hypotheses in full detail.

It seems to me, however, that the central merit of the present study is that it shows that the complexity of the data on PG has been vastly underestimated. More generally, a study like this one makes apparent the limitations of the standard generative methodology of data collection by introspection. Even as professional linguists, our introspective abilities are simply unable to come up with the relevant range of data. And, in a case like the one under study, this clearly has important consequences for the mainstream theoretical proposals.

Beyond this, a corpus study makes apparent some of the Usage Preferences (UPs, see Miller 2013) governing the use of PG. Because of the cumulative effect of multiple UP violations, it is crucial to base one's analyses on examples that conform to UPs, which is not possible until these have been established. For instance, Lasnik 1999 cites a single example of a comparative PG at the beginning of his paper, but invents all of his other data, which are noncomparative with full NP subjects. The present study makes apparent that such cases are dispreferred, even when nothing else is wrong with them, so that any other problems they might exhibit (e.g. lack of parallelism, less accessible antecedents) might lead to a feeling of strong unacceptability. It is thus crucial to understand the usage factors that make examples more or less acceptable if one is to disentangle what are truly grammatical constraints from other factors affecting acceptability.

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Epithets as De Re Pronouns

Pritty Patel-Grosz

This paper outlines the distribution of epithets that occur in a ccommand relation with their antecedents in environments where Condition C obviation effects occur. It argues that epithets have the syntax of null pronouns that are modified by a nominal appositive. Cases where their distribution differs from that of pronouns are explained as follows: epithets cannot modify null pronouns that are uninterpreted, e.g. to receive a *de se* construal. This derives different contrasts in the distribution of epithets, shedding new light on the nature of anti-locality and the Binding Conditions.

Keywords: appositives, epithets, de re/de se, logophoricity, pronouns

1 The Empirical Scope

1.1 What are Epithets?

Epithets are anaphoric expressions that look like definite descriptions, in the sense that they consist of a nominal component and a determiner. However they differ from definite descriptions in that they involve a negative or positive evaluative component, as in the case of *the idiot* in (1a) and *the great man* in (1b), respectively. Any noun can be construed as an epithet if the relevant world view is constructed, as shown in the examples in $(2)^1$, where *the whistle-blower* and *the Naxalite* are used to convey a negative evaluation of the referent.

- a. Yesterday John₁ bumped into a fan who really loves [the idiot]₁.
 b. Yesterday John₁ bumped into a fan who really loves [the great man]₁.
- (2) a. Yesterday John₁ bumped into a fan who really loves [the whistle-blower]₁.
 b. Yesterday John₁ bumped into a fan who really loves [the Naxalite]₁.

As shown in (1) and (2), epithets can occur in configurations where they are c-commanded by a coreferential DP (here: *John*), an observation that goes back to Dubinsky and Hamilton (1998).² This is generally assumed to be impossible with definite descriptions that do not qualify as epithets (*Binding Condition C*, see Chomsky 1981), as in (3); if we replace *the idiot* with *the businessman* in (1a), the sentence becomes unacceptable.

- (3) a. *Yesterday John₁ bumped into a fan who really loves [the man]₁.
 - b. *Yesterday John₁ bumped into a fan who really loves [the businessman]₁.

The core question of this paper is how to account for such 'Condition C obviation' effects and how they are constrained. An initial question that arises at this point concerns the na-

¹Thanks to Noam Chomsky (p.c.) for these examples.

²The relative clause examples in (1) and (2) are based on an example in Dubinsky and Hamilton (1998:687).



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ture of the relationship between the epithet and the antecedent, that is, whether it involves (*accidental*) co-reference or a referential dependency.

1.2 Co-reference vs. Referential Dependency

There are different ways in which DPs can co-refer; (4) illustrates a case of *accidental co-reference* (see Evans 1980, Higginbotham 1985).³ In this case, there are multiple occurrences of two DPs (*he* and *John*) that refer to the same individual by virtue of the speaker not knowing the identity of that individual. In other words, in (4), each occurrence of the pronoun *he* and of the proper name *John* denote the same entity and accidentally co-refer due to the (inferable) context (and crucially, without a so-called referential dependency, see below).

(4) He put on John's coat; but only John would do that; so he is John. (Higginbotham 1985:570)

By contrast, a *referential dependency* is a relation that holds between two DPs if the meaning of one is dependent on the other (see Evans 1980, Reinhart 1983b). It can be shown that the relationship between epithets and their c-commanding antecedents that we have seen in (1) and (2) is one of referential dependency and not one of accidental coreference.

Reinhart (1983a, 1983b) defines Condition C as a restriction that states that an R-expression (i.e. a non-pronominal DP, such as *the man* or *the businessman*) cannot be c-commanded by an antecedent DP that it is referentially dependent on. Reinhart (1983a, 1983b) attributes the role of c-command to the possibility/impossibility of syntactic binding. The reason that *John* can be c-commanded by *he* in (4) is thus the lack of a referential dependency. We can now argue that the examples in (1)-(2) involve referential dependency, rather than accidental co-reference, that is, we appear to be dealing with syntactically bound epithets: if (1)-(2) involved accidental co-reference, then example (3) should be grammatical as well, in line with example (4). However, (3) exhibits a Condition C violation.

One may conjecture that examples of bound epithets in relative clauses simply involve Quantifier Raising (QR) followed by late merge of a relative clause (see Lebeaux 1988); while this type of QR is known to exist, it is not unconstrained. Fox (1999:181) discusses the examples in (5), which are ungrammatical even though QR should give rise to the LFs in (6).

- (5) a. */? You bought him₁ every picture that John₁ liked.
 b. *He₁ bought you every picture that John₁ liked.
- (6) a. [every picture that John₁ liked]₂ [you bought him₁t₂]
 b. [every picture that John₁ liked]₂ [he₁ bought you t₂]

Crucially, epithets can obviate Condition C even in the cases that Fox (1999) takes to be ungrammatical, as shown by (5) vs. (7). The examples in (7), which were constructed by replacing *John* in (5) with an epithet, are acceptable. In fact, the contrast in (5) vs. (7) is sometimes perceived to be stronger than the contrast in (1)–(2) vs. (3), because (5)/(7) involve less distance between the epithet and its antecedent.

- (7) a. You bought him₁ every picture that [the idiot]₁ liked.
 - b. He₁ bought you every picture that [the idiot]₁ liked.

As further confirmation of the observed contrast, the additional examples in (8) (from Fox 1999:184) are as unacceptable as the examples in (5), whereas the same examples with an epi-

³Indices are omitted, since I generally use indices to mark referential dependency.

thet in (9) are acceptable.

- (8) a. ^{??}/*You sent him₁ the letter that John₁ expected you would write.
 b. ^{??}/*You reported him₁ to every cop that John₁ was afraid of.
- (9) a. You sent him₁ the letter that [the idiot]₁ expected you would write.
 b. You reported him₁ to every cop that [the idiot]₁ was afraid of.

This indicates that epithets can quite generally obviate Binding Condition C, and that this Condition C obviation does not reduce to an independent phenomenon such as late merge of the relative clauses. At this point, one may ask if Dubinsky and Hamilton's (1998) observation is confined to English. The next section shows that it is not.

1.3 Relative Clauses Cross-Linguistically

The following set of cross-linguistic examples⁴ shows that epithets may quite generally be ccommanded by a co-referent antecedent when contained in a restrictive relative clause.

(10) Czech

 OK Včera Honza₁ narazil na fanouška, který [toho idiota]₁ úplně zbožňuje. yesterday Honza bumped on fan who that idiot totally adores 'Yesterday, John₁ bumped into a fan who really loves [the idiot]₁.'

(11) Croatian

^{?OK}Jučer je John₁ naletio na obožavatelja koji stvarno obožava yesterday AUX.3sg John bumped.PTCPL on fan who really adores [tog idiota]₁.
that idiot
'Yesterday, John₁ bumped into a fan who really loves [the idiot]₁.'

(12) *Dutch*

^{OK}Gisteren kwam Jan₁ een fan tegen die helemaal dol is op [de idioot]₁. yesterday met Jan a fan PRT who entirely fond is of the idiot 'Yesterday John₁ met a fan who is really fond of [the idiot]₁.'

(13) French

^{OK}Hier, John₁ est tombé sur un fan qui adore [cet imbécile]₁. yesterday John is fallen onto a fan who loves the idiot 'Yesterday John₁ bumped into a fan who loves [the idiot]₁.'

(14) Russian

^{OK}John₁ včera vstretil poklonnicu, kotoraja bogotvorit [ètogo idiota]₁.
 John yesterday met fan.FEM who.FEM adores this idiot
 'Yesterday, John₁ bumped ino a fan who really loves [the idiot]₁.'

At this point, the question arises if and how Condition C obviation with epithets is constrained. Section 1.4 addresses this issue, as well as outlining the core problem to be solved in this paper.

⁴The aim throughout this paper is not to provide a comparative analysis for all of the empirical data presented, but to show that the observation of epithets in particular configurations that involve Condition C obviation) is cross-linguistically robust.

1.4 The Core Problem

Once we have established that epithets can sometimes be referentially dependent on a ccommanding antecedent, we expect to find such configurations quite generally. And, indeed, in addition to the examples where epithets are bound inside relative clauses, we also find cases where they are bound in complement clauses. In (15), the epithet *the idiot* is in a complement clause and it is c-commanded across the clause boundary by a co-referring antecedent, *John* (which is in the matrix subject position). Such examples are cross-linguistically acceptable, as illustrated for Croatian in (16). Observe the difference between (15a)/(16a)and (15b)/(16b), which shows, once again, that a regular NP such as *the janitor* cannot occur in such contexts.

- (15) a. 2OK John₁ convinced the panel that [the idiot]₁ is smart.
 - b. *John₁ convinced the panel that [the janitor]₁ is smart.
- (16) Croatian

a. ^{?OK}Peter₁ je uvjerio predstavnike da će [prokleti Peter AUX.3sg convinced.ptcpl representatives that will.3sg damn problem. izdajnik]₁ riješiti traitor solve problem. 'Peter₁ convinced the representatives that [the damn traitor]₁ would solve the problem." b. *Bill₁ je predstavnike podvornik₁ uvjerio da će Bill AUX.3sg convinced.ptcpl representatives that will.3sg janitor riješiti problem. solve problem 'Bill₁ convinced the representatives that [the janitor]₁ would solve the problem.'

However epithets cannot freely co-refer with a c-commanding antecedent, as shown by (17) and (18); epithets are less acceptable in complements to *think* than in complements to *convince*, at least when in subject position.

- (17) *Peter₁ thinks that [the idiot]₁ is smart.
- (18) Croatian

*Peter₁ misli da je [prokleti izdajnik]₁ pametan. Peter thinks that AUX.3sG damn traitor smart 'Peter₁ thinks that [the damn traitor]₁ is smart.'

Contrasts like (19a) vs. (19b) show that matters are more complex. Specifically, a bound epithet can occur in the object position of a complement clause under *think*, but not in the subject position.

- (19) a. *Nero₁ thinks that [the damn traitor]₁ will be invited to the reception.
 - b. ^{OK}Nero₁ thinks that they will invite [the damn traitor]₁ to the reception.

The reader should be aware that the judgments for such constructions vary greatly. The data presented here were collected via a ratings questionnaire. For information regarding number of participants for each language, see Patel-Grosz (2012).

In the remainder of this paper, I will attempt to explain the distribution of epithets in contexts where they occur with a c-commanding antecedent, as outlined above. My goal is to derive the contrast between (15a) and (17), on the one hand, and the contrast between (19a)

and (19b), on the other hand. Section 2 presents a syntactic analysis of epithets that accounts for the fact that epithets tend to be exempt from Condition C, even though they take the surface shape of definite descriptions. In section 3, I propose a semantic analysis that derives the examples where Condition C effects appear to resurface, and the contrasts that we have observed.

2 The Syntactic Structure of Epithets

There is a long standing debate in the literature which questions the nature of epithets, that is, whether they are R-expressions or pronouns. I am going to show that for the purposes of the narrow syntax, epithets are pronouns, and present empirical evidence in favour of this claim.⁵ Specifically, I argue that epithets are null pronouns modified by a nominal appositive, as illustrated in (20).

(20) [pro [the idiot]] equivalent to [he, [the idiot]]

Section 2.1 argues that epithets are pronominal in nature; section 2.2 provides support for the specific analysis in (20).

2.1 Epithets as Pronominal Elements

2.1.1 In Support of Epithets as Pronouns I To begin with, consider the discussion in Demirdache and Percus (2011a, 2011b). Demirdache and Percus argue that epithets in Jordanian Arabic involve an appositive structure, which contains a pronoun *ha* 'this', as in (21). In other words, an epithet such as *the idiot* has the structure *he the idiot*. This seems to be a more general pattern, also observed in Aoun and Choueiri (2000) for Lebanese Arabic.⁶

(21)	xaled,	fakartu	?innu	ha-l-Hmar	bi-l-bajat			
	Xaled	you.thought	that	pro-the-donkey	at-the-house			
	Lit. 'Xaled, you thought that (he,) this donkey is at home.'							
	(Demin	dache and Per	cus 201	1a:(15b-ii))				

My proposal in (20) is motivated by the assumption that expressions with a similar syntactic and semantic behaviour and distribution also share structural properties cross-linguistically.⁷

2.1.2 In Support of Epithets as Pronouns II Further argumentation for the claim that epithets are pronouns can be found in Beller (2011), who observes that epithets have the same prosodic properties as pronouns, as in (22) (adapted from Beller 2011:1). The contrast between (22a) vs. (22b) shows that a pronoun in a sentence with default focus must be unstressed, (22b), whereas an R-expression carries default stress, (22a). (Pronouns can only be stressed contrastively, (22c).) Beller finds that epithets quite generally pattern like pronouns with respect to prosody. In (23a) (from Beller 2011:1, who attributes it to Ladd 2008), *the butcher* is unstressed, resulting in the epithet reading. In contrast, if we stress *the butcher*, only the literal interpretation is possible, as in (23b).

- (22) a. [Susan slapped JIM]_F.
 - b. [Susan SLAPPED him]_F.

⁵Further evidence and argumentation are provided in Patel-Grosz (2012).

⁶In Lebanese Arabic, the expressive component of epithets is typically negative, cf. Aoun and Choueiri (2000) for further discussions and data.

⁷In Arabic, the pronoun is overt, whereas in languages like English and German, the pronoun is null.

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- c. Susan slapped [HIM]_F.
- (23) Context: How was your operation?
 - a. Don't ask me about it. I'd like to STRANGLE the butcher. (*the butcher* refers to the surgeon)
 - b. Don't ask me about it. I'd like to strange the BUTCHER. (*the butcher* refers to the actual butcher)

2.1.3 New Evidence from Quantifier-Variable Binding The strongest piece of evidence for treating epithets as pronouns stems from the following observation. In many languages, an epithet such as *the idiot* can co-vary with a quantifier such as *every professor* that c-commands it. The epithet in such constructions is thus syntactically bound by the quantifier under c-command. Crucially, a quantifier can bind an epithet in a restrictive relative clause, as in (24a), but not in an appositive relative clause, as in (25a). This is the same pattern that we find with bound pronouns, as in (24b) and (25b), thus lending support to the assumption that (24a) involves syntactic binding.

- (24) *Dutch*
 - a. ^{OK}Bij de receptie is [iedere professor]₃ wel een (één of andere) professor the reception is every or other at PRT а one uitmuntende student tegengekomen, die $[de idioot]_3$ had laten zakken. excellent student met who the idiot had let fail 'At the reception, [every professor]₃ bumped into some excellent student or other who [the idiot]₃ had failed.'
 - b. ^{OK}Bij de receptie is [iedere professor]₃ wel een (één of andere) at the reception is every professor PRT a one or other uitmuntende student tegengekomen, die ze₃ had laten zakken. excellent student met who she had let fail 'At the reception, [every professor]₃ bumped into some excellent student or other who she₃ had failed.'
- (25) Dutch
 - a. *Bij de receptie is [iedere professor]₃ die geniale Jan tegengekomen, die at the reception is every professor that genius Jan met who [de idioot]₃ had laten zakken.
 the idiot had let fail
 'At the reception, [every professor]₃ bumped into the genius John who [the idiot]₃ had failed.'
 - b. *Bij de receptie is [iedere professor]₃ die geniale Jan tegengekomen, die at the reception is every professor that genius Jan met who ze₃ had laten zakken.
 she had let fail
 *At the reception [successformer] hummed into the genius Jahn who she had

'At the reception, [every professor] $_3$ bumped into the genius John who she $_3$ had failed.'

Generally, only pronouns can be bound by quantifiers; therefore, examples like (24a) support the view that epithets are pronouns and not R-expressions. Consider also the German example in (26), which also involves a restrictive relative clause: the pronoun *denjenigen* 'those' can only be modified by a restricted relative clause and not by an appositive relative clause.

(26) [Jeder NPÖ-Politiker]₁ schickt denjenigen, die [den Idioten]₁ öffentlich every NPÖ-politician sends those who the idiot publicly unterstützen, eine Kornblume.
support a corn.flower
'Every NPÖ politician sends a cornflower to those who publicly support the idiot.'

In addition to being bound in a restrictive relative clause by a quantifier outside of the clause, (27) from Dutch shows that epithets can also be bound in complement clauses. This corroborates the generalisation from above, that epithets can co-vary with a quantifier and be bound under c-command. In (27), *die idioot* (the idiot) seems to be bound by *iedere uitvoerderer* 'every performer'.

(27) [Iedere uitvoerder]₁ overtuigde het paner ervan dat [die idioot]₁ slim is.
every performer convinced the panel of.it that the idiot smart is.
'[Every performer]₁ convinced the panel that [the idiot]₁ is smart.'

Having thus argued that epithets exhibit the behaviour of pronominal elements, we can now turn to the second part of the analysis, which is the treatment of epithets as nominal appositives that modify a null pronoun.

2.2 Epithets as Nominal Appositives with a Null Head

2.2.1 The Proposal As briefly discussed above, I propose that epithets have the structure of a nominal appositive, illustrated in (28). Nominal appositives consist of an anchor, such as *John* in (29c), which is the head of the appositive, and an apposition (here: *the idiot*). The analysis in (28) is very much in the spirit of den Dikken (2001) and Kayne (2010), who propose that so-called *committee* nouns actually have the structure *they, the committee* with a null variant of *they*.

- (28) [pro [the idiot]] equivalent to [he, [the idiot]]
- (29) a. Do you know John? *The idiot* came to my party.
 - b. Do you know John? He, the idiot, came to my party.
 - c. John, the idiot, came to my party.

Note that the idea of treating epithets as nominal appositives is not new; see Postal's (1972:247)⁸ examples in (30) and (31). In this vein, although I adopt a different analysis from Postal (1972), I concur that epithets are pronouns that are modified by an appositive.

- (30) a. I wanted Harry $_i$ to help me but he $_i$, who is a bastard, wouldn't do it.
 - b. I wanted $Harry_i$ to help me but the bastard_i wouldn't do it.
- (31) a. I have never met Melvin_i but Joan says she has met him, who_i is a bastard.
 b. I have never met Melvin_i but Joan says she has met the bastard_i.

Let us now turn to empirical arguments for the analysis in (28).

⁸While Postal (1972) suggests on the basis of (30) and (31) that perhaps epithets are underlyingly appositive constructions, he does not explicitly discuss their appositive structure. Since Postal (1972), many others have followed suit in assuming that epithets are appositives (Umbach 2002, Potts 2003, 2005, 2007, and Beller 2011), but the internal structure of the epithet remains controversial.

2.2.2 Arguments for Treating Epithets as Nominal Appositives with a Null Anchor⁹ Den Dikken (2001), Kayne (2010) and Taylor (2009) have argued for other constructions that there are nominal appositives which have a null anchor, as I assume for epithets. The basic idea is that so called *pluringulars* or *committee nouns* that can trigger plural-like agreement (given in (33a)) actually involve a singular nominal appositive (*the committee*) with a plural anchor (a null pronoun corresponding to *they* in (33c)). (33) is based on Kayne (2010:133, fn. 3).

Kayne (2010) presents the following argument for this analysis: on the one hand, floating quantifiers typically associate with a suitable noun phrase (e.g. *the politicians* in (32)); on the other hand, in pluringular constructions, although quantifier float is possible, as in (33a), the quantifier cannot be a part of the DP, as in (33b). This is exactly what we would expect if (33a) is analysed as (33c), and (33b) as (33d), since quantifiers like *all* cannot modify pronouns like *they*.

- (32) a. The politicians have all voted yes. / All the politicians have voted yes.b. The politicians have both voted yes. / Both the politicians have voted yes.
- (33) a. The committee have all voted yes.
 - b. *All the committee have voted yesterday.
 - c. They, the committee, have all voted yes.
 - d. *All they, the committee, have voted yes.

To summarise the core point of Kayne's argument, *committee* nouns can c-command a floating quantifier, as in (33a), but they cannot combine with the quantifier, as in (33b); while we can say *all the politicians*, we cannot say *all the committee*. This follows if the phrase *the committee* actually modifies a null pronoun (*they*), for *all they, the committee* is unacceptable as well.

The data in (34) and (35) show how Kayne's argumentation can be applied to epithets. Here, I use the epithet *scum*, which is grammatically singular but can refer to more than one individual; thus *both/all* cannot be a part of the appositive because **both/all the scum* is ungrammatical due to a number mismatch (*both/all* requires a plural complement). The data indicate that epithets also have such a structure: a null pronoun modified by a nominal appositive.

- (34) a. John, Bill, and Jack were here. The scum have voted yes.
 - b. John, Bill, and Jack were here. The scum have all voted yes.
 - c. John, Bill, and Jack were here. *All The scum have voted yes.
- (35) a. John and Jack were here. The scum have voted yes.
 - b. John and Jack were here. The scum have both voted yes.
 - c. John and Jack were here. *Both the scum have voted yes.

I would like to make it clear, however, that *the scum* is not simply a *committee* noun (which would be a possible source of confusion); first, it can refer to individuals, while *committee* nouns cannot, and, second, the judgments in (34) and (35) are shared by speakers of British and North American English; by contrast, *committee* nouns are used only by British English speakers. Based on the data and observations outlined in this section, I conclude that epithets are null pronouns modified by an appositive. We can now turn to the question of why epithets do not always behave like pronouns.

⁹Cf. Patel-Grosz (2012) for further argumentation supporting this claim.

3. The Role of the Attitude Predicate

3.1 The Problem

The core problem that we need to address can be stated as follows. First, if epithets are indeed pronouns, as argued in section 2, see (36a), then we would expect them to pattern alike in all environments, that is, we would expect them to always have the distribution of pronouns. In relative clauses, this clearly holds, as shown in (36a-c) vs. (36d). In (36), the epithet *the idiot* behaves exactly like the pronoun *him*.

- (36) a. Yesterday, John₁ bumped into a fan who really loves [*pro*₁ the idiot].
 - b. Yesterday, John₁ bumped into a fan who really loves him₁.
 - c. Yesterday, John₁ bumped into a fan who really loves [him₁, the idiot].
 - d. *Yesterday, John₁ bumped into a fan who really loves [the teacher]₁.

However, surprisingly from this perspective, the data in (37) show that when epithets are in complement clauses, they sometimes do not pattern like pronouns, but like R-expressions, cf. (37a) and (37d) vs. (37b-c). In (37a), the epithet is unacceptable in a place where a pronoun is acceptable. If epithets are pronominal elements, this raises the question as to why they are unacceptable in certain cases where pronouns are acceptable.

- (37) a. *John₁ thinks that [pro_1 the idiot] is smart.
 - b. John₁ thinks that he_1 is smart.
 - c. John₁ thinks that $[he_1, the idiot,]$ is smart.
 - d. *John₁ thinks that [the teacher]₁ is smart.

Moreover, recall the core empirical problem: in many languages we find a contrast between complements of *think* and complements of *convince*. A complement of *think* generally cannot contain epithets in subject position that refer to the matrix subject, as in (38a), whereas a complement of *convince* can, as in (38b). The same pattern that we find in English also holds in Russian, as shown in (39); again, an epithet is acceptable in the subject position of the complement of *convince*, as in (39b), but not in the subject position of the complement clause of *think*, as in (39b).

- (38) a. *Peter₁ thinks that [the idiot]₁ is smart.
 - b. ${}^{?OK}$ John₁ convinced the panel that [the idiot]₁ is smart.
- (39) Russian
 - a. *John₁ dumaet, čto [ètot idiot]₁ umjon. John.Nom thinks that this idiot.Nom smart 'John₁ thinks that [this idiot]₁ is smart.'
 - b. 70K John₁ ubedil sovet, čto [ètot idiot]₁ umjon. John.nom convinced panel that this idiot.nom smart 'John₁ convinced the panel that [this idiot]₁ is smart.'

Do these empirical data challenge the view that epithets are pronominal rather than R-expressions? The short answer to this question is: no. Epithets systematically differ from regular R-expressions; what we see in (40) is, once again, that genuine R-expressions in the complement of *convince* are still ungrammatical. If epithets were R-expressions, they should be unacceptable in the complement of *convince* as well, in contrast to what we see in (38b) and (39b).

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- (40) a. John₁ convinced Peter that [the idiot]₁ is smart.
 - b. *John₁ convinced Peter that [the janitor]₁ is smart.

It is worth pointing out that *think* and *convince* do not form a minimal pair; a more minimal example is provided in (41), where we see that an epithet in the complement of *not know* is more acceptable than an epithet in the complement of *know*.

(41) a. *Nero1 knows that [the damn traitor]1 should invite Sarkozy to the peace talks.
b. Nero1 doesn't know that [the damn traitor]1 should invite Sarkozy to the peace talks.

3.2 A Solution

To account for the difference between *think* and *convince* with respect to epithets, I propose an analysis based on Percus and Sauerland (2003a, 2003b). The main idea is that the semantics of predicates like *think* involve the *belief-self* of its subject (i.e. the individual with whom the subject of *think* identifies in his or her beliefs). A pronoun in the complement clause of *think* can be identified with this belief-self, giving rise to a so-called *de se* construal (cf. Lewis 1979, Perry 1979, and Chierchia 1989). In this vein, (42a) describes a situation where John thinks that John's belief-self is smart, that is, John has a belief about himself. Here, the pronoun *he* in the complement clause is construed *de se*.

- (42) a. John₁ thinks that he_1 is smart. (Intended reading: John thinks "I am smart.")
 - b. De se *construal*: John₁ thinks that John's belief-self₁ is smart. (Where John's belief-self = who John is in John's beliefs)

I propose to derive the epithet-pronoun difference from the assumption that epithets cannot modify a null pronoun that receives such a *de se* construal, as reflected by (43).

- (43) *John thinks that pro_{de-se} the idiot is smart.
 - (Intended reading: John thinks: "I am smart" and the speaker does not like John.)

As we will see in section 3.3, the proposal sketched informally in (42) and (43) derives the patterns which are at the heart of the problem, repeated in (44). The core idea is that (44a) (in the reading in which it is unacceptable) allows and, in fact, requires a *de se* construal, as in (43), whereas (44b) does not have such a *de se* construal. Note that, in fact, (44a) is only unacceptable in the reading in (43), where John has a *de se* belief. Percus and Sauerland (2003a, 2003b) discuss contexts such as the following: John is drunk, sees a video of someone, and thinks that this person is smart, without recognizing that he himself is the person in the video. Intuitively (44a) is acceptable in such a situation, in which John has a *de re* belief about himself.

- (44) a. *John₁ thinks that [the idiot]₁ is smart.
 - b. John₁ convinced Peter that [the idiot]₁ is smart.

At this point, the question remains why a *de se* reading cannot arise in (44a) as a special type of *de re* reading; we come back to this question below.

3.3 Formalising the Solution

Percus and Sauerland (2003a, 2003b) argue that, in English, *de se* readings for examples like (42) above have an independent logical form in the semantics. Percus and Sauerland (2003a)

discuss the example in (45) and argue that it can be used to describe both the *de se* belief in (45b) and the *de re* belief in (45c). In other words, (45a) can be used to describe two different situations: in the *de se* situation, described in (45b), John has a conscious belief about himself. Here, the embedded pronoun that co-refers with *John* is identical to his belief-self (i.e. the individual identical to John in all of John's belief worlds). In the *de re* case, described in (45c), John also has a belief about himself but he does not know that the belief is about himself.

- (45) a. John₁ thinks that he₁ will win the election. (Percus and Sauerland 2003a)
 - b. De se *belief* John thinks: "I will win the election."
 - c. De re *belief* John is drunk and sees someone giving a speech on TV; not recognising that it is he himself, John thinks: "This guy (on TV) will win the election."

The core idea that I pursue is that when an epithet is contained in the complement proposition of *think*, and a *de se* interpretation is intended, the epithet cannot be interpreted in its surface position. In (44a), this yields ungrammaticality. I return to this in section 3.4.

Let us first revisit Percus and Sauerland's (2003a, 2003b) analysis, shown in (46).

(46) VP

$$\begin{bmatrix} John thinks (he^{*}) \lambda_{2} t_{2} will win the election \end{bmatrix}^{g}$$

$$= \lambda w . For all < y, w' > in DOX_{John,w}, y will win the election in w' where y is John's belief-self in w' DP V'
$$\begin{bmatrix} John \end{bmatrix}^{g} = John \qquad \begin{bmatrix} thinks (he^{*}) \lambda_{2} t_{2} will win the election \end{bmatrix}^{g} =$$

$$= \lambda x . \lambda w . For all < y, w' > in DOX_{x,w}, y will win the election in w' where y is x's belief-self in w' CP_{1}$$

$$\begin{bmatrix} thinks \end{bmatrix}^{g}$$

$$= \lambda P_{} . \lambda x . \lambda w .$$
For all in DOX_{x,w}, P(y)(w') = 1 where y is x's belief-self in w' A_{2} CP_{2}$$

$$\begin{bmatrix} t_{2} will win the election \end{bmatrix}^{g}$$

$$= \lambda w . g(2) will win the election in w$$

In this analysis, a predicate such as *think* takes a clausal complement, which contains an empty individual variable slot that is bound by the subject's belief-self *y*. To get the *de se* LF, Percus and Sauerland assume that a complement clause, such as *he will win the election*, is turned into a property. This is done by lambda-abstracting over one of the embedded arguments, and that argument is the *de se* pronoun. By doing this, the embedded argument position that is superficially occupied by the *de se* pronoun is actually bound by the belief-self that its matrix verb introduces. The relevant parts of the Percus and Sauerland analysis are given in (46), deriving a *de se* LF for (45a–b). (DOX_{x,w} stands for the set of pairs <y, w'> such that w' is a world compatible with x's beliefs in w, and y is the individual in w' who x in w identifies as himself.) A pronoun that has a *de se* construal is marked by an asterisk (*). The resulting LF is given in (47): most importantly, (47) conveys that John has a belief about his belief-self; put differently, he has a conscious belief about himself.

(47) De se LF

[John thinks (he^{*}) λ_2 [t₂ will win the election]]

= λw . For all <y, w'> in DOX_{John,w}, y will win the election in w', where y is John's beliefself in w'

In words: 'In all worlds that are compatible with John's thoughts/beliefs, and which contain John as he views himself (= John's belief-self), John's belief-self will win the election.'

This is very different from a *de re* LF, which is given in (48). We can think of two possible *de re* LFs. The two *de re* LFs in (48a-b) differ from the *de se* LF in (47), because in both (48a) and (48b), the belief-self doesn't bind the argument position associated with the embedded pronoun. As shown, *de re* LFs can involve binding of the embedded pronouns by the matrix subjects, as in (48a), or simply coreference, as in (48b). In either case, the embedded argument will not be identified with the matrix subject's belief-self. In other words, John's beliefs are not about his belief-self; they are about an individual in the actual world who happens to be John.

- (48) a. De re *LF* with binding John λ_2 thinks [he₂ will win the election]
 - b. De re *LF* without binding John thinks [he_2 will win the election] (Where he_2 refers to John)
 - c. [[(48a)]] = [[(48b)]] = λw. For all <y, w'> in DOX_{John,w}, John will win the election in w', where y is John's belief-self in w'
 In words: 'In all worlds that are compatible with John's thoughts/beliefs, and which contain John as he views himself (= John's belief-self), John will win the election.'

In brief, the difference between the two denotations ultimately comes down to the fact that in the *de se* case in (47), the subject of *will win the election* is identified with John's belief-self. By contrast, in the *de re* case in (48), the subject of *will win the election* is identified with John in the actual world, not with John's belief-self.

To derive the restrictions on epithets, I pursue the idea that *de se* LFs are obligatory whenever the context involves a *de se* belief (cf. Schlenker's (2005b) *Prefer De Se!*).¹⁰ Furthermore, it is not possible for an epithet to contain a null pronoun that is construed *de se*. What this means in Percus and Sauerland's system is that the appositive contained in an epithet cannot modify an uninterpreted pronoun that is marked by an asterisk (*pro**). The purpose of using such an uninterpreted pronoun is to identify the pronoun's argument position with the matrix subject's belief-self.

Note that for object pronouns, Percus and Sauerland (2003a) assume a configuration analogous to (47), as given in (49). Here, the embedded object is identified with the belief-self of the matrix subject.

(49) a. John thinks Mary will vote for him.

¹⁰An anonymous reviewer points out that it is unclear why the unacceptable examples with bound epithets cannot simply be saved by a *de re* construal, whenever they are presented in out-of-the-blue contexts. This seems to be connected to the fact that *de re* readings (where someone has a belief that involves themselves without re-alizing that it is about themselves) are generally more difficult to access than *de se* readings (where someone consciously has a self-directed belief). Native speakers report that the most natural reading of *John thought that he was smart* is always a reading in which John thought: "I am smart." The alternative *de re* readings always require an elaborate context to become accessible.
b. De se LF: John thinks (him^{*}) λ_2 [Mary will vote for t_2] (Adapted from Percus and Sauerland 2003a:241)

To recapitulate, my proposal amounts to the idea that predicates which do not allow a bound epithet in the embedded clause are the same predicates that allow for *de se* LFs. Specifically, epithets cannot combine with null anchors consisting of uninterpreted pronouns. This idea is based on Demirdache and Percus (2011a, 2011b). Turning to the core examples, repeated in (50), a pronoun in the complement of *think* that refers to the matrix subject must be identified with its matrix subject's belief-self, rendering (50a) unacceptable. By contrast, the acceptability of (50b) can be attributed to the fact that a pronoun in the complement of *convince* cannot be identified with the matrix subject's belief-self, that is, it cannot receive the relevant *de se* construal, see Stephenson (2007). This is due to the fact that *think* introduces the matrix subject's belief-self and *convince* has been argued to introduce the matrix object's belief-self; see (51) vs. (52).

(50) a. *John₁ thinks that [the idiot]₁ is smart.
b. ^{?OK}John₁ convinced Peter that [the idiot]₁ is smart.

In the framework of Percus and Sauerland (2003a), *think* has a meaning as given in (51); as shown by Stephenson (2007:43, 149), *convince* differs in that the belief state that results from a convincing event is a belief-self on the part of the hearer. This is shown in (52).

- (51) The meaning of think $[think]^{g} = \lambda P_{\langle e, \langle s, t \rangle \rangle} \cdot \lambda x \cdot \lambda w \cdot For all \langle y, w' \rangle in DOX_{x,w}, P(y)(w') = 1$
- (52) The meaning of convince [[convince]]^g = λz_e . λP_{<e,<s,t>>} . λx . λw . x communicates with z in a way that causes it to be the case that for all <y, w'> in DOX_{z,w}, P(y)(w') = 1

The analyses for (50) are summarized in (53). In (50a), a *de se* LF is possible and, in fact, obligatory, giving rise to the unacceptable (53a). For (50b), a *de se* LF is impossible and we get the acceptable (53b), thus deriving the *think* vs *convince* difference. This motivates the following conclusion: *think* must combine with *de se* LFs whenever the reported context is one where the actual belief is best characterized as a *de se* belief. As *convince* is not interpreted with respect to the subject's beliefs, *a de* se reading cannot pick out the subject's belief-self, which derives the fact that (53b) is acceptable.

(53) a. *John thinks $pro^* \lambda_2$ [t₂ the idiot] is smart (*de se* LF) b. ^{?OK}John convinced Peter that [*pro*₁ the idiot] is smart (only *de re* LF, where *pro*₁ refers to John)

Note that the relative clause cases are also predicted to be grammatical under this analysis, since the relevant constructions with relative clauses that we discussed in section 1 do not contain a predicate that introduces a belief-self (such as *think*). As a consequence, a *de se* construal of the null pronoun modified by the epithet does not arise.

3.4 Deriving the Subject-Object Asymmetry

I now want to return to the subject-object asymmetry, as discussed in section 1.4. The data are repeated in (54). We find that epithets in the complement of *think* are only ungrammatical when co-referring to the matrix subject if they are in subject position, and not if they are

in object position. The data in (54a) sharply contrast with those in (54b): while (54a) is unacceptable, (54b) seems to be perfectly acceptable.

- (54) a. *Nero₁ thinks that [the damn traitor]₁ should invite Sarkozy to the peace talks.
 - b. OK Nero₁ thinks that Sarkozy should invite [the damn traitor]₁ to the peace talks.

From the perspective of Percus and Sauerland, subject pronouns and object pronouns should not differ in terms of a *de se* construal; see (47) and (49). These contrasts are thus not predicted by the above analysis. The idea that I pursue is inspired by Demirdache and Percus (2011a, 2011b). The idea is that the asymmetry follows from an asymmetry on extraction.

I propose that constructions where epithets surface in the location of an uninterpreted null anchor can be saved by Demirdache and Percus's epithet float, given in (55). Demirdache and Percus argue that epithets cannot attach to a trace that results from a *de se* construal of a pronoun. This is equivalent to my own proposal for other languages. However, crucially, they argue that in such cases the expressive material can move covertly from its surface position to the position of its antecedent, known as *epithet float*.

(55) Epithet float

On the way to LF, an epithet's expressive term can float away from its host pronoun and combine with the pronoun's "antecedent". (Demirdache and Percus 2011b:382)

The LFs in (56a) and (56b) would be the ungrammatical *de se* LFs of (54a) and (54b) if epithet float did not apply. Once epithet float is applied, we see that it can save (56b), but not (56a).

- (56) a. *LF: Nero thinks *pro*^{*} λ_2 that [t₂ the damn traitor] should invite [Sarkozy] to the peace talks
 - b. *LF: Nero thinks *pro*^{*} λ_2 that [Sarkozy] should invite [t₂ the damn traitor] to the peace talks

The important contrast is given in (57) vs. (58). I propose that the grammatical (57a) actually has the LF in (57b), generated by covert movement, as in (57c). Crucially, in (57c), the epithet can covertly move out of the object position, which is why it is grammatical. The question that remains is why (58) cannot involve such movement. (58a) should have the LF in (58b), generated from the surface syntactic structure by analogous covert movement, as in (58c). This should be grammatical if epithet float was unconstrained. I conjecture that the difference between (57) and (58) is related to the fact that subject positions are islands for extractions, while object positions are not (Huang 1982). The core idea is thus that epithet float in these cases can move the epithet from the object position in (57), as opposed to the subject position in (58). The former is possible, the latter is not.

- (57) a. OK Nero₁ thinks that Sarkozy should invite [the damn traitor]₁ to the peace talks.
 - b. ^{OK}LF: [Nero, the damn traitor], thinks *pro*^{*} λ_1 Sarkozy should invite t_1 to the peace talks
 - c. Epithet float of *the damn traitor* at LF: Nero <u>the damn traitor</u> thinks *pro*^{*} λ_1 Sarkozy should invite [t₁ the damn traitor] ...
- (58) a. *Nero₁ thinks that [the damn traitor]₁ should invite Sarkozy to the peace talks. b. *LF: [Nero, the damn traitor], thinks *pro** λ_1 t₁ should invite Sarkozy to the peace talks

c. Epithet float of *the damn traitor* at LF: (ungrammatical due to island constraints) *Nero <u>the damn traitor</u> thinks $pro^* \lambda_1 [t_1 \text{ the damn traitor}]$ should invite Sarkozy ...

A recent data point to illustrate a similar subject/object asymmetry for a less controversial case of covert movement is given by Kayne (1998:234, 241), who presents the contrast in (59a) vs. (59b). Kayne argues that Quantifier Raising cannot move an embedded subject into the matrix clause, whereas an object can undergo such movement.

- (59) a. She has requested that they read [not a single linguistics book].
 ^{OK}QR-ed reading:
 'There was not a single linguistics book such that she requested that they read it.'
 - b. She has requested that [not a single student] read our book. *QR-ed reading:
 - 'There was not a single student such that she requested that he read our book.'

4 Conclusion

I have presented a new puzzle for anti-locality, repeated in (60), and I argued that epithets are null pronouns with an adjoined nominal appositive.

- (60) a. *Nero₁ thinks that [the damn traitor]₁ will be invited to the reception.
 - b. ^{OK}Nero₁ thinks that they will invite [the damn traitor]₁ to the reception.
 - c. ${}^{?OK}$ John₁ convinced Peter that [the idiot]₁ is smart.

The difference between *think* in (60a) and *convince* in (60c) then follows from the assumptions that epithets cannot modify uninterpreted *de se* pronouns. The subject-object asymmetry in (60a) vs. (60b) follows from general constraints on movement, such as the constraint that extraction is possible from the object position, but not from the subject position. One open question remains, namely: when is a *de se* interpretation possible or blocked to begin with? This is a more general issue that goes beyond the focus of this paper.

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Distance Distributivity in Polish: Towards a Glue Semantics Approach

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We propose a novel syntactico-semantic analysis of distance distributivity in Polish and other languages, which is couched in Lexical Functional Grammar coupled with Glue Semantics. We introduce and analyse a troublesome construction, apparently not considered so far in the distance distributivity literature, where the sorting key is syntactically embedded in the distributive share. Worked-out examples are provided with Glue Semantics proofs.

Keywords: distance distributivity, Glue Semantics, LFG, Polish

1 Introduction

The aim of this paper is to provide a semantic analysis of some distance distributivity facts in Polish, including potentially problematic facts apparently not discussed previously either in the context of Polish or on the basis of other languages. Distance distributivity may be illustrated with the following examples from English, German, and Polish; their common feature is that the distributive element (each, jeweils, po) combines directly with the distributed NP¹ (e.g. two sausages in (1)) and that the plural NP denoting the restriction of the distribution (e.g. boys in (1)) may be expressed at some distance from the distributive element.

- (1) The boys have bought two sausages each.
- Die Jungen haben jeweils zwei Würstchen gekauft. (German; Zimmermann 2002:37) (2)have DISTR two sausages the boys bought 'The boys have bought two sausages each.'
- (3) Chłopcy kupili po dwie kiełbaski. (Polish) bought DISTR two sausages boys 'The boys (have) bought two sausages each.'

Following Choe 1987, Zimmermann 2002 and subsequent literature, the phrase denoting the distributed objects (two sausages here) will be called the distributive (or distributed) share, and the phrase denoting the set over which distribution takes place (boys above) will be called the sorting (or distributive) key.

Zimmermann 2002 - couched in transformational grammar and roughly following the approach to semantics outlined in Heim and Kratzer 1998 - remains the most comprehensive account of distance distributivity in German and cross-linguistically, but it is not without problems.² Dotlačil 2012 notes that on Zimmermann's account the relation between the distributive

²See Przepiórkowski 2014b for extended discussion.



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¹Polish is a determinerless language, hence the use of NP rather than DP here.

share and the sorting key must be expressed by a constituent in the syntactic tree (e.g. such a constituent exists for *have bought* in (1)), but examples where no such constituent may be posited are easily found, as in *Alex and Sasha visited the capitals of three states each* (there is no constituent corresponding exactly to *visited the capitals of*). Moreover, while Zimmermann (2002) seeks to provide an account not relying on LF movement, he acknowledges (sect. 2.4.2 of chap. V) that his analysis must assume such covert movement for some occurrences of *jeweils*, e.g. in (4) (Zimmermann 2002:269):

(4) Jeweils zwei Offiziere begleiteten die Ballerinen nach Haus. (German)
 DISTR two officers accompanied the ballerinas to home
 'Each ballerina was accompanied home by two officers.'

Finally, his analysis does not handle inverse linking cases where the sorting key is syntactically embedded in the distributive share, as in the Polish example (5) (whose schematic syntactic structure is given in (6)) or the corresponding German example (7) (Malte Zimmermann, p.c.):³

- (5) Przybyło po 3 przedstawicieli 25 krajów. (Polish) arrive.PAST DISTR 3 representatives 25.GEN countries.GEN
 '3 representatives arrived from each of 25 countries.'
- (6) Przybyło [po [3 [przedstawicieli [25 krajów]]]].
- (7) Jeweils 3 Abgeordnete aus 25 Ländern trafen ein. (German)
 DISTR 3 representatives from 25 countries arrived

To the best of our knowledge such constructions – and the difficulties they cause – have not been noticed in the distance distributivity literature so far.

We propose an analysis which is free from such problems: it does not assume that the relation between the distributive share and the sorting key is expressed by a syntactic constituent, it is uniformly formulated at the interface between the level of grammatical functions and the semantic level, and it correctly handles constructions exemplified by (5) and (7).

The main idea of the account is this: the semantic impact of *po* activates only once the distributive share combines semantically with the verb and creates a property. For example, in case of (5), the meaning of *Przybyło 3 przedstawicieli*, ' λY . 3 representatives of *Y* arrived', is derived first. Then, the meaning of *po* combines with this property, let us call it *S*, holding of some set *Y*, and produces a new property, which is just like *S* but holds of each element of *Y*: ' λY . for each element *y* of *Y*, 3 representatives of *y* arrived'. Finally, this new property combines with the sorting key *25 krajów* '25 countries', resulting in the meaning: 'for each of 25 countries, 3 representatives arrived'.

The remainder of this paper is structured as follows. Polish distance distributivity facts are outlined in section 2. A brief introduction to Glue Semantics follows in section 3. The analysis, together with some worked-out examples (including (5) above), is presented in section 4. Finally, section 5 concludes the paper.

³In order to increase clarity and shorten the textual form of the examples, numbers are written as digits here; the fully spelled-out form of (5) is: *Przybyło po trzech przedstawicieli dwudziestu pięciu krajów.*

2 Distance Distributivity in Polish

The syntactic behaviour of the distributive *po* in Polish is complex. Przepiórkowski 2013 shows that at least three morphosyntactically different distributive lexemes *po* exist in Polish, illustrated below.⁴

- (8) Dałem im po jabłku.
 gave-I them.DAT DISTR apple.LOC
 'I gave them an apple each.'
- (9) Dałem im po dwa jabłka. gave-I them.DAT DISTR two.ACC apples.ACC 'I gave them two apples each.'
- (10) ...nagroda należy się po trzem osobom z każdej klasy... reward is due to DISTR three.DAT person.DAT.PL from each class
 'Three people from each class deserve a reward.'
 (NKJP)

When *po* combines with a non-numeral nominal phrase, as in (8), this phrase must occur in the locative case, which in Polish is reserved for complements of some prepositions. Such *po*+NP phrases are restricted to so-called structural case positions (nominative, accusative, genitive of negation). The situation is much more complex when the distributive *po* combines with a numeral phrase. In some positions *po* behaves like a preposition assigning the accusative case; this is illustrated in (9), where case would remain accusative even if the verb was negated, cf. (11a) below. This shows that the NumP *dwa jabłka* 'two apples' receives its case from *po*, as otherwise it would bear the genitive of negation, as in (11b).

(11)	a.	Nie dałem im	ро	dwa/*dv	wóch	jabłka/*jabłek.	
		NEG gave-I them.DAT	DISTF	a two.Acc	c/*gen	apples.ACC/*GEN	
		'I didn't give them ty	vo app	les (each	ı).'		
	b.	Nie dałem im	dwóc	h/*dwa	jabłek	:/*jabłka.	
		NEG gave-I them.DAT two.GEN/*ACC apples.GEN/*ACC					
		'I didn't give them ty	vo app	oles.'			

Finally, (10) illustrates that *po* sometimes does not assign case and may be transparent to case assignment; the dative on *trzem osobom* 'three people' is assigned by the verb. While similar examples may also be found for other morphological cases, including instrumental, genitive and locative, they are often judged marginal or downright unacceptable, which shows that the availability of this third lexeme *po* is restricted.

Despite such morphosyntactic idiosyncrasies, Przepiórkowski 2013 in the HPSG settings and Przepiórkowski and Patejuk 2013 within LFG, provide a unified analysis of the three lexemes *po* which treats all of them as heads. Hence, in the remainder of this paper we will not distinguish them and we will assume that the phrase *po* combines with is its object.

Polish patterns with German rather than English in allowing the distributive share in the subject position. In a classic paper on *po*, Łojasiewicz (1979:154) cites the following examples

⁴The first two examples, (8)–(9), are constructed but uncontroversial. As mentioned below, the acceptability status of examples such as (10) is disputed, so this example is attested; NKJP stands for *Narodowy Korpus Języka Polskiego* 'National Corpus of Polish' (http://nkjp.pl/; Przepiórkowski et al. 2012). Henceforth, Polish examples will not be explicitly marked as such.

with (post-verbal) subjects:⁵

- (12) Z drzew spadło po jabłku. from trees fell DISTR apple.LOC 'An apple fell from each tree.'
- (13) W pokojach będą po dwa fotele.in rooms be.FUT DISTR two armchairs'There will be two armchairs in each room.'

Such cases pose no problem for the analysis proposed below.

One aspect of distance distributivity in Polish that is not considered here is the possibility of distribution over events. The argument that distributive elements like the German *jeweils* may quantify over events comes from examples such as (14) adduced by Moltmann (1997) and cited in Zimmermann 2002:28:

(14) Peter hat Maria aus jeweils zwei Gründen kritisiert und gelobt. (German)
 Peter has Maria for DISTR two reasons criticised and praised
 'Peter has criticised and praised Maria for two reasons respectively.'

This sentence means that for each of the two events involving Peter as an agent and Maria as a patient, namely, that of criticising and that of praising, Peter had two reasons to be so involved in them. Similarly, the only way to interpret (15), also from Zimmermann 2002:36, is to assume a contextually given set of events of the Pope's travels that *jeweils* quantifies over.

(15) Der Papst ist in jeweils drei Länder gefahren. (German)
 the Pope has to DISTR three countries travelled
 'The Pope has travelled to three countries each.'

Similar examples can be constructed in Polish:

- (16) Piotr miał po dwa powody by chwalić i krytykować Marię.
 Piotr had DISTR two reasons to praise and criticise Maria.
 'Peter had two reasons each to criticise and to praise Maria.'
- (17) Papież zwiedzał po trzy kraje.Pope visited DISTR three countries'The Pope visited three countries each time.'

Nevertheless, we assume simplistic eventless representations here and do not treat such cases of distributivity over events.⁶

3 Glue Semantics

In traditional approaches to compositionality (e.g. Heim and Kratzer 1998), meanings combine when they are expressed by siblings in a constituency tree. By contrast, in Glue Semantics (Dalrymple 1999, 2001) coupled with Lexical-Functional Grammar (Bresnan 2001, Dalrymple 2001),

 $^{^{5}}$ The case of *dwa fotele* 'two armchairs' is not given in (13), as it is not clear whether this phrase occurs in the nominative or in the accusative here; Przepiórkowski 2013 and Przepiórkowski and Patejuk 2013 argue for the accusative, despite appearances to the contrary.

⁶In Przepiórkowski 2014a, we show that the extension of the current analysis to distribution over events is immediate.

meanings combine based on f(unctional)-structures, rather than on c(onstituent)-structures, and meaning representations are paired with glue formulae specifying how these meanings combine with which other meanings. Any pair consisting of a meaning representation and a glue formula is called a *meaning constructor*.

For example, the glue part of the meaning constructor for various forms of *yawn* is:

(18) $e((\uparrow \text{SUBJ})) \multimap t(\uparrow)$

We follow here the First Order approach to Glue Semantics (Kokkonidis 2008), where glue formulae contain parameterised types, and assume two basic type constructors: e (for *entity*) and t (for *truth*). The parameters of such basic type constructors are f-structures. As usual in LFG, the up arrow \uparrow in a lexical entry denotes the f-structure of the word, so (\uparrow subj) – with obligatory parentheses, hence the double parentheses in the antecedent of (18) – denotes the f-structure of the subject of this word. In effect, (18) says that by consuming the e type corresponding to the subject of a form of *yawn* such as *yawned*, we may produce the t type corresponding to *yawned* and, hence, to the whole clause headed by *yawned* (in LFG heads normally share their f-structure with their projections).

This mode of composition remains true regardless of specific tree configurations. For example, when *yawn* is a complement of a control verb, its covert subject is never realised in the c(onstituent)-structure, according to standard LFG analyses, but it is still present in its fstructure, as the value of the subj attribute, so (18) is still relevant.

Glue Semantics is resource-sensitive: once a semantic resource – i.e., a glue formula – is consumed, it cannot be reused. Dually, all semantic resources introduced by lexical items (or otherwise; semantic resources may be introduced constructionally) must be consumed in a derivation of the semantic resource of the whole sentence. For example, assuming that *David* introduces a glue formula matching the antecedent of $-\infty$ in (18), a proof rule analogous to *modus ponens* (and introduced more formally below) consumes both formulae and produces the formula $t(\uparrow)$ for the sentence *David yawned*. As this is the only resource left, the proof succeeds.

The other part of the meaning constructor is a formula in any language that allows application and abstraction such as the language of the first-order predicate logic with lambda calculus. For example, the meaning of *David* can be defined as a logical constant, *David*, and the meaning of *yawned* can be defined as usual, as $\lambda X.yawn(X)$ (ignoring event variables, semantic roles, tense and aspect, etc.). In complete meaning constructors, the meaning part is separated from the glue part by the uninterpreted colon character (:), so the complete meaning constructors for *David* and *yawned* are as in the second lines of the following lexical entries:

(19)	David	N	$(\uparrow \text{ PRED}) = \text{`DAVID'}$ David : $e(\uparrow)$
(20)	yawned	V	$(\uparrow \text{ PRED}) = '\text{YAWN} < \text{SUBJ} >' \lambda X. yawn(X) : e((\uparrow \text{SUBJ})) \multimap t(\uparrow)$

According to these lexical entries and standard LFG constituency rules, *David yawned* receives the c-structure displayed in (21) and the f-structure in (22); moreover, given this f-structure, meaning constructors are instantiated as in (23):⁷

⁷We adopt here the HPSG convention of naming feature structures with boxed numbers and of signalling structure-sharing by the repeated occurrence of a boxed number (cf. \Box in (22)). Labels of meaning constructors are written in **[bold-in-square-brackets]**.

Now, using one of the proof rules of Glue Semantics, namely, the Implication Elimination rule in (24), and performing the usual β -reduction, the meaning of *David yawned* may be derived from the meaning constructors in (23) as shown in (25):

$$\frac{(24)}{f(a):B} \xrightarrow{a:A} f:A \multimap B}{f(a):B} \xrightarrow{\sim_{\mathcal{E}}} \frac{(25)}{2} \frac{David:e(1)}{yawn(David):t(0)} \xrightarrow{\lambda X.yawn(X):e(1) \multimap t(0)}{\gamma_{\mathcal{E}}} \xrightarrow{\sim_{\mathcal{E}}} \frac{(25)}{yawn(David):t(0)} \xrightarrow{\sim_{\mathcal{E}}}$$

Since both meaning resources introduced by lexical items, e(I) and $e(I) \rightarrow t(O)$, are consumed in this proof, and the only meaning resource produced, t(O), corresponds to the f-structure of the whole sentence, this is a valid proof that the meaning side of the whole sentence is yawn(David).

Obviously, we cannot do justice to Glue Semantics within the confines of this paper; the above is only meant to make the analysis below more accessible to motivated readers not familiar with this approach. The best introduction to Glue Semantics may still be found in the classical LFG textbook of Dalrymple 2001, on which the above exposition is based. Early influential papers are gathered in Dalrymple 1999, but they may be a little hard for an uninitiated reader, as they use a different – perhaps less transparent – notation; the exception is Dalrymple et al. 1999a, which introduces the notation adopted in subsequent work on Glue Semantics. As mentioned above, in this paper we assume the First Order approach to Glue advocated in Kokkonidis 2008, which allows quantification over e types, not just over t types, as in previous versions of Glue Semantics – the analysis proposed below crucially relies on this type of quantification.

The glue side of meaning constructors is a fragment of linear logic (Girard 1987). Resources are understood here as types parameterised with functional structures, but that does not mean that Glue Semantics is necessarily tightly coupled with LFG; versions of this approach have been proposed for other grammatical formalisms, including Head-driven Phrase Structure Grammar (Asudeh and Crouch 2002) and Lexicalized Tree-Adjoining Grammar (Frank and van Genabith 2001). Also, while the meaning side adopted here is a version of the language of predicate logic with lambdas, this is not a necessity. Instead, Intensional Logic is employed in Dalrymple et al. 1999c and various derivatives of Discourse Representation Theory are used in Dalrymple et al. 1999b, Crouch and van Genabith 1999, and more recently in Haug 2013.

4 Analysis

4.1 Preliminaries

Let us first consider the two run-of-the-mill examples below:

- (26) Chłopcy mają po dwa tatuaże. boys.NOM have.PL DISTR two.ACC tattoos.ACC '(The/Some) boys have two tattoos each.'
- (27) Piotr kupił dziewczynom po róży.
 Piotr.NOM bought.SG girls.DAT DISTR rose.LOC
 'Peter bought (the/some) girls a rose each.'

In both examples the *po*-phrase (the distributive share) occupies the position of the direct object of the verb; the purely morphosyntactic difference between the accusative case of *dwa tatuaże* 'two tattoos' in (26) and the locative case of *róży* 'rose' in (27) was explained in section 2. The sorting key is expressed by the subject *Chlopcy* 'boys' in (26) and by the indirect object *dziewczynom* 'girls' in (27).

The intended meaning representations of these two examples are given below:

(28) Intended meaning representation of (26):

 $exists(Z, boy^{s}(Z) \land |Z| > 1,$ $all(X, |X| = 1 \land X \subset Z,$ $exists(V, |V| = 2 \land tattoo^{s}(V), have(X, V))))$

(29) Intended meaning representation of (27):

 $exists(Z, girl^{s}(Z) \land |Z| > 1,$ $all(X, |X| = 1 \land X \subset Z,$ $exists(V, |V| = 1 \land rose^{s}(V), bought(p, V, X))))$

In fact, both examples taken out of context are similarly ambiguous: the plural bare NPs (*Chlopcy* 'boys' and *dziewczynom* 'girls') may be interpreted either as indefinites or as definites. For reasons of simplicity, both indefinites and definites are represented as generalised quantifiers in the current paper; the former are approximated by the existential quantifier *exists*, as in the representations above, and the latter will be represented below via the *iota* relation.

As common in LFG and Glue Semantics, generalised quantifiers are represented here as relations between an individual and two propositions involving that individual, so that *Everyone yawned* has the representation *all*(*X*, *person*(*X*), *yawn*(*X*)) (Dalrymple 2001:227). Moreover, we follow Dotlačil 2012 and earlier work on treating entities as sets,⁸ and properties – as sets of such sets. For example, *boy*^s is the property of being a non-empty set of boys – either a singleton or a set of higher cardinality (the superscript *s* indicates the possible plural) – and λZ . $|Z| > 1 \land boy^{s}(Z)$ is the property of being a set of at least two boys. On this view, the standard inclusion relation \subseteq is defined on entities.

How do these meaning representations differ from meanings of corresponding examples without the distributive element? The relevant examples and their intended collective meanings (assuming the existential closure of all bare NPs) are given below.⁹

(30)	a.	Chłopcy mają	dwa	tatuaże.	(Cf. (26))
		boys.nom have.pr	two.acc	c tattoos.ACC	
		'(The/Some) boys	have tw	ro tattoos.'	
	b.	$exists(Z, boy^{s}(Z))$	$\wedge Z > 1$	1,	(Cf. (28))
		exists(V, V =	$2 \wedge tatto$	$o^{s}(V), have(Z, V))))$	

⁸In particular, we do not distinguish between singleton sets and their elements.

⁹In case of (30), the collective meaning may be difficult to get, unless one understands tattoos as temporary sticker tattoos (before they are applied).

(31)	a.	Piotr kupił	dziewczyno	m różę.	(Cf. (27))
		Piotr.noм bought	t.sg girls.dat	rose.ACC	
	b.	$exists(Z, girl^s(Z))$	$\wedge Z > 1,$		(Cf. (29))

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 $exists(V, |V| = 1 \land rose^{s}(V), bought(p, V, Z))))$

The difference between the meaning representations in (30b) and (31b) above and the earlier representations in (28) and (29) should make the impact of the distributive *po* clear: it takes a property holding of some set and transforms it into an analogous property holding of each singleton subset of the set. We formalise this observation in the following subsection.

4.2 Semantics of po and Worked-out Example

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The first version of the meaning constructor for *po*, labelled as **[distr]**, is given below:¹⁰

 $(32) \quad [\textbf{distr}] \quad \lambda S.\lambda Z.all(X, |X| = 1 \land X \subset Z, S(X)) : \forall G, H. [e(G) \multimap t(H)] \multimap [e(G) \multimap t(H)]$

The meaning part (on the left of the colon) directly reflects the considerations of the previous subsection: *po* takes a property *S* and returns a property that holds of *Z* if and only if *S* holds of all singleton (proper) subsets of *Z*. The glue part (on the right of the colon) says that *po* is an identity function on semantic resources corresponding to properties: it consumes a resource $[e(G) \multimap t(H)]$ (for any *G* and *H*) in order to produce the same resource. Hence, *po* as construed above may combine with just any $\langle e, t \rangle$ property in the sentence; as we will see below, this analysis is too permissive and will be further constrained in section 4.4.

We will illustrate the analysis in detail on the basis of example (26), repeated below (with the additional assumption that the subject is to be understood existentially):

(26') Chłopcy mają po dwa tatuaże.boys.NOM have.PL DISTR two.ACC tattoos.ACC'Some boys have two tattoos each.'

As usual in LFG and Glue Semantics, the two common nouns occurring in this sentence have the following lexical entries (ignoring morphosyntactic features such as case or gender):

(33) chlopcy N (\uparrow PRED) = 'BOYS' $\lambda X.boy^{s}(X) \land |X| > 1 : e(\uparrow) \multimap t(\uparrow)$ (34) tatuaże N (\uparrow PRED) = 'TATTOOS' $\lambda X.tattoo^{s}(X) \land |X| > 1 : e(\uparrow) \multimap t(\uparrow)$

Simplifying somewhat, we treat cardinals as existential quantifiers:

(35) dwa Num $(\uparrow \text{ SPEC}) = 2$ $\lambda R.\lambda S.exists(Y, |Y| = 2 \land R(Y), S(Y)) :$ $\forall H. [e(\uparrow) \multimap t(\uparrow)] \multimap [[e(\uparrow) \multimap t(H)] \multimap t(H)]$

While there are syntactic arguments that numerals take the following NPs as complements, that is, that phrases of the form Num+NP are really headed by the numeral, we simplify here

¹⁰The meaning side is essentially the semantic representation of the abstract DIST(ributivity) operator proposed by Link 1991. The arguments given by Zimmermann 2002:68–69 that the German *jeweils* is not an overt realisation of DIST do not bear on the choice of this meaning representation here.

by treating the numeral and the following noun as co-heads. Given the c-structure rule in (36), we get the f-structure for *dwa tatuaże* 'two tattoos' shown in (37):

Given this f-structure, all occurrences of \uparrow in (34) and in (35) instantiate to \exists , so we can construct the following proof for the meaning of *dwa tatuaże* 'two tattoos':¹¹

$$(38) \begin{array}{l} \lambda R.\lambda S.exists(Y, |Y| = 2 \land R(Y), S(Y)) : \\ \lambda X.tattoo^{s}(X) \land |X| > 1 : \\ \hline \forall H. [e(\underline{\Im}) \multimap t(\underline{\Im})] \multimap [[e(\underline{\Im}) \multimap t(H)] \multimap t(H)] \\ \hline \lambda S.exists(Y, |Y| = 2 \land tattoo^{s}(Y), S(Y)) : \\ \hline \forall H. [e(\underline{\Im}) \multimap t(H)] \multimap t(H) \end{array} \rightarrow (H)$$

The only missing lexical entries needed to analyse (26) are that of the main verb, majq 'have', as in (39), and that of po, as in (40):

(39) $majq \quad V \quad (\uparrow \text{ PRED}) = `HAVE<SUBJ,OBJ>' \\ \lambda X.\lambda Y.have(X, Y) : e((\uparrow \text{ SUBJ})) \multimap [e((\uparrow \text{ OBJ})) \multimap t(\uparrow)]$ (40) $po \quad P \quad (\uparrow \text{ PRED}) = `PO<OBJ>' \\ \lambda P.P : \forall F. [e(\uparrow) \multimap t(F)] \multimap [e((\uparrow \text{ OBJ})) \multimap t(F)]$

$$\lambda S.\lambda Z.all(X, |X| = 1 \land X \subset Z, S(X)) : \forall G, H. [e(G) \multimap t(H)] \multimap [e(G) \multimap t(H)]$$

The lexical entry of the verb should be self-explanatory at this stage: the semantic resources of the subject and the object must be consumed to produce a semantic resource corresponding to the verb (and, hence, to the whole sentence headed by this verb). On the other hand, the preposition po^{12} introduces two meaning constructors. The effect of the first one is that whatever property *P* is specified elsewhere to hold of the meaning of the *po*-phrase, it must hold of the meaning of the object of *po* instead. The other one is **[distr]** discussed above. These lexical entries, together with standard c-structure rules, produce the following f-structure for the complete sentence in (26):

(41)
$$\begin{bmatrix} PRED & HAVE(1,2)' \\ SUBJ & 1 \begin{bmatrix} PRED & BOYS' \end{bmatrix} \\ OBJ & 2 \begin{bmatrix} PRED & PO(3)' \\ OBJ & 3 \begin{bmatrix} SPEC & 2' \\ PRED & TATTOOS' \end{bmatrix} \end{bmatrix}$$

Given this f-structure, the meaning of *majq* 'have' instantiates to (42) and the first meaning constructor of *po* instantiates to (43):

- (42) **[have]** $\lambda X.\lambda Y.have(X, Y) : e(1) \multimap [e(2) \multimap t(0)]$
- (43) **[po]** $\lambda P.P: \forall F.[e(2) \multimap t(F)] \multimap [e(3) \multimap t(F)]$

¹¹Each meaning constructor is broken into two lines for typographical reasons. We also drop the conjunct |Y| > 1 in the conclusion, as it follows from |Y| = 2.

 $^{^{12}}$ As discussed in section 2, there are three different lexemes *po* in Polish, but they are all analysed as heads, so the lexical entry in (40) is a sufficiently good approximation of all of them.

At this point another Glue Semantics proof rule is needed, Implication Introduction, which says that if the introduction of an assumption [x : A] leads to a proof of f : B then $\lambda x.f : A \multimap B$ is proved:

(44)
$$[x:A]^{1}$$

$$\vdots$$

$$\frac{f:B}{\lambda x.f:A \multimap B} \multimap_{I,1}$$

Using this rule, (45) may be proved from (42) and (43) as shown in (46):

(45) [have-po]
$$\lambda X.\lambda Y.have(X, Y) : e(1) \multimap [e(3) \multimap t(0)]$$

(46) $\lambda X.\lambda Y.have(X, Y) :$

$$\frac{[X : e(1)]^1 \quad e(1) \multimap [e(2) \multimap t(0)]}{\lambda Y.have(X, Y) : e(2) \multimap t(0)} \overset{\sim}{\longrightarrow} \lambda P.P : \forall F.[e(2) \multimap t(F)] \multimap [e(3) \multimap t(F)]}{\lambda Y.have(X, Y) : e(3) \multimap t(0)} \overset{\sim}{\longrightarrow} \frac{\lambda Y.have(X, Y) : e(3) \multimap t(0)}{\lambda X.\lambda Y.have(X, Y) : e(1) \multimap [e(3) \multimap t(0)]} \overset{\sim}{\longrightarrow} I.1$$

The conclusion may be combined with the conclusion of proof (38), repeated in (47), to render the meaning of *mają dwa tatuaże* 'have two tattoos' in (48); the proof is shown in (49):

 $\begin{array}{ll} \text{(47)} \quad [\texttt{two-tattoos}] \quad \lambda S.exists(Y, |Y| = 2 \land tattoo^{s}(Y), S(Y)) : \forall H. \left[e(\boxdot) \multimap t(H)\right] \multimap t(H) \\ \text{(48)} \quad [\texttt{have-po-two-tattoos}] \quad \lambda X.exists(Y, |Y| = 2 \land tattoo^{s}(Y), have(X, Y)) : e(\boxdot) \multimap t(\textcircled{0}) \\ \text{(49)} \quad \lambda X.\lambda Y.have(X, Y) : \\ \hline \frac{[X:e(\fbox{1})]^{1} \quad e(\fbox{1}) \multimap \left[e(\fbox{3}) \multimap t(\fbox{0})\right]}{\lambda Y.have(X, Y) : e(\fbox{3}) \multimap t(\textcircled{0})} \multimap \varepsilon \quad \lambda S.exists(Y, |Y| = 2 \land tattoo^{s}(Y), S(Y)) : \\ \hline \frac{\lambda Y.have(X, Y) : e(\fbox{3}) \multimap t(\textcircled{0})}{exists(Y, |Y| = 2 \land tattoo^{s}(Y), have(X, Y)) : t(\fbox{0})} \multimap \varepsilon \\ \end{array}$

 $\overline{\lambda X.exists(Y, |Y| = 2 \land tattoo^{s}(Y), have(X, Y)) : e(1) \multimap t(0)} \overset{\circ_{I,1}}{\longrightarrow}$

The conclusion of proof (49) is of the form that may be combined with the second meaning constructor for *po* given in (40):

Now we face an apparent problem, as – apart from the resource in the conclusion of proof (50) – the only other resource left is that of *chlopcy* 'boys', introduced in (33) and instantiated here to (51), and these two resources are incompatible (cannot be combined).

(51) **[boys]**
$$\lambda X.boy^{s}(X) \wedge |X| > 1: e(1) \multimap t(1)$$

However, as noted above, such bare NPs are understood as either indefinites or as definites, so the grammar must provide appropriate meaning constructors completing the lexical meanings of bare NPs. As it is not the aim of this paper to investigate the representation of (in)definites, we approximate them via generalised quantifiers (even though it is well known that they have different scopal properties than usual quantifiers). In the case at hand, the meaning constructor that is needed is (compare this to the meaning of dwa 'two' in (35)):

(52) [existential]
$$\lambda R.\lambda S.exists(Z, R(Z), S(Z)) :$$

 $\forall H. [e(\mathbb{I}) \multimap t(\mathbb{I})] \multimap [[e(\mathbb{I}) \multimap t(H)] \multimap t(H)]$

Once this constructor is available, the existential meaning of *chlopcy* 'boys' may be derived using the Implication Elimination proof rule:

Applying the same proof rule to the conclusions of (50) and (53), we obtain the same (up to variable names) meaning side as the intended meaning representation of (26), given in (28):

(54)
$$\lambda Z.all(X, |X| = 1 \land X \subset Z,$$

$$exists(Y, |Y| = 2 \land tattoo^{s}(Y), have(X, Y))): \quad \lambda S.exists(Z, boy^{s}(Z) \land |Z| > 1, S(Z)):$$

$$\frac{e(\square) \multimap t(\boxdot)}{exists(Z, boy^{s}(Z) \land |Z| > 1,}$$

$$all(X, |X| = 1 \land X \subset Z,$$

$$exists(Y, |Y| = 2 \land tattoo^{s}(Y), have(X, Y)))): t(\boxdot)$$

The schematic structure of the whole proof is given below, with references to subproofs:

Note that all resources introduced by lexical items have been consumed in the process and that the only resource left is t(0), which corresponds to the complete sentence; hence, this is a linguistically valid proof (Asudeh 2012:chap. 5).

An analogous proof could be constructed for the definite reading of *chlopcy* 'boys', using the following meaning constructor instead of **[existential]** of (52):

(56) [definite]
$$\lambda R.\lambda S.iota(Z, R(Z), S(Z)) :$$

 $\forall H. [e(1) \multimap t(1)] \multimap [[e(1) \multimap t(H)] \multimap t(H)]$

Such meaning constructors must be optionally available for any common noun. If the noun contributes to the restriction of a lexical quantifier, as in case of *tatuaże* 'tattoos' restricting the quantifier *dwa* 'two', optional meaning constructors of this kind cannot be used – the lexical quantifier consumes the resources necessary to activate such constructors. On the other hand, when there is no appropriate lexical quantifier, either the existential closure or the definiteness meaning constructor may activate and combine with the bare noun.¹³

¹³We assume that such optional meaning constructors are introduced in lexical entries of common nouns, as part of a common noun template, so as to avoid missing generalisations (Asudeh et al. 2013); another option would

4.3 Sorting Key within Distributive Share

Let us now turn to (5), repeated below as (5'), where the sorting key, *25 krajów* '25 countries', is syntactically embedded within the phrase expressing the distributive share, *po 3 przedstawicieli 25 krajów* '3 representatives of (each of) 25 countries'; the schematic constituent structure is repeated as (6').

- (5') Przybyło po 3 przedstawicieli 25 krajów.
 arrive.PAST DISTR 3 representatives 25.GEN countries.GEN
 '3 representatives arrived from each of 25 countries.'
- (6') Przybyło [po [3 [przedstawicieli [25 krajów]]]].

Lexical entries for *3* and *25* parallel that for *dwa* 'two' given in (35):

(57) 3 Num
$$(\uparrow \text{ spec}) = 3$$

 $\lambda R.\lambda S.exists(Y, |Y| = 3 \land R(Y), S(Y)) :$
 $\forall H. [e(\uparrow) \multimap t(\uparrow)] \multimap [[e(\uparrow) \multimap t(H)] \multimap t(H)]$
(58) 25 Num $(\uparrow \text{ spec}) = 25$
 $\lambda R.\lambda S.exists(Y, |Y| = 25 \land R(Y), S(Y)) :$
 $\forall H. [e(\uparrow) \multimap t(\uparrow)] \multimap [[e(\uparrow) \multimap t(H)] \multimap t(H)]$

Similarly, the lexical entry for *krajów* 'countries' is analogous to those for *chłopcy* 'boys' and *tatuaże* 'tattoos' in (33) and (34), and the entry for *przybyło* 'arrived' is simpler than that for *mają* 'have' in (39), as it only takes one argument:

(59)
$$krajów$$
 N (\uparrow PRED) = 'COUNTRIES'
 $\lambda X.country^{s}(X) \land |X| > 1 : e(\uparrow) \multimap t(\uparrow)$
(60) $przybyło$ V (\uparrow PRED) = 'ARRIVE'
 $\lambda X.arrive(X) : e((\uparrow SUBJ)) \multimap t(\uparrow)$

What is new in this example is a relational noun, przedstawicieli 'representatives'.¹⁴

(61) przedstawicieli N (
$$\uparrow$$
 pred) = 'REPRESENTATIVES'
 $\lambda Y.\lambda X.representative^{s}(X, Y) \land |X| > 1 :$
 $e((\uparrow OBJ)) \multimap [e(\uparrow) \multimap t(\uparrow)]$

The meaning constructor of (61) differs from that of (59) and other non-relational nouns in the additional requirement of the argument of the noun.

With these lexical entries, as well as the lexical entry for *po* given in (40) above, the f-structure of (5) is as shown in (62).

be to add them to appropriate c-structure rules.

¹⁴We remain agnostic as to whether OBJ, assumed in (61), is really the right grammatical function for the complement of *przedstawicieli* 'representatives'. Dalrymple et al. 1999c:57 and Dalrymple 2001:249 analyse arguments of English nouns *rumor* and *relative*, introduced by the prepositional markers *about* and *of*, as values of OBL_{ABOUT} and OBL_{OF}, respectively.



The intended meaning of (5), given in (63), may be attained via the proof schematically shown in (64), where the particular meaning constructors, as instantiated for (62), are given in (65)-(76).¹⁵

(63) exists
$$(Z, |Z| = 25 \land country^{s}(Z),$$

 $all(X, |X| = 1 \land X \subset Z,$
 $exists(V, |V| = 3 \land representatives^{(V, X), arrived(V)))) : t(@)$
(64) [arrived-po] $\neg_{\varepsilon} [3]$ [representatives] $\neg_{\varepsilon \in I}$
[distr] $\neg_{\varepsilon} [25]$ [countries]
 $\boxed{[distr-arrived-po-3-representatives]} \quad \neg_{\varepsilon} [25]$ [countries] \neg_{ε}
[25-countries-distr-arrived-po-3-representatives] \neg_{ε}
(65) [25]
 $\lambda R.\lambda S. exists(X, |X| = 25 \land R(X), S(X)) : \forall H. [e(B) \multimap t(B)] \multimap [[e(B) \multimap t(H)] \multimap t(H)]$
(66) [countries]
 $\lambda X. country^{s}(X) \land |X| > 1 : e(B) \multimap t(B)$
(67) [25-countries]
 $\lambda S. exists(X, |X| = 25 \land country^{s}(X), S(X)) : \forall H. [e(B) \multimap t(H)] \multimap t(H)$
(68) [3]
 $\lambda R.\lambda S. exists(X, |X| = 3 \land R(X), S(X)) : [\forall H. [e(B) \multimap t(B)] \multimap [[e(D) \multimap t(H)] \multimap t(H)]$
(69) [representatives]
 $\lambda Y.\lambda X$ representatives]
 $\lambda Y.\lambda S. exists(X, |X| = 3 \land R(X), S(X)) : [\forall H. [e(B) \multimap t(B)] \multimap [[e(D) \multimap t(H)] \multimap t(H)]$
(70) [3-representatives]
 $\lambda Y.\lambda S. exist(X, |X| = 3 \land representative^{s}(X, Y), S(X)) : \forall H. e(B) \multimap [[e(D) \multimap t(H)] \multimap t(H)]$
(71) [po]
 $\lambda P.P : \forall F. [e(D) \multimap t(P)] \multimap [e(D) \multimap t(F)]$
(72) [arrived]
 $\lambda X. arrived(X) : e(D) \multimap t(B)$
(73) [arrived_N: $e(D) \multimap t(B)$
(74) [arrived_PO-3-representatives[$\lambda Y. A; xrived(X) : e(D) \multimap t(B)$

¹⁵The parts of the proof marked with $\multimap_{\mathcal{EEI}}$ consist of three steps analogous to subproofs given in (46) and in (49). Again, we omit |X| > 1 once it follows from particular cardinalities contributed by the numerals.

- (75) [distr-arrived-po-3-representatives] (see (32) for [distr]) $\lambda Z.all(X, |X| = 1 \land X \subset Z,$ $exists(V, |V| = 3 \land representative^{s}(V, X), arrived(V))) : e(3) \multimap t(0)$
- (76) [25-countries-distr-arrived-po-3-representatives] $exists(Z, |Z| = 25 \land country^{s}(Z),$ $all(X, |X| = 1 \land X \subset Z,$ $exists(V, |V| = 3 \land representative^{s}(V, X), arrived(V)))) : t(0)$

This proof shows that the analysis proposed in the previous subsection provides a correct meaning representation for troublesome cases when the sorting key is embedded within the phrase expressing the distributive share.

4.4 Constraining Analysis

Unfortunately, as it stands, the analysis heavily overgenerates. For example, apart from (64), there are other proofs for the same sentence, leading to nonsensical or wrong meaning representations. The problem is that the meaning of po, as given in (32) and (40), may combine with any (appropriately typed) property available in the derivation, e.g., with [countries] in (66), with [arrived] in (72) or with the property derived from [representatives] in (69) by introducing the assumption $Y : e(\Im)$ and using the Implication Elimination rule (24).

We will illustrate this problem with a simpler example, by showing that the sentence Chłopcy mają po dwa tatuaże '(Some/The) boys have two tattoos each', given as (26) in section 4.2, has another proof, leading to the incorrect meaning in (77), paraphrased as "for each of some two tattoos, there are some boys that have it."

(77)
$$exists(Y, |Y| = 2 \land tattoo^{s}(Y),$$

$$all(X, |X| = 1 \land X \subset Y,$$

$$exists(Z, boy^{s}(Z) \land |Z| > 1, have(Z, X))))$$

The proof is analogous to (55), and it is given in (78) below, with references to subproofs:

$$(78) \quad \frac{[\text{have}] [\text{po}]}{[\text{have-po}]} (46) \quad \frac{[\text{boys}] [\text{existential}]}{[\text{boys-existential}]} (53) \\ \hline \frac{[\text{boys-existential-have-po}]}{[\text{distr}]} (80) \quad \frac{[\text{two}] [\text{tattoos}]}{[\text{two-tattoos}]} (38) \\ \hline \frac{[\text{distr-boys-existential-have-po]}}{[\text{two-tattoos-distr-boys-existential-have-po]}} (80) \quad \frac{[\text{two}] [\text{tattoos}]}{[\text{two-tattoos}]} (38) \\ (81) \\ \hline (79) \quad \frac{\lambda X.\lambda Y.have(X,Y):}{[X:e(\square])^2 \quad \lambda Y.have(X,Y):e(\square) \rightarrow \tau(\square)]} \sim \varepsilon \\ \hline \frac{\lambda X.\lambda Y.have(X,Y):e(\square) \rightarrow \tau(\square)}{\lambda Y.have(X,Y):e(\square) \rightarrow \tau(\square)} \rightarrow \varepsilon \\ \hline \frac{have(X,Y):t(\square)}{\lambda X.have(X,Y):e(\square) \rightarrow \tau(\square)} \rightarrow \varepsilon \\ \hline \frac{\lambda S.exists(Z, boy^{S}(Z) \land |Z| > 1, S(Z)):}{\langle \lambda Y.have(Z, Y):t(\square) \quad \forall H.[e(\square) \rightarrow t(H)] \rightarrow \tau(H)} \rightarrow \varepsilon \\ \hline \frac{exists(Z, boy^{S}(Z) \land |Z| > 1, have(Z,Y)):t(\square)}{\langle \lambda Y.exists(Z, boy^{S}(Z) \land |Z| > 1, have(Z,Y)):e(\square) \rightarrow \tau(\Xi)} \rightarrow \varepsilon \\ \hline \end{array}$$

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 $(80) \quad \begin{array}{l} \lambda Y.exists(Z, boy^{s}(Z) \land |Z| > 1, have(Z, Y)) : \quad \lambda S.\lambda Y.all(X, |X| = 1 \land X \subset Y, S(X)) : \\ \\ \underbrace{e(\boxdot) \multimap t(\boxdot)}_{\lambda Y.all(X, |X| = 1 \land X \subset Y, exists(Z, boy^{s}(Z) \land |Z| > 1, have(Z, X))) : \\ \\ e(\boxdot) \multimap t(\boxdot) \end{array} \xrightarrow{\leftarrow \varepsilon} e(\boxdot) \\ \end{array}$

(81)
$$\lambda Y.all(X, |X| = 1 \land X \subset Y,$$

$$exists(Z, boy^{s}(Z) \land |Z| > 1, have(Z, X))): \qquad \lambda S.exists(Y, |Y| = 2 \land tattoo^{s}(Y), S(Y)):$$

$$\underline{e(\exists) \multimap t(\textcircled{0})} \qquad \forall H.[e(\exists) \multimap t(H)] \multimap t(H) \qquad \neg e$$

$$\begin{aligned} exists(Y, |Y| &= 2 \land tattoo^{s}(Y), \\ all(X, |X| &= 1 \land X \subset Y, \\ exists(Z, boy^{s}(Z) \land |Z| > 1, have(Z, X)))) : t(@) \end{aligned}$$

A preliminary solution to this problem – presented in greater detail and further refined in Przepiórkowski 2014a – is inspired by the Glue Semantics approach to Negative Polarity Licensing proposed by Fry 1999. The original intuition behind this approach is that a Negative Polarity Item (NPI) "attaches" to its usual meaning a marker which is transferred during the semantic derivation until it meets a licensor which discharges (i.e. consumes) it. In the case at hand, the distributive share acts as an NPI and the marker is discharged when the distributive meaning of *po* combines with a meaning containing the contribution of this distributive share.

Technically, we introduce the "marked" type t^d , modify the distributive meaning constructor so that it eliminates the marking (we will call it **[distr-E]**), and add another meaning constructor in the lexical entry of *po* which introduces the marking (we will call it **[distr-I]**); compare the lexical entry (82) for *po* below with (40) above:

(82)
$$po \quad P$$
 ($\uparrow \text{ PRED}$) = 'PO'
[po] = $\lambda P.P : \forall F. [e(\uparrow) \multimap t(F)] \multimap [e((\uparrow OBJ)) \multimap t(F)]$
[$distr-E$] = $\lambda S.\lambda Z.all(X, |X| = 1 \land X \subset Z.S(X)) :$
 $\forall G, H. [e(G) \multimap t^d(H)] \multimap [e(G) \multimap t(H)]$
[$distr-I$] = $\lambda Q.Q :$
 $\forall H. [[e((\uparrow OBJ)) \multimap t(H)] \multimap t(H)] \multimap [[e((\uparrow OBJ)) \multimap t(H)] \multimap t^d(H)]$

In the running example, given the f-structure (41), the three meaning constructors in the lexical entry of *po* instantiate to:

(83) **[po]**
$$\lambda P.P: \forall F.[e(2) \multimap t(F)] \multimap [e(3) \multimap t(F)]$$

(84) **[distr-E]**

$$\lambda S.\lambda Z.all(X, |X| = 1 \land X \subset Z, S(X)) : \forall G, H. [e(G) \multimap t^d(H)] \multimap [e(G) \multimap t(H)]$$

(85) **[distr-I]**
$$\lambda Q.Q: \forall H. [[e(\exists) \multimap t(H)] \multimap t(H)] \multimap [[e(\exists) \multimap t(H)] \multimap t^d(H)]$$

With these meaning constructors, the proof of the correct meaning in the running example is similar to that in (55), with **[distr]** replaced by **[distr-E]** and with **[distr-I]** combining with the meaning of *dwa tatuaże* 'two tattoos'. Modified partial conclusions are presented below (unchanged constructors are repeated for convenience):

(45') [have-po] $\lambda X.\lambda Y.have(X, Y) : e(1) \multimap [e(3) \multimap t(0)]$

- (47') **[two-tattoos]** $\lambda S.exists(Y, |Y| = 2 \land tattoo^{s}(Y), S(Y)) : \forall H. [e(\exists) \multimap t(H)] \multimap t(H)$
- (86) **[distr-I-two-tattoos]** $\lambda S.exists(Y, |Y| = 2 \land tattoo^{s}(Y), S(Y)) : \forall H. [e(\exists) \multimap t(H)] \multimap t^{d}(H)$
- (87) [have-po-distr-I-two-tattoos] $\lambda X.exists(Y, |Y| = 2 \land tattoo^{s}(Y), have(X, Y)) : e(1) \multimap t^{d}(0)$
- (88) [distr-E-have-po-distr-I-two-tattoos] (= [distr-have-po-two-tattoos] in proof (55)) $\lambda Z.all(X, |X| = 1 \land X \subset Z, exists(Y, |Y| = 2 \land tattoo^{s}(Y), have(X, Y))) : e(1) \multimap t(0)$
- (89) **[boys-existential]** (= conclusion in subproof (53) = **[boys-existential]** in proof (55)) $\lambda S.exists(Z, boy^{s}(Z) \land |Z| > 1, S(Z)) : \forall H.[e(1) \multimap t(H)] \multimap t(H)$
- (90) [boys-existential-distr-E-have-po-distr-I-two-tattoos] (= conclusion in proof (55)) $exists(Z, boy^{s}(Z) \land |Z| > 1,$

 $all(X, |X| = 1 \land X \subset Z,$ exists(Y, |Y| = 2 \land tattoo^s(Y), have(X, Y)))) : t(0)

Note how the marking d is introduced by **[distr-I]** on the quantifier *two tattoos* in (86), how it is transferred to the predicate in (87) and how it is eliminated by **[distr-E]**, which now expects its semantic argument to be so marked, in (88). The proof is summarised below.



At the same time, the unwanted proof (78) for the same sentence (26) is blocked now. Since the constructor **[distr-I]** may only combine with the constructor of a quantifier whose restriction is expressed by the object of *po*, it cannot combine with the existential *chlopcy* 'boys', whose restriction on the glue side contains $e(\square)$ instead of the $e(\square)$ expected by **[distr-I]**. Hence, **[boys-existential]** in a putative analogue of proof (78) cannot contain the marker ^{*d*}, so it cannot pass it to **[boys-existential-have-po]**, and so **[distr-E]** cannot combine with it. While **[distr-I]** may still combine with **[two-tattoos]**, neither the resulting **[distr-I-two-tattoos]** nor **[distr-E]** may enter the proof now.

5 Conclusion

Analyses of distance distributivity, such as Choe 1987, Safir and Stowell 1988, Moltmann 1997, Zimmermann 2002 or Dotlačil 2012, have so far been formulated mainly within the transformational paradigm. In contrast, the current paper provides a non-transformational analysis, couched within Lexical Functional Grammar and coupled with the morphosyntactic account of Przepiórkowski and Patejuk 2013. On the semantic side, we employed the resource-sensitive approach of Glue Semantics. Empirically, the main point of this paper is the introduction – and successful analysis – of a construction troublesome for previous analyses, where the sorting

key is syntactically embedded in the phrase expressing the distributive share.

The account proposed here is still at a relatively early stage of development. It remains to be seen whether the mechanism employed to harness overgeneration, introduced in section 4.4, is sufficiently general and robust. Moreover, we had nothing to say about distribution over events, witnessed in Polish and German, among other languages. (Both points are addressed in Przepiórkowski 2014a.) Nevertheless, we hope that the current proposal provides a reasonable backbone to flesh out a more exhaustive constraint-based and resource-sensitive analysis of distance distributivity in Polish and other languages.

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Surface Non-Conservativity in German

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Proportional determiner quantifiers in German allow interpretations that violate the conservativity universal of Keenan and Stavi (1986). I argue for an analysis that distinguishes between surface syntax and the logical form of sentences. I show that in surface syntax, German non-conservative quantifiers are determiners that form a constituent with a noun phrase and share case and agreement properties with the noun phrase. But I propose that at logical form the non-conservative determiners undergo an adverbialization movement and are interpreted by a mechanism that generalizes focus-affected quantification of Herburger (2000). This result refines the understanding of conservativity as a constraint on interpretation.

Keywords: quantification, German, conservativity, focus, logical form, partitive

1 Introduction

This paper is concerned with the interpretation of proportional quantifiers like *twenty percent* and *two thirds*. I will only consider proportional quantifiers that take two arguments, the restrictor and the scope. Proportional quantifiers in contrast to cardinal quantifiers have the property that the order of their two arguments affects sentence interpretation: *10% of linguists are German* might be true, but *10% of Germans are linguists* definitely isn't. In the following, I explore mostly in German an observation I owe to work on Korean by Ahn (2012) and Park (2007);¹ namely, that proportional quantifiers across languages seem to allow a switch of the two arguments with small morphosyntactic modifications. For example, in Korean, the placement of the nominative case marker *ka* in (1) changes the order of the two arguments of the quantifier.

(1) KOREAN (Ahn 2012)

Gyosu	isib-pro-ka	wa-as-ta.	
Professor	twenty-percent-NOM	come-past-decl	
Twenty p	ors came.'	(conservative)	
Gyosu-ka	isib-pro	wa-as-ta.	
Professor-	come-PAST-DECL		
Twenty p	(reversed)		
	Gyosu Professor Twenty p Gyosu-ka Professor- Twenty p	Gyosu isib-pro-ka Professor twenty-percent-NOM Twenty percent of the profess Gyosu-ka isib-pro Professor-NOM twenty-percent Twenty percent of those who	Gyosuisib-pro-kawa-as-ta.Professor twenty-percent-NOM come-PAST-DECLTwenty percent of the professors came.'Gyosu-kaisib-proWa-as-ta.Professor-NOM twenty-percent come-PAST-DECLTwenty percent of those who came were professors.'

The interpretation in (1b), I call the *reversed interpretation* of the quantifier following Ahn. I also call occurrences of quantifiers with a reversed interpretation *reversed quantifier*, so (1b) shows

¹Ahn and Park independently discovered similar Korean data. Since Park's work is written in Korean except for the abstract, I rely primarily on Ahn's description of Park's work.



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the reversed quantifier *isib-pro* ('20%'), which contrasts this with the *conservative* quantifier in (1a).

In English, reversed interpretations are also possible, as shown in (2). Specically, the omission of the preposition *of* and the determiner *the* from (1a) brings about the reversed interpretation in (2b). But reversed interpretation seem more restricted in English than in most other languages.

(2)	a.	Most recent class of NASA astronauts consists of 50% of the women. ((conservative)
	b.	Most recent class of NASA astronauts consists of 50% women. ²	(reversed)

In French, the morphological change required to reverse a proportional quantifier is even smaller, as (3) illustrates: omission of the definite marker suffices.

(3) FRENCH (Benjamin Spector, personal communication)

a.	Ce	film	а	été	vu	par	deux	tiers	des	journalistes		
	This	s movie	e has	been	seen	ı by	two	thirds	of-the	e journalists		
	'Tw	o thirds	s of	the jo	urnal	lists	have	seen tl	his mo	vie'	(con	servative)
b.	Ce	film	а	été	vu	par	deux	tiers	de jou	ırnalistes		
	This movie has been seen by two thirds of journalists											
	'Tw	o third	s of	the pe	eople	who	o have	e seen	this m	ovie are journali	sts'	(reversed)

This paper focuses, though, on German. In German, the omission of the definite determiner similarly reverses the quantifier's arguments, as in (4b).³

	Frauen haben gewählt.	a. 60% d	(4)
	א women have voted	60% tl	
(conservati	women voted.'	'60% d	
	n _F haben gewählt.	b. 60% F	
	n have voted	60% w	
(revers	voters were women.'	'60% (

In all the languages, the distinction between the conservative and reversed interpretation correlates also with a difference in focus placement as indicated in (4). Specifically, the reversed interpretation requires focus on the noun, while the conservative interpretation allows different focus placements (see section 3 below).

Much of this paper is dedicated to a detail empirical description of reversed quantifiers in German. Some highlights of their properties that I argue for below:

- 1. reversed quantification is similarly available with mass quantifiers as well
- 2. reversed quantification is available in any verbal argument position

²http://iwasm.org/wp-blog/2013/06/20/4308/, accessed 01/28/2014. Example (2b) is actually a headline as evidence by the omission of initial *the*. Example (i) from http://www.youtube.com/watch?v=lRNN-0BuFyA shows the reversed structure in a non-headline example.

(i) In this segment, Jon talks about the new gaming market, which consists of 50% women.

³The datum (4b) is not acceptable in some southern German dialects, but the majority of German speakers even from the south accept it. See also the further discussion of dialects below.

- 3. reversed quantifiers form constituents in the overt syntax
- 4. the proportion noun or fraction and head noun share the same morphological case
- 5. verbal agreement is preferred with the proportion or fraction noun, but can also be with the head noun

To my knowledge, no linguistic work has been done on the reversed uses of quantifiers shown in (1) through (4) other than the work on Korean. Surveys of quantification don't mention reversed interpretations of proportional quantifiers (e.g. Keenan and Paperno 2012). Herburger (1993, 1997, 2000) and Eckardt (1999) discuss similar phenomena with weak quantifiers, but specifically claim at least for English that strong quantifiers don't allow reversed uses. The phenomenon though seems widespread and it is important for the study of quantification generally, specifically the conservativity universal of Keenan and Stavi (1986). The universal proposes that all determiner quantifiers in language are conservative.⁴ The conservativity universal is widely assumed to be borne out, and discussed in some semantics textbooks (e.g. Chierchia and McConnell-Ginet 1990). But, all of the b-examples above are counterexamples to the conservativity constraint if their syntactic structure is like that of the a-examples.⁵ For example, assume that the quantier 50% in (4b) is a determiner that takes as its first argument the noun women and the predicate $\lambda_x x$ haben gewählt as its scope. Then the lexical entries for 60% in (4) and (4b) must be different, so I use the terms $60\%_A$ and $60\%_B$ for the following discussion. On such an analysis, the interpretations of $60\%_A$ and $60\%_B$ would need to differ such that, for any two sets A and B, $[60\%_A] (A)(B) = [20\%_B] (B)(A)$. $60\%_A$ is a standard proportional determiner quantifier as in (5). But, $60\%_B$ as a determiner quantifier would require the lexical entry in (6).

(5)
$$[[60\%_A]](A)(B) = 1$$
iff. $\frac{\#(A \cap B)}{\#A} \ge 60\%$
(6) $[[60\%_B]](A)(B) = 1$ iff. $\frac{\#(A \cap B)}{\#B} \ge 60\%$

It is easy to see by inspecting the formula in (6) that $60\%_B$ violates the conservativity constraint: Since the cardinality of the set *B* is the denominator of the fraction in (6), the cardinality of *B*, and not just the set of $A \cap B$ plays a role in the truth conditions. Applied to the two sets *A* and $A \cap B$, the fraction in (6) is always equal to 1, but when $B \neq A \cap B$, the result in (6) will differ.

The non-conservativity of reversed quantifiers is also apparent in the examples. Consider just example (2b): if the quantifier *50% women* was conservative, (2b) ought to be equivalent to (7): since the first class of NASA astronauts didn't contain any women, the intersection of the set of women with the two restrictors is the same. But, clearly (7) is false, while (2b) is true.

⁴Recall that a quantifier Q is conservative if for any two sets A and B, $Q(A)(B) = Q(A)(A \cap B)$. For example, the universal quantifier is conservative, because if $A \subset B$, then also $A \subset A \cap B$ holds. But the focus particle *only* would be not conservative if it could occur as determiner. Namely, then *only* As *are* Bs would be interpreted as only(A)(B) = 1 iff $B \subset A$. But then, any two sets A and B where $B \not\subset A$ would be a counterexample to conservativity because $A \cap B \subset A$ always holds. However, there is general agreement that *only* and its equivalents across languages aren't determiners (pace Zuber 2004 on Polish *tylko/sam* 'only'), so that the conservativity universal isn't violated.

⁵A different challenge to the conservativity constraint comes from the analysis of the German quantifier *lauter* (roughly: 'all but possibly a few') by Eckardt (2006). However, Anderssen (2011) argues that *lauter* is conservative.

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(7) The most recent and the first class of NASA astronauts together consist of 50% women.

The goal of my paper is to investigate data like (4) in German in detail. The English data as well as the Korean and French data have many pecularities that ought to be explored further on a future occasion, but are beyond the scope of this paper. For example, reversed quantification seems to be restricted to non-subjects in English, but this isn't the case in Korean and German, as (1) and (4) already show. The two central conclusions of my German findings are the following two: First, reversed quantifiers are part of the DP constituent in the overt syntax, but the associated NP is adjoined to the quantifier. Secondly, the reversed quantifiers combine with only one overt clausal scope argument at logical form, while the restrictor is determined by focus. Taken together, these two conclusions entail that conservativity holds at the level of logical form, but that there must be a syntactic rule moving determiner quantifiers to adverbial positions (Bayer 1996, Herburger 2000).

In the following, I first seek to establish that the morphological and syntactic properties of reversed quantifiers in German. On this basis, I conclude they occupy the determiner position in overt form and form a constituent with the associated NP. In the second section, I then argue that the semantic interpretation of reversed quantifiers requires a different structure than the overt one—namely, they need to occupy a position with clausal scope like adverbials. After that, I develop a complete syntax and semantics for the reversed quantifiers in German, including a novel covert movement rule applying to phrasal Determiners.

Before I enter the empirical discussion, I need to comment the dialectal status of my data. As I already mentioned in footnote 3, the German data I discuss are subject to some dialect variation. At this point, I have not had access to the necessary resources to properly investigate this variation systematically, but I have some impressions from asking about 30 German speakers about data with percentages like (4b) and also fractions as in (8). I encountered three German speakers that reject (4b), and they were all native speakers of a southern variety of German. Even most southern speakers accept (4b), (8), and similar examples.

- (8) Ein Drittel Frauen sitzt nur in Norwegen im Parlament.
 - a third women sits only in Norway in parliament

'A third of parliament members are women only in Norway.'

Also, it is quite easy to find relevant data on the internet: (9) shows four attested examples. Examples (9a) and (9b) are from an Austrian newspaper and an Austrian governmental organization, and therefore likely to be from a speaker of a southern variety of German:

(9) a. Nur zwölf Prozent Frauen sind in der heimischen Start-up-Szene tätig.⁶
 Only twelve percent women are in the local start-up-scene working 'Only 12% of the people working in the local start-up-scene are women.'

 $^{^{5}} http://diepresse.com/home/wirtschaft/economist/1492848/Startups_Maenner-sind-selbstbewusster. All of the following internet references were accessed on 01/23/2014.$

 $^{^{6}} https://www.kommunalnet.at/news/artikel/article/studie-frauen-in-der-burgenlaendischen-kommunalpolitik. html?cHash=70d53583994d521a425f64108c696c11$

⁷http://www.franken-architekten.de/newsletter/1104/Interview_2.pdf

⁸http://www.mission-einewelt.de/index.php?id=1375

- b. Ganze 46 Prozent Frauen sind dort in den Kommunen politisch aktiv.⁷ whole 46 percent women are there in the municipalities politically active 'Of the people politically active at the municipal level there 46% are women.'
- c. Wieviel Prozent Frauen sind [...] in der Immobilienwirtschaft tätig?⁸
 how many percent women are [...] in the real estate business working
 'How many percent of the people working in real estate are generally women?'
- d. Gut ein Drittel Frauen haben die LDS-Kurse besucht, erzählt der 50-Jährige.⁹ good a third women have the LDS-classes visited tells the 50-year-old 'The 50-year old men says that more than a third of the people attending the LDSclasses are women.'

2 The Constituency of Reversed Quantifiers

In this section, I show that German reversed quantifiers are phrasal determiners heading a DP constituent. Specifically, I propose the two structures exemplified in (10) (for (4)) for conservative and reversed quantifiers to explain the morphological and syntactic differences in German, where x-CASE indicates the externally licensed case on the DP.¹⁰



The conservative quantification structure I propose is similar to a proposal by Grestenberger (2013) for pseudo-partitives, except that her system of projection labels is more fine-grained than mine: Grestenberger argues that pseudo-partitives in German involve numberless measure nouns acting as the head of a projection she calls #, while I use the label D in (10). I don't think that this difference is important for the following. The important structural difference between conservative and reversed quantification for my analysis is the following: with conservative quantification, the determiner *Prozent* ('percent') takes an DP complement, while with reversed quantification, an NP is merged to the DP the determiner *Prozent* projects. I argue that this difference underlies morphosyntactic differences between the two structures: the second DP in conservative quantification is subordinate to the measure D, but in reversed quantification the DP and NP are more equal in status, and for example share the same externally licensed case indicated by x-CASE. Furthermore I show that the DP projected by the determiner *Prozent* in reversed quantification fills the determiner position of the associated NP. Finally, I also argue that the structural difference in (10) underlies the LF restructuring leading to reversed quantification in the second case.

In the first subsection, I present six different arguments for the constituency shown in (10b) for reversed quantifiers. Then I present an account of the morphological and syntactic differences with respect to case marking and agreement between the conservative and reversed DP structures in the second subsection.

¹⁰The reversed structure bears a similarity to cases discussed by Ott (2014).

2.1 Determiner Phrase Properties of Reversed Quantifiers

The first two arguments for the constituency of reversed quantification come from verb-second and from scope reconstruction. These two arguments show specifically that the reversed quantifier and the noun phrase following it form a constituent, but not yet what the head of this constituent is. I then present five further arguments that address the internal constituency of the reversed quantifier and its associated noun phrase, specifically, arguments from argumenthood, from a contrast with adverbs, from noun omission, from determiner insertion, and from left dislocation.

For the first argument that reversed quantifiers and the associated noun phrase form a constituent, recall that German is a verb-second language (e.g. Haider 2010): the material in front of the finite verb in German must form a single constituent. The reversed proportional quantifiers, however, can occur preverbally with the associated noun phrase as already shown by (4b) and (8) above.

A second argument for the joint constituency of reversed quantifier and noun comes from scope reconstruction. This argument relates to a discussion of the focus particle *nur* ('only') in German. Jacobs (1983) suggests that focus particles like *nur* can adjoin to a full CP, but associate with the focus on the initial DP. On this analysis the sentence in (12) would need to be analyzed as [Nur [_{CP} Maria liebt keiner]]. This proposal has some initial plausibility despite the fact that this structure violates the verb-second constraint because there are some exceptions to verb-second. Specifically, German allows examples like (11) with frame and sentence adverbials to the left of a verb-second construction (e.g. Frey and Pittner 1999).

(11) Aber / Noch mal die Entscheidung ist gefallen.
but / again the decision is fallen
'But / Again, the decision was made.'

But Jacobs's analysis of *nur* turns out to make the wrong predictions for scope, as Reis (2005) and Meyer and Sauerland (2009) argue: (12) is scopally ambiguous. Scope ambiguity in German generally requires one scopal element to have moved across another making scope reconstruction possible (Frey 1993, Wurmbrand 2008). But, if *nur* was adjoined to CP, *nur* should not be able to undergo scope reconstruction. In contrast to Jacobs's analysis, an analysis where *nur* is adjoined to the DP *Maria* and both move together from the object position makes the correct prediction for (12).

(12) Nur Maria liebt keiner only Mary.(Acc) loves no one.NOM.MASC
'Nobody loves only Mary.' (no ≫ only)
'Only Mary is such that nobody loves her' (only ≫ no)

For reversed quantifiers, a CP-adjunction analysis might initially seem as attractive as Jacobs's analysis of *nur*.¹¹ However, the CP-adjunction analysis can be dismissed for reversed quantifiers for the same reason as for *only*: scope reconstruction is also available for reversed quantifiers. Specifically, (13) shows that the reversed quantifier can take scope below negation.

¹¹Altmann (1978) proposes an analysis of *im Allgemeinen* 'in general' as a CP-adjunct.

(13) 20% / Zwei Drittel Studenten sind diesmal nicht angenommen worden.
20% / two thirds students are this time not accepted become
'This time, it's not the case that 20% / two thirds of the acceptances went to students.'
(not ≫ 20%, 2/3)
'This time, 20% / two thirds of the rejections went to students.' (20%, 2/3 ≫ not)

Similarly, (14) shows that the reversed quantifier can also take narrow scope below the subject quantifier *only one*. (14) also allows the surface scope. This interpretation is most easily accessible in a scenario like the following: we compile a list of which department members successfully submitted a paper to a conference. Then we wonder who the people were whose papers were only accepted at one conference.

(14) 20% / Zwei Drittel Studenten hat nur eine Konferenz angenommen.

 $20\%\,/\,{\rm two}~$ thirds students ~ has only one conference accepted

'At only one conference, 20% / two thirds of the acceptances went to students.' (only one \gg 20%, 2/3)

'Of the people who were accepted by only one conference, 20% / two thirds were students.' (20%, $2/3 \gg$ only one)

Now consider the following data showing a cooccurence restriction with other determiners. So far we considered data with a reversed quantifier and a bare plural noun phrase. While bare plurals could occur without a preceding determiner, in two other ways there are syntactic cooccurrence relations between reversed quantifiers and the associated bare NPs. Firstly, reversed quantifiers cannot occur without a following noun, as shown by the examples in (15): only (15c) where the reversed quantifier and the associated NP form one constituent is acceptable.¹²

(15) a. *(Die) Kinder haben 20% / zwei Drittel übernachtet.
 (the) children has 20% / two thirds stayed overnight

 12 The data in (15) also show a difference to the extent adverbials with zu 'to'. For both (15a) and (15b), the versions with zu in (i) and (ii) are fully acceptable.

- (i) (Die) Kinder haben zu 20% / zu zwei Dritteln übernachtet.
 (the) children has to 20% / to two thirds stayed overnight
 '20% / Two thirds of overnight stays were by (the) children.'
 '20% / Two thirds of the children stayed overnight.'
- (ii) Zu 20% / Zu zwei Dritteln haben (die) Kinder übernachtet.
 to 20% / to two thirds have (the) children stayed overnight
 '20% / Two thirds of overnight stays were by (the) children.'
 '20% / Two thirds of the children stayed overnight.'

The difference shows that the extent adverbials have a different syntax from reversed quantifiers. However, it seems also possible for extent adverbials with zu to occupy a similar position to the reversed quantifiers, as shown in (iii). In this position, furthermore, the interpretation is limited to the one also available with a reversed quantifier in (15c), while (i) and (ii) are more flexible. That the definite determiner is possible in (iii), though, indicates that there still is some difference between (iii) and the reversed quantifiers, as I discuss in the main text below. I conclude that the extent adverbials with zu involve different structures which are beyond the scope of this paper.

- (iii) Zu 20% / Zu zwei Dritteln (die) Kinder haben übernachtet to 20% / to two thirds (the) children have stayed overnight '20% / Two thirds of overnight stays were by (the) children.'
 - $\ast `20\%$ / Two thirds of the children stayed overnight.'

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b.	*20% / Zwei Drittel haben (die) Kinder übernachtet
	20% / two thirds have (the) children stayed overnight
c.	20% / zwei Drittel Kinder haben übernachtet.
	20% / two thirds children have stayed overnight
	'20% / Two thirds of overnight stays were by children.'

Also note that reversed quantifiers differ from the focus particle *nur* 'only' and adverbials like *größtenteils* 'for the most part' and *meistens* 'mostly' with respect to the data in (15), as (16) shows. This contrast shows that reversed quantifiers are more unequivocally determiners than elements like these.

(16) (Die) Kinder haben größtenteils / meistens / nur übernachtet.
 (the) children has for the most part / most times / only stayed overnight
 '(The) children have for the most part / most of the time / only stayed overnight.'

The second type of cooccurence restriction involves the combination of reversed quantifiers with full DPs. If reversed quantifiers occupy the determiner position, we expect such examples to be ill-formed. The data in (17) show that this prediction is borne out: reversed proportional quantifiers cannot combine with a definite DP, an indefinite DP, or a pronoun in (17), while the combination with a bare plural in (14) is fully grammatical.

(17) *Zwanzig Prozent {diese/einige Studenten / sie} sind angenommen worden.
 twenty percent {these/some students / they} were accepted PASS

As shown in (18), *nur* 'only' and *größtenteils* 'for the most part' contrast reversed quantifiers in this respect (see also fn. 12). For example, the textbook of Chierchia and McConnell-Ginet (1990) cites the cooccurence of *only* with pronouns and full DPs as an argument against analyzing *only* as a determiner. The data in (17), however, show that reversed quantifiers behave more like determiners in this respect than *only* does. Only temporal adverbials like *meistens* 'most times' cannot adjoin to a DP, and therefore cannot be construed with associated DPs or NPs.

(18) {Nur / Größtenteils / ?*Meistens} {diese Studenten / sie} sind ang. worden. only / for the most part / most times {these students / they} were accepted PASS 'Only/Mostly these students / they were accepted.'

Finally, consider left dislocation, which for example, Müller (2005) uses as a test for constituency in German. (19) shows that left-dislocation is possible with reversed quantifiers. The quantifier-noun sequence in (19) forms a DP that occupies one argument position of the verb *angenommen*, which is mediated by the resumptive pronoun *die*.

(19) 20% / Zwei Drittel Studenten, die sind nur 2006 angenommen worden.
 20% / two thirds students they were only 2006 accepted PASS

In sum, the data in this section argue that reversed quantifier and noun form a constituent. The constituent has the distribution of DPs, as seen in (19). Furthermore, the acceptability of the reversed quantifier depends on an NP following it. All of this behavior follows straightforwardly from an analysis of the reversed quantifier-noun sequence as a DP. Of course, I couldn't possible rule out every other conceivable analysis. Nevertheless, I will restrict attention to the DP analysis for the remainder of this paper. In the following section, I address the case and agreement properties of reversed quantifiers and their NPs within the DP-analysis.

2.2 Case and Agreement

In this section, I argue for three generalizations regarding case and agreement of reversed quantifiers: the first relates to the pattern of strong and weak morphology in German DP-internal agreement, the second to verbal agreement, and the third to case agreement. I show that the reversed quantifier and its associated NP behave like two separate DPs for the strong/weak morphology. Secondly, I show that when the quantifier itself has a nominal constituent, the verb can agree with the noun of the quantifier or with the associated NP. Finally, I show that both the quantifier and the associated NP agree in case.

Within the German DP, there is generally agreement in number, case and, in the singular, gender among noun, determiner, and adjectives. Furthermore, German grammar imposes a distinction between *strong* and *weak* endings, which is more intricate: the endings for all three categories (D, N, and A) are similar and frequently syncretic. The class of endings with the greatest number of distinct items must be used, among others, with definite determiners. In German grammar, these are called the strong endings. Most adjectives and some nouns take strong endings only when they aren't preceded by a definite determiner or some other determiner that takes a strong ending. Otherwise, these adjectives and nouns must take a weak ending. (20) and (21) exemplify this behavior: with the definite in (20), the weak endings are used for an adjective and a noun, which don't mark case in the plural. But, the strong endings that mark case are used for both an adjective and a noun with either a bare plural NP or a bare numeral followed by an NP, as in (21).

- (20) a. Die schwedisch-en Studierend-en haben sich registriert. the.PL,NOM,STRONG Swedish-PL,WEAK student-PL,WEAK have self registered 'The Swedish students registered.'
 - b. (Drei) Schwedisch-e Studierend-e haben sich registriert. (three) Swedish-PL,NOM,STRONG student-PL,NOM,STRONG have self registered '(Three) Swedish students have self registered.'

As (21) shows, reversed quantifiers also require strong endings on the following adjective and noun.

(21) 10% schwedisch-e Studierend-e haben sich registriert.
 10% Swedish-PL,STRONG,NOM students-PL,STRONG,NOM have self registered
 '10% of the people who registered were Swedish students.'

For reversed mass quantifiers, as well, the strong endings are used, as shown by (22).

(22) Aus 50% zugefügtem Zucker besteht dieses Müsli. out of 50% added-sg,strong,DAT sugar consists this musli '50% of this musli is added sugar.'

The same pattern is corroborated by fractions, but these data are more complicated since the fractions themselves have an internal syntax.¹³ The singular fraction in (23a) and the plural one

¹³The word *Prozent* 'percent' can also function as a noun in German, as in (i).

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in (23b) both contain the adjective *gut* (lit. 'good', here 'slightly more') construed with the head noun of the fraction.¹⁴

(23)	a.	Ein-e gut-e	Hälft-e	schwedisch-e
		one-sg,noм good-s	sg,nom half-sg,nor	эм Swedish-pl,strong,nom
		Studierend-e	hat / ?]	[?] haben sich registriert.
		students-pl,stron	д, NOM have.3sg / h	have.3PL self registered
		'Slighly more than	half of the registra	rations were by Swedish students.'
	b.	?Zwei gut-e	Drittel	schwedisch-e
		two good-pl,strc	NG,NOM thirds.NO	om Swedish-pl,strong,nom
		Studierend-e	haben sic	ch registriert.
		students-pl,stron	д, NOM have.3pl sel	elf registered
		'Slightly more than	n two thirds of the	e registrations were by Swedish students.

For these data, the observation plays a role that the numeral *ein* 'one'/'a' has a mixed status in the strong/weak system of German, while all other numerals are followed by strong agreement, as we see in (23b). *Ein*, however, for some feature combinations has an ending of its own and then generally triggers the weak endings, as seen in (23a). For the feature combination in (23a), the strong and weak endings are homophonous, but the dative example in (24) shows conclusively that indeed the weak ending must be used.

(24)	?Aus	ein-er	gut-	en		Hälft-e
	out of	one-dat,sg,fem,stro	NG good	l-dat,sg,	WEAK	half-sg
	zugef	ügt-em	Zucker	besteht	dieses	Müsli.
	added	l-dat,sg,masc,strong	sugar	consists	this	musli
	'Sligh	tly more than half of t	his mus	li is adde	ed suga	ır.'

The pattern in (24) shows most clearly that the determination of weak/strong morphology in within the fraction is independent of that on the associated NP. This shows that there are two DPs present in these examples.

Now consider verbal agreement, which German exhibits with subjects in person and number. Since all reversed quantifiers are third person and there is no gender agreement on the verb

(i) Diese Partei hat ihr Ergebnis um 12 Prozente gesteigert. this party.[FEM] has PRO.FEM.POSS result by 12 percent-PL increased 'This party increased its result by 12 percent.'

However, the inflected form is incompatible with a proportional quantifier in (ii) and (iii) (vs. (22)).

- (ii) *10 Prozent-e der schwedisch-en Studierend-en haben sich registriert. 10 percent-PL of the Swedish students have self registiered
- (iii) *10 Prozent-e schwedisch-e Studierend-e haben sich registriert. 10 percent-PL Swedish students have self registered

 14 The preferred version of (23b) would be to use gut 'good' without inflection and in a different position, as in (i). However, (23b) is also quite acceptable.

(i) Gut zwei Drittel schwedisch-e Studierende haben sich registriert. good two thirds.NOM Swedish-PL,STRONG,NOM students-PL,STRONG,NOM have.PL self registered 'Slightly more than two thirds of the registrations were by Swedish students.'

in German, number agreement is all we can investigate. The example in (23a) already indicates the general pattern: both agreement with the head noun of the fraction and also agreement with the noun associated with the quantifier is possible, but agreement with the head noun of the fraction is preferred. This is confirmed by the data in (25a) (a simplified version of (23a)) with a singular fraction and plural NP and in (25b) with a plural fraction and a singular NP.

(25)	a.	Ein-e	Hälfte	Japaner	hat	/ [?] haben	sich registriert
		one-sg,NOM	half	Japanese-PL	have-3sg	/ have-3pl	self registered
		'One half of	the reg	gistrations w	ere by Jap	anese.'	
		-		21			

 Zwei Drittel Butter [?]kommt / kommen in diesen Teig.
 two thirds butter come-3sg / come-3pl into this dough 'Two thirds of what goes into this dough is butter.'

The same pattern also is found with percentages even though the noun *Prozent* 'percent' itself doesn't exhibit full nominal morphology (as discussed in fn. 13). (26a) shows *Prozent* in the singular with a plural associated noun, and (26b) shows *Prozent* in the plural with a singular associated noun.

(26)	a.	Ein Prozent Japaner wohn-t / [?] wohn-en in Berlin.					
		one percent Japanese.pl live-3sg / live-3pl in Berlin					
		'One percent of Berlin residents is Japanese.'					
		0					

b. Sechzig Prozent Butter 'komm-t / komm-en in diesen Teig.
60 percent butter come-3sg / come-3pl into this dough '60% of what goes into this dough is butter.'

Finally consider case-marking. For the reversed quantifiers, both the quantifier and the associated NP exhibit the case that is appropriate for the verbal or prepositional argument position that they occur in. In other words, the two phrases generally agree in case. This pattern is already exemplified by much of the data above (especially, (24)), but since the nominative and accusative forms are homophonous except for the masculine singular, I present some more examples. The first pair in (27) shows nominative vs. accusative case on both the quantifier and the associated NP.

(27)	a.	Ein	hoher	Prozentsatz	deutscher	Käse	wurde	verkauft.	
		а-пом	high-NOM	percentage	German-NOM	cheese	was	sold	
		'A high percentage of what was sold was German cheese.'							

b. Einen hohen Prozentsatz deutschen Käse hat sie verkauft. a-ACC high-ACC percentage German-ACC cheese has she sold 'A high percentage of what she sold was German cheese.'

The example in (28) shows a contrast with the data in (23) above. Namely, (28) has dative case on both the fraction and the associated NP while the data in (23) show nominative/accusative case.¹⁵

(28) ?Zwei Drittel-n Studierend-en wurde gratuliert.
 two third-PL,DAT student-PL,DAT PASS congratulated
 'Two thirds of the congratulations went to students.'

¹⁵The case marking on *Drittel* is optional in (28).

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In sum, this section showed that both the quantifier and the associated NP act like they are arguments of the verb (or a preposition), but in some sense are parallel. We saw that with respect to the strong/weak morphology and case-marking the following descriptive pattern holds: If the reversed quantification structure (29a) is grammatical, both (29b) with NP-ellipsis and (29c) with a bare NP also are grammatical.

- (29) a. [reversed quantifier] [associated NP] verb ...
 - b. [reversed quantifier] verb ...
 - c. [associated NP] verb ...

Also verbal agreement exhibits a similar generalization that both quantifier and verb: if there is a mismatch in number between the reversed quantifier and the associated NP, either one can trigger agreement on the verb, though agreement with the reversed quantifier is slightly preferred.

(30) [reversed quantifier] [associated NP] Verb ...

3 Logical Form and Semantics

Up to now, I have characterized reversed quantification as a true reversal of the conservative interpretation of a quantifier: when the conservative interpretation was Q(A)(B), the reversed interpretation was Q(B)(A) in the data above. However, example (31) shows that this characterization isn't always correct. With focus on the adjective *deutsche* 'German', the interpretation of (31) differs from the reverse application of the quantifier. Reverse application would predict an interpretation requiring that twenty percent of all accepted people, including both students and faculty, were German students. But, (31) is interpreted with a smaller restrictor of the quantifier 20%: the set of accepted students, excluding accepted faculty.

 $\begin{array}{lll} \text{(31)} & Z \text{wanzig Prozent [DEUTsche]}_{F} \text{ Studenten sind angenommen worden.} \\ & \text{twenty percent German}_{F} & \text{students be accepted become} \\ & \text{`Twenty percent of the accepted students were German.'} \end{array}$

The effect of narrow focus in the associated noun phrase can be observed in all examples where the associated noun phrase of the reversed quantifier is complex. (32) is an example with a fraction. In this case, the plain reversed interpretation would be clearly false: It would require that most Berlin residents be foreigners from Europe. But (32) with narrow focus on *Europa* has an interpretation that is actually true at least if Russia and Turkey are regarded as parts of Europe.

(32) Zwei Drittel Ausländer aus [EuROpa]_F wohnen in Berlin.
 two thirds foreigners from Europe reside in Berlin
 'Two thirds of the foreigners living in Berlin are from Europe.'

Examples (31) and (32) show that the restrictor of the reversed quantifiers is determined by focus, rather than by surface constituency. A similar phenomenon was studied by Herburger (1993, 1997, 2000), who introduced the term *focus-affected quantification*. Herburger's data in

(33) concern the proportional reading of the quantifiers *few* and *many*.¹⁶ She points out that (33b) has an interpretation that can be paraphrased as follows: a large percentage of the cooks that applied were incompetent.

- (33) a. Many [ScandiNAvians]_F have won the Nobel prize in literature. (Westerståhl 1985:403)
 - b. Few [inCOMpetent]_F cooks applied. (Herburger 1993:81)

As indicated in (33), the focus-affected interpretation requires a focus on or within the NP associate with *many* or *few*. Herburger already points out that similar data are available in German as illustrated in (34).

[KÖCH-e]_F (34)a. Viel-e / Wenig-e haben sich beworben. many-pl.nom / Few-pl.nom [cook-pl.nom]_F have self applied 'A small / large proportion of applicants were cooks.' ja doch viele / einige / wenige [SCHWALben]_F in den Süden b. ... weil to the South because PRT PRT many / some / few [swallows]_F fliegen fly 'because many / some / few of those flying to the South are swallows' (Herburger 1997:95)

In contrast to the reversed quantification data with percentages and fractions, focus-affected quantification and conservative quantification show no morphological differences other than the placement of focus. While (34a) has a salient focus-affected (i.e. in effect, reverse) reading, (35) has a conservative interpretation.¹⁷

 (35) Viel-e / Wenig-e Köch-e haben sich [beWORben]_F many-pl.nom / Few-pl.nom cook-pl.nom have self applied
 'A small / large proportion of all cooks applied.'

However, this lack of morphological distinction may also indicate that the interpretation of (35) should also be derived as a focus-affected interpretation. Note that the arguments of the quantifier *viele* 'many' also depend on focus more than on syntactic constituency even when the focus is not part of the NP associated with *viele*: the focus in (36) is place on part of the object DP, and the resulting interpretation has a restriction solely determined by focus.

(36) Viel-e / Wenig-e Köch-e haben sich in [INA]'s Abteilung beworben many-PL.NOM / Few-PL.NOM cook-PL.NOM have self in [INA]'s department applied 'A large / small proportion of the cooks that applied applied to Ina's department.'

¹⁶Herburger also discusses examples with intersective quantifiers like *some*. But with intersective quantifiers the relevant distinctions in interpretation cannot be detected since they are symmetric, so I disregard these data in my discussion.

 $^{^{17}}$ A scenario with two versions to bring out the conservative readings for (35) is the following: the human resources department reviews which employees applied for outside positions to estimate job satisfaction. Cooks stand out in the results: [Version for *many*:] Out of the 5 cooks, 4 applied elsewhere. [Version for *few*:] Out of the 1000 cooks, only 100 applied elsewhere.

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I propose therefore that the reversed readings and Herburger's focus-affected readings have the same grammatical source. One effect that also corroborates this proposal comes the restriction of focus-affected reading to stage level predicates that Herburger (1997) observes. (38) shows two examples similar to Herburger's example (37). If focus-affected interpretations were available in (38), both should have a reading that is actually true: 10% of the about 100 million German speakers are Austrian. But this reading isn't easily available for (38a) with *wenige* ('few') nor for (38b) with a percentage.¹⁸

(37) #Few [SalvaDOreans]_F speak Spanish. (Herburger 1997:63)

(38)	a.	#Wenige Österreich	n Deutsch				
		few Austrians	speak	German			
		Intended: 'Few of	the German	speakers are Austrian.'			
	b.	#10% Österreicher _F sprechen Deutsch.					
		10% Austrians	speak G	erman.			
		Intended: '10% of the German speakers are Au					

That the cardinal determiners *many/few* behave like the pseudo-partitives and the proportional determiners we are considering also follows from work on cardinal determiners such as that by Hackl (2000). Hackl argues that cardinal determiners involve a null measurement head CARD. The abstract head CARD is structurally analogous to the unit noun in pseudo-partitives and the nouns *percent* and the fraction nouns in the proportional quantifiers.

The analysis I propose for focus-affected readings—now including the reversed quantification data—adopts central elements from the work of Herburger (1997, 2000). Specifically, I follow Herburger to assume that the quantifiers receiving the focus-affected interpretation take clausal scope. Herburger's proposal entails that focus-affected readings involve a mismatch between overt syntax and logical form. Specifically, Herburger's focus-affected quantifiers are determiners in the overt syntax. Furthermore, I argued above that reversed quantifiers form a DP constituent with their associated noun in overt syntax. But, that the quantifier in both cases takes clausal scope at LF like an adverb is the claim of Herburger's I adopt. The syntactic transformation required to accomplish this is unusual. I first illustrate the proposal by means of example (39) (repeated from (4b)).

(39) 60% [FRAU-en]_F haben gewählt.
60% [woman-PL] have-PL voted
'60% of the voters were women.'

In (40), I again show focus-marking on *Frauen* ('women').¹⁹ Focus on the associated NP *Frauen* is obligatory in (39). I propose, therefore, that the structural configuration of focus-affected quantification requires the NP that forms a constituent with the focus-affected quantifier to either be in focus or to contain a subconstituent that is in focus.

¹⁸In my judgment, though, example (37b) is slightly easier to accept than (38a). This difference may arise because (38b) is morphologically unambiguous: the reversed interpretation is required.

¹⁹In the discussion of reversed quantification in the previous sections, I generally omitted focus. However, it is as far as I can tell always the case the NP associated with the reversed quantifier must be focussed, as shown in (39).
The overt constituency of the (39) that I have argued for is shown in (40a). The LF representation I assume for (39), however, has the constituency in (40b).²⁰



Following Herburger, I assume that there is a syntactic movement rule that must apply covertly to transform (39) into (40). To make this explicit, I state the generalization in (41):

- (41) *DP-Adverbification Generalization:* The structural configuration [_{DP} DP NP] in an argument position that case *Z* is assigned to have the following properties:
 - a. DP and NP share the same case marking, namely for case Z
 - b. both DP and NP are accessible for verbal agreement
 - c. NP must contain a focus
 - d. at LF, DP must move to position outside of DP with clausal scope

At this point, (41) is a descriptive generalization. I hope future work in syntax can derive (41) from more general principles, but at this point have no contentful suggestions regarding this endeavour.

Now consider the semantic interpretation of structure (40b). The central intuition is that (39) involves association with focus, as Herburger already proposes for her focus-affected readings. Rooth (1985, 1992) has proposed different semantic mechanisms for association with focus: direct association in Rooth (1985) and indirect association in (Rooth 1992). While Herburger adopts direct association, I assume indirect association in the following. Already Krasikova (2011) presents a version of Herburger's proposal using indirect association, so my proposal essentially extends this analysis to reversed quantification. In the indirect analysis, the silent operator ~ associates directly with focus and a contextual variable links ~ with the focus-sensitive quantifier. A structure for focus-sensitive quantification is shown in (42).

(42) many_{*C*} ~_{*C*} λ_x [cooks_F(*x*) \wedge applied(*x*)]

Rooth's operator ~ introduces the presupposition that $C \subset \lambda x$ applied(x). This presupposition is derived from the set of focus alternatives of λ_x [cooks_F(x) \land applied(x)]. Since *C* restricts *many*, the predicted interpretation of (42) is the one paraphrasable as a large part of the people who applied were cooks.

For the syntactic derivation of (42), the determiner *many* moves from the DP internal position to a position with clausal scope. This movement furthermore introduces the abstractor λ_x in (42), while \sim_C must be inserted countercyclically (Nissenbaum 2000). Finally, the variable

²⁰In LF representation in (40b), the semantic heads establishing association with focus are omitted for simplicity. See the further discussion below.

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x must inserted by the movement twice; in the argument position of the noun phrase and also the verb.

For reversed quantification exactly the same structure predicts the observed interpretations. Consider again (31), repeated in (43).

The logical form representation of (43) is shown in (44).

(44) $20\%_C \sim_C \lambda_x$ [[German_F students](*x*) \land was-accepted(*x*)]

Since in (44), the focus is only on the adjective, the value of *C* is presupposed to be a subset of λ_x [students(*x*) \wedge was-accepted(*x*)]; that is, the set of accepted students. The interpretation is therefore predicted to only range over accepted students, not all people accepted.

4 Conclusion

In this paper, I discussed contrasts like (45) (repeated from (4)) in German. Specifically note-worthy is that (45b) violates the conservativity universal.

(45)	a.	60% der	Frauen haben gewählt.	
		60% the.ge	N women have voted	
		'60% of the	women voted.'	(conservative)
	b.	60% Frauer	ı haben gewählt.	
		60% wome	n have voted	
		'60% of the	voters were women.'	(reverse)

I argued that proportional quantifiers with heads like *Prozent* 'percent' and the fractions such as *Drittel* 'third', and pseudo-partitives in German can occur in the two kinds of structures shown below (repeated from (10)); one leading to conservative quantification, the other leading to focus-affected quantification.



In both cases, I assumed that the quantifiers project a DP headed by *Prozent* 'percent' or another uninflected measure noun. In the conservative structure, this determiner takes a DP complement which receives genitive case. In the structure leading to the reversed interpretation, however, the associated NP is merged to the DP projected from *Prozent* ('percent') and the numeral

preceding the measure noun. I claim that this structure explains certain morphosyntactic behaviors of the reversed quantifiers: they agree with respect to case, but at the same time behave like to independent nominal phrases with respect to strong/weak adjective marking.

For the interpretation, I argue that the mechanisms of focus-associated readings that Herburger (2000) developed must be applied. Specifically, this involves LF-movement of the determiner to a position with clausal scope. Conservativity is violated by the reversed structure at the overt structure, but at LF conservativity holds.

Further support for the LF-movement analysis comes from the observation that some adverbials (though not all, as example (18) showed) can occur in the same position as the reversed quantifiers.

- - b. Ausschließlich / Nur $[HOLländische]_F$ Frau-en sind Fahrrad gefahren. exclusively / only $[Dutch]_F$ woman-PL be.PL bicycle driven 'All the women who rode a bicycle were Dutch.'

These examples share the constituency of reversed quantification. Also, the NP associated with the quantificational adverbial must contain a focus that associates with the fronted constituent. However, there is one selectional difference: adverbials allow the associated phrase to also be a full DP rather than just an bare NP, as the contrast in (48) illustrates.

(48)	a.	Größenteils / Ausschließlich die Kinder _F hat sie versorgt.
		biggest.part / exclusively die child-PL has she for.cared
		'She mostly / only took care of the children.'
	b.	*Zwei Drittel / 99% die Kinder hat sie versorgt.
		two third / 99% the child-PL has she for-cared

Finally, there is also evidence from islands to LF-movement (see Bayer 1996) that corroborates the analysis. (49) is one relevant example: if the reversed quantifier is embedded within a complex DP, the reversed quantifier interpretation is difficult.

(49) *?Die Bilder von (nur) 20% Frauen hängen im Louvre. the pictures of (only) 20% women hang in the Louvre

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The *yú* Comparative Construction in Mandarin Chinese

Zhiguo Xie

This paper provides an empirical description and a syntactic-semantic analysis of the less-studied yú comparative construction in Mandarin Chinese, which is of the form X G(radable predicate) yú Y. In the discussion, the $y\dot{u}$ comparative is compared to other comparative constructions in Mandarin Chinese. Most notably, the yú comparative construction has two rather peculiar properties. First, it allows no differential expression measuring the difference between Xand Y. I argue that an illegitimate, double Case assignment is responsible for the constraint. Second, it disallows maximum-standard adjectives from serving as G. To account for this constraint, I hypothesize that the semantics of comparative $y\dot{u}$ contains an evaluative component that requires X's degree on the scale associated with G to exceed the standard for G. If on the right track, my analysis suggests yet another potential parametric variation among comparative constructions: comparative constructions may be evaluative or non-evaluative.

Keywords: comparative constructions, evaluativity, Case assignment, degree semantics, Mandarin Chinese

1 Introduction

The primary objective of this paper is to provide a detailed description of empirical morphosyntactic and semantic properties of what I call the $y\dot{u}$ comparative construction in Mandarin Chinese. In spite of the interesting peculiarities the construction carries, it has thus far received very little attention in current linguistics literature, far less than other Mandarin Chinese comparative constructions such as the $b\check{i}$ and transitive comparative constructions. Thus, through this paper, I hope to bring a new comparative construction in Mandarin Chinese to the attention of the theoretical linguistics community. The secondary goal of the paper is to provide theoretical explanations of two peculiar properties observed with the $y\dot{u}$ comparative construction. I show that the affixal, preposition status of $y\dot{u}$ gives rise to the incompatibility of a differential expression in the $y\dot{u}$ comparative constructions in Mandarin Chinese. In addition, I hypothesize, albeit informally and tentatively, that the $y\dot{u}$ comparative construction involves an evaluative component in its semantics. The hypothesis, if correct, suggests a new potential parametric variation among comparative constructions, namely, whether they are evaluative or not.

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Several comparative constructions in Mandarin Chinese, with rather distinguished syntactic and semantic properties, have been observed and discussed in the literature of Chinese Linguistics. The most famous and commonly used one is the bi comparative construction, of the form X bi Y G (D). This construction specifies that an individual X exceeds an individual Y with respect to the gradable property G, and the difference can be optionally specified by a differential expression D (Chao 1968, Erlewine 2007, Lin 2009, Xiang 2005, among many others), as illustrated in (1). At various points of this paper, for the sake of convenience I will refer to Y as the standard of comparison, and G as the predicate of comparison.¹

- (1) a. gēge bǐ mèimei gāo (sān límǐ). brother BI sister tall three centimeter
 'The brother is (three centimeters) taller than the sister.'
 b. zhè zhī bǐ bǐ nà zhī piányí (wǔ kuài). this CL pen BI that CL cheap five dollar
 - 'This pen is (five dollars) cheaper than that one.'

In certain circumstances, it is also possible to express comparison with a bi-less comparative construction. One such construction is the so-called transitive (or bare) comparative construction of the form X G Y D (Erlewine 2007, Grano and Kennedy 2012, Xiang 2005). In this construction, the predicate of comparison G immediately precedes Y, and a differential expression D is obligatory, as illustrated by the sentence in (2).

(2)	a.	gēge	gāo	mèim	ei *	(sān	límĭ).		
		brother	tall	sister	t	hree	centime	eter	
		'The bro	other is	three	centii	nete	rs taller	than the	sister.'
	b.	dìèr	míng	zhĭ	màn	dìy	ī míng	*(liǎng	miǎo).
		second	place	only	slow	firs	t place	two	second
		'The sec	ond-pl	ace wi	inner	is on	ly two s	econds sl	lower than the first-place winner.

The transitive comparative has a few *prima facie* "variants,"² in all of which a morpheme appears between *G* and *Y*, and the presence or absence of a differential expression *D* depends on the choice of morpheme. Such a morpheme can be $ch\bar{u}$ or $gu\dot{o}$. In the former case, the presence of *D* is obligatory, as shown in (3). In the latter case, however, the presence of *D* is optional, as shown in (4), though native speakers of Mandarin Chinese may prefer the presence of such an expression (Grano and Kennedy 2012, C. Liu 2007, Lü 1980).

- (3) gēge gāo chū mèimei *(sān límǐ).
 brother tall CHU sister three centimeter
 'The brother is three centimeters taller than the sister.'
- (4) gēge gāo guò mèimei (sān límǐ).
 brother tall GUO sister three centimeter
 'The brother is (three centimeters) taller than the sister.'

The morpheme appearing between *G* and *Y* can be yet another morpheme $y\dot{u}$, which is generally taken to be a versatile preposition in Mandarin Chinese. This construction, at least

¹The abbreviations used in this paper are as follows: $BI = b\check{t}$; $CHU = ch\bar{u}$; $GUO = gu\dot{o}$; $YU = y\acute{u}$; CL = classifier; DET = determiner; $DOU = universal quantifier <math>d\bar{o}u$; MOD = modification marker.

²The use of the word "variants" is purely based on the surface similarity of the relevant comparative constructions. Whether these constructions are true variants to each other is a theoretical issue that may be subject to different analyses.

in its contemporary use, contrasts with the $b\check{t}$, $ch\bar{u}$, $gu\dot{o}$, and transitive comparative in that the differential expression D is *disallowed* in it (Lü 1980, C. Liu 2007).³ The sentences in (5) and (6) illustrate the $y\acute{u}$ comparative construction. It is obvious that the five comparative constructions⁴ mentioned above form a rather interesting, complete paradigm with regard to the optional/obligatory presence/absence of a differential expression. The paradigm is summarized in Table 1.

- (5) a. gēge (*sān límǐ) gāo yú mèimei (*sān límǐ).
 brother three centimeter tall YU sister three centimeter
 'The brother is (intended: three centimeters) taller than the sister.'
 - b. xīn kuǎn xiàngjī (*wǔ kè) qīng yú lǎo kuǎn (*wǔ kè).
 new style camera five gram light YU old style five gram
 'The new camera is (intended: five grams) lighter than the old version.'
- (6) xīn fángzi de jiàgé (*2000 kuài) gāo yú jiù fángzi de jiàgé (*2000 kuài). new house MOD price 2000 dollar high YU old house MOD price 2000 dollar 'The price of new houses is (intended: 2000 dollars) higher than that of old houses.'

Table 1Pattern of differential expressions in comparative constructions

	optional	obligatory
presence	<i>bĭ</i> comparative	transitive comparative <i>chū</i> comparative
absence	guo comparative	<i>yú</i> comparative

The rest of the paper is organized as follows. In the next section, I give a brief introduction to the historical development of the $y\dot{u}$ comparative construction. By doing this, I hope to put this comparative construction in a broader context, in terms of its status and use in modern Mandarin Chinese. In section 3, I discuss several important morphosyntactic and semantic properties of the $y\dot{u}$ comparative construction. Two of the properties are rather peculiar and worth special attention. In section 4, I turn to the task of giving the syntactic structure of the $y\dot{u}$ comparative construction, which explains one of the two peculiar properties discussed in section 3. In section 5, I discuss, albeit rather informally and tentatively, the semantic interpretation of the $y\dot{u}$ comparative construction, which constitutes the very first

³Jo-wang Lin (personal communication) pointed out to me that the sentence in (i) below, which contains the phrase $y\bar{i}$ diandian 'a bit' after the Y element wo' I', is acceptable to him.

tā zhǐ gāo yú wǒ yī diǎndian.
 he only tall YU I a bit
 'He is only a bit taller than me.'

Based on (i), Lin suspected that a phrase denoting a *small* degree is allowed to serve as D in the $y\dot{u}$ comparative construction. I disagree with this suggestion. Changing $y\bar{i}$ diandian in (i) to another phrase denoting a (contextually) small degree, say, (*xiao*) ban lími '(less than) half a centimeter', does not yield a sentence of improved grammaticality. The sentence in (i) contains $y\bar{i}$ diandian, a vague degree term that is ambiguous between being interpreted as a true measure phrase and as a degree modifier (Grano and Kennedy 2012, Kennedy and McNally 2005). It seems that the sentence is only acceptable when $y\bar{i}$ diandian is interpreted as a degree modifier, not as a measure phrase specifying the difference between the heights of the two relevant persons.

⁴Various authors discussed other constructions in Mandarin Chinese that express comparison. Li (2009, 2013) and Xie (2011a, 2011b, 2014), for instance, discussed the so-called differential verbal comparative construction and the possessive degree construction, respectively. Such constructions are beyond the scope of the current paper, and hence are not included in the discussion.

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attempt to explain its second peculiar property. In the discussion in sections 3–5, where relevant, I compare the $y\dot{u}$ comparative construction to the other comparative constructions given in Table 1 above. In section 6, I discuss some remaining issues and conclude the paper.

2 A Historical Flavor

The $y\dot{u}$ comparative construction was recorded in use as early as in the Late Archaic Chinese period (5th to 3rd c. BC) (Peyraube 1989, Huang 1992, Wei 2007). The sentence in (7) is an example from *Mozi*, an important Chinese philosophical text compiled during that period. The construction continued to be widely used in the Han dynasty (206 BC to 220 AD), as evident by the sentence in (8) from the history masterpiece *Shiji* completed during that dynasty. In fact, Peyraube (1989) even claimed that $y\dot{u}$ was the only overt morpheme for (superior) comparison in Late Archaic and Han Chinese, during which b, though widely used for comparison in modern Mandarin Chinese, was used as a verb meaning "compare" and did not function like a true comparative morpheme.

- (7) yī shǎo yú èr, ér duō yú wǔ.
 one less YU two but more YU five
 'One is less than two, but is (or more precisely, can be) greater than five.'
- (8) ráng hóu zhī fù, fù yú wáng shì.
 rang marquis MOD wealth wealthy YU prince family
 'As for the wealth of Marquis Rang, he is wealthier than the family of the Prince.'

From the Medieval Chinese period (3rd to 13th c. AD) onward, the use of the $y\dot{u}$ comparative construction had been in gradual decline. This process, expedited in Late Medieval Chinese, was accompanied by the increasing use of several other comparative morphemes, some of which are not retained in modern Mandarin Chinese (Peyraube 1989, Huang 1992, Wei 2007). In particular, $b\check{t}$ gradually lost "its full verbal meaning and became a preposition" (Peyraube 1989:611). Moreover, during the grammaticalization process, the gradable predicates of comparison to combine with $b\check{t}$ extended from exclusively verb phrases in Early Medieval Chinese (3rd to 6th c. AD) to other types of gradable phrases starting from Late Medieval Chinese ((9) vs. (10)), most likely a direct result of imposition from the shrinking use of the $y\acute{u}$ comparative with adjective phrases (Huang 1992).⁵

- (9) zhōu yí bǐ chén yǒu guóshì mén fēng.
 Zhou Yi BI me have statesman familial behavior
 'Zhou Yi, compared to me, has more familial tradition of a statesman.'
 (Peyraube's (65), from *shishuoxinyu* in the 5th c. AD)
- (10) bǐ lǐ gōngzuǒ děng suǒ shù yóu gèng xiángxì.
 BI Li Gongzuo et al DET narrate even more detailed
 '(It) is even more detailed than the narrations of Li Gongzuo and the others.'
 (Peyraube's (65), from sanchao beimeng huibian in the 12th c. AD)

In modern Mandarin Chinese, the bi comparative construction is by far the most commonly used strategy to make comparison. The $y\dot{u}$ comparative construction, more or less a

⁵An anonymous reviewer correctly pointed out that knowledge about the historical development of the $y\dot{u}$ comparative construction (or any other language phenomenon, for that matter) plays no role in children's acquisition of the construction. The purpose of including section 2 in this paper, however, is merely to keep the reader informed with regard to how the $y\dot{u}$ comparative came to its current status in modern Mandarin Chinese.

diachronic remnant, is less often used. When it is used, it is more common in writing than in daily conversations, presumably due to its "archaic" flavor. Nevertheless, the $y\dot{u}$ comparative construction remains a considerably productive comparative construction, and native speakers' intuitions about $y\dot{u}$ comparative sentences are (still) clear.⁶ The relative dispreference of the $y\dot{u}$ comparative construction in actual use, therefore, does not prevent researchers of Chinese linguistics from studying the phenomenon from a contemporary syntactic and semantic perspective and drawing conclusions that may have wider theoretical implications.

3 Empirical Properties

In this section, I discuss some empirical morphosyntactic and semantic properties of the $y\dot{u}$ comparative construction, and when relevant and appropriate, compare it to other comparative constructions in Mandarin Chinese. First, the predicate of comparison *G* in the $y\dot{u}$ comparative construction, of the form *X G* $y\dot{u}$ *Y*, can only be a monosyllabic gradable predicate; multisyllabic gradable predicates cannot serve as *G* in the construction. This is illustrated by the minimal pair in (11). The two gradable adjectives, *liàng* and *míngliàng*, have an (almost) identical meaning (i.e. 'bright') and merely differ in the number of syllables contained in them. Only the former, however, can appear in a $y\dot{u}$ comparative sentence. By contrast, this monosyllabic constraint does not apply to many other prepositional uses of $y\dot{u}$. For example, the acceptable sentences (12a) and (12b), illustrating the time and direction/goal uses of $y\dot{u}$ respectively, both contain disyllabic phrases before $y\dot{u}$.

- (11) tàiyáng shēngqǐ le, chuāng wài yǐjīng liàng/*míngliàng yú shì nèi. sun rise PERF window outside already bright YU room inside 'The sun has risen, and the outside is already brighter than the inside.'
- (12) a. nà jiā gōngsī chénglì yú liǎng nián qián. that CL company establish YU two year ago 'That company was established two years ago.'
 - b. tā yīzhí mănzú yú yĭ yǒu de chéngjì.
 he always satisfied YU already have MOD achievement 'He is always satisfied with what he has already achieved.'

The transitive and $ch\bar{u}$ comparative constructions, too, only allow certain monosyllabic gradable predicates (e.g. $g\bar{a}o$ 'tall' and $ku\dot{a}i$ 'fast') to serve as the predicate of comparison (Y. Liu 2004). However, this requirement is a mere coincidental consequence of two independent constraints in Mandarin Chinese. One constraint is that the transitive and $ch\bar{u}$ comparative constructions only allow for gradable predicates associated with conventional measurement systems (e.g. speed, linear extent, time interval, etc.) (Grano and Kennedy 2012, Xiang 2005). The other constraint is that such gradable predicates all happen to be monosyllabic in Mandarin Chinese. Both $g\bar{a}o$ 'tall' and $m\check{e}i$ 'beautiful' are monosyllabic, but only the former comes with a scale for which conventional measuring units exist (e.g. inch, meter). Hence the acceptability contrast between (13a) and (13b).

(13) a. gēge gāo (chū) mèimei sān límĭ.
 brother tall CHU sister three centimeter
 'The brother is three centimeters taller than the sister.'

⁶Li and Thompson (1980) pointed out that the $y\dot{u}$ comparative construction is better retained in modern Cantonese than in modern Mandarin Chinese. For practical reasons, the discussion in this paper is limited to Mandarin Chinese.

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 b. *tā měi (chū) diànyĭng zhōng de měi nǚ liǎng bèi.
 she beautiful CHU movie in MOD beautiful woman two fold Intended: 'She is two times prettier than the beautiful woman in the movie.'

By contrast, the monosyllabic requirement observed with the $y\dot{u}$ comparative appears not to arise from any similar consideration. Whether a monosyllabic gradable predicate comes with a conventional measure system or not does not affect its ability to appear in the $y\dot{u}$ comparative construction. This claim is already evident from the acceptability of the sentence with *liàng* 'bright' in (11), which is not associated with a conventional measurement unit. It can be further seen in the contrast between the sentences in (13) and (14).

- (14) a. gēge gāo yú mèimei.
 brother tall YU sister
 'The brother is taller than the sister.'
 - b. tā měi yú diànyĭng zhōng de měi nů.
 she beautiful YU movie in MOD beautiful woman
 'She is prettier than the beautiful woman in the movie.'

Second, comparative constructions can be divided based on several parameters of comparison (Kennedy 2007a, Lin 2009). One such classification is whether a comparative construction involves explicit or implicit comparison. Explicit comparison involves "specialized morphology that expresses arbitrary ordering relations," and implicit comparison involves "taking advantage of the inherent context sensitivity of the positive (unmarked) form" (Kennedy 2007a:143). The *more...than* comparative construction in English is an example of explicit comparison, and comparative sentences involving the "unmarked," positive form of gradable predicates and introduced by "compared to" belong to the implicit comparison strategy, as shown in (15).

(15) a. John is taller than Mike. (explicit comparison)b. Compared to Mike, John is tall. (implicit comparison)

Naturally, one may wonder if $y\dot{u}$, as a preposition, can be understood to mean "compared to" or "in comparison with" and to express implicit comparison. The answer is negative. Kennedy (2007a) pointed out that implicit comparison requires a contextually non-minimal difference between the compared objects in order for the comparison to make sense. Explicit comparison, however, does not carry such a requirement. The different behaviors give rise to the so-called "crisp judgment" test. Applying this test to the $y\dot{u}$ comparative construction suggests that it involves explicit, rather than implicit, comparison.

More specifically, imagine a scenario in which there are two essays. The first essay is 600 words long, and the second one is 300 words long. The $y\dot{u}$ comparative sentence in (16) would be felicitous in this scenario. Imagine another scenario in which the first essay remains 600 words long, but the second essay becomes 597 words long, only 3 words shorter than the first. The sentence in (16) would be still felicitous. This contrasts with the sentence in (17), with $g\bar{e}n...xi\bar{a}ngb\check{i}$ 'compared to', which clearly involves implicit comparison (Erlewine 2007) and which is only felicitous in the first, but not the second, scenario. This difference suggests that the $y\acute{u}$ comparative is an explicit comparison strategy.

(16) dìyī piān wénzhāng cháng yú dìèr piān wénzhāng.
 first CL article long YU second CL article
 'The first article is longer than the second article.'

(17) gēn dièr piān wénzhāng xiāng bǐ, dìyī piān wénzhāng cháng. with second CL article with compare first CL article long 'Compared to the second article, the first article is long.'

The third empirical property of the $y\dot{u}$ comparative construction is that the predicate of comparison *G* can be either of positive polarity (e.g. "tall" and "fast") or of negative polarity (e.g. "short" and "slow"). This is evident from the acceptability of (18) regardless of *cháng* 'long' or *duǎn* 'short' serving as the predicate of comparison. This property puts the $y\dot{u}$ comparative construction in the same group as the $b\check{t}$ and transitive comparative constructions (as in (19)), both of which allow negative polarity gradable predicates to serve as the predicate of comparison (Lin 2009, C. Liu 2007). In this regard, the $y\dot{u}$ comparative is different from the *chū* and *guò* comparatives, neither of which allows negative polarity gradable predicates to serve as the predicate of comparison, as shown in (20).⁷

- (18) liǎng jiǎo jiān de jùlí yào luè kuān/zhǎi yú shuāng jiān. two foot between MOD distance need a bit wide/narrow YU two shoulder 'The two feet should be apart a bit wider/narrower than the two shoulders.'
- (19) a. tā jīntiān pǎo de bǐ zuótiān kuài/màn. he today run EXT BI yesterday fast/slow 'He ran faster/slower today than yesterday.'
 - b. gēge zhòng/qīng mèimei sān gōngjīn.
 brother heavy/light sister three kilogram
 'The brother is three kilograms heavier/lighter than the sister.'
- (20) zhè tiáo shéngzi cháng/*duǎn guò/chū nà tiáo liǎng yīngchǐ. this CL rope long/short GUO/CHU that CL two foot 'This rope is two feet longer/(intended: shorter) than that rope.'

Fourth, it is a well-known observation that gradable predicates can further be classified based on the context-dependency of the standard of comparison. Kennedy and McNally (2005), for example, divided gradable adjectives into relative-standard adjectives (e.g. *tall, heavy, important*), minimum-standard adjectives (e.g. *dirty, wet, bent*), and maximum-standard adjectives (e.g. *full, flat, straight*). A relative-standard adjective comes with a context-dependent standard: what counts as tall or heavy varies from context to context. By contrast, the latter two types of gradable adjectives do not introduce a context-dependent standard. Rather, the argument of a minimum-standard adjective is required to possess any *non-zero* degree of the relevant property: a minimal bend on a rod would qualify the rod as being bent. The argument of a maximum-standard adjective is required to possess a *maximal* degree of the relevant property: a straight rod (strictly speaking) needs to be completely straight and have no bend at all.

The three types of gradable predicates manifest different properties. Only relative- and minimum-standard adjectives can serve as the predicate of comparison in the $y\dot{u}$ comparative construction, as shown by the acceptability of the sentences in (21). It is unacceptable to have a maximum-standard adjective as the predicate of comparison in a $y\dot{u}$ comparative sentence, as evident from the unacceptable sentences in (22).⁸

⁷In this paper, I will not address this difference between the $b\check{i}$, $y\acute{u}$, and transitive comparatives, on the one hand, and the $gu\grave{o}$ and $ch\bar{u}$ comparatives, on the other hand.

 $^{^{8}}$ In her discussion of the *bi* comparative construction, Paul (1993) posited that a (cyclic) C-command relation holds between the two terms of comparison. One important piece of evidence she cited was the dependence

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- (21) a. yìndù rénkŏu de zēngzhǎng sùdù kuài yú zhōngguó. India population MOD grow speed fast YU China 'The population grows faster in India than in China.'
 - b. lóu nèi shènzhì zāng yú lóu wài qiángtǐ.
 building inside even dirty YU building outside wall.
 'The inside of the building is even dirtier than the outside wall.'
- (22) a. *yībānshuōlái, gāosùgōnglù zhí yú xiāngjiān xiǎo lù. generally speaking highway straight YU countryside small road Intended: 'Generally speaking, highways are straighter than small rural roads.'
 - b. *zhè ge xiāngzi míngxiǎn mǎn yú nà ge xiāngzi.
 this CL suitcase obviously full YU that CL suitcase
 Intended: 'Obviously, this suitcase is fuller than that suitcase.'

In this regard, the $y\dot{u}$ comparative is again different from the $b\check{\iota}$ and $gu\dot{o}$ comparatives.⁹ The latter two constructions are compatible with all three types of gradable predicates serving as the predicate of comparison. For the $gu\dot{o}$ comparative, this claim is evident in the grammaticality of the sentences in (23). The sentences in (24) illustrate the $b\check{\iota}$ comparative construction with all three types of gradable predicates.

- (23) a. zǎoshàng gāofēngqī, qí zìxíngchē huì kuài guò kāi chē. morning rush hour ride bicycle should fast GUO driving car 'During the morning rush hour, riding a bicycle should be faster than driving a car.'
 - b. yǒuxie kuài cān diàn de bīngkuài zāng guò mǎtǒng shuǐ.
 some fast food restaurant MOD ice dirty GUO toilet water
 'Ice in some fast food restaurants is dirtier than toilet water.'
 - c. zhè ge xiāngzi míngxiǎn mǎn guò nà ge xiāngzi. this CL suitcase obviously full GUO that CL suitcase 'Obviously, this suitcase is fuller than that suitcase.'
- (24) a. tāde chéngjì bǐ wǒde hǎo.
 his performance BI my good
 'His performance/grade is better than mine.'
 - b. zhè jiàn yīfú gănjué bǐ nà jiàn yīfú shī.
 this CL clothes feel BI that CL clothes wet
 'This piece of clothing feels wetter than that one.'
 - c. měi ge rén dōu zhàn de bǐ wǒ zhí. every CL person DOU stand DE BI me straight 'Everyone stood straighter than I did.'

Fifth, certain comparative constructions can be conflated to occur in the same sentence. The sentence in (25), for example, combines bi and $ch\bar{u}$ comparatives together, and the sen-

of the scope of comparison upon the standard of comparison. The same observation seems to apply to the $y\dot{u}$ comparative construction. The sentence in (21a), for example, can be understood either as comparing India and China with respect to the topic of population growth (among many other potential topics), or as directly comparing the population growth rates of the two countries.

⁹When it comes to compatibility with the different types of gradable predicates, native intuitions of Mandarin Chinese speakers, at times, could be unclear with the transitive and $ch\bar{u}$ comparative constructions. Adding to the difficulty of judgment is the fact that the gradable predicates that can appear in the two constructions are rather limited (Xiang 2005, Grano and Kennedy 2012).

tence in (26) combines $ch\bar{u}$ and $gu\dot{o}$ comparative together.¹⁰ By contrast, the $y\dot{u}$ comparative is disallowed from combining with any other comparative construction, as illustrated by the sentences in (27).

(25)	zhā Zha 'Zh	ingsān bĭ angsan BI angsan is t	lĭsì Lisi wo in	gāo tall ches t	chū CHU aller t	liǎng two han Li	cùn. inch isi.'	(Grano and K	Cennedy's (53a))
(26)	zhā Zha 'Zh	ingsān gāc angsan tall aangsan is t	o chū CH wo in	u guo U GU ches t	ò lĭs O Lis aller t	ì liăn si two han Li	ng cùn o inc isi.'	ı. (Grano and K h	Cennedy's (56))
(27)	a.	zhāngsān Zhangsan 'Zhangsan	(*bĭ) BI is tal	gāo tall ler tha	yú YU m Lisi	lĭsì. Lisi i.'			
	b.	zhāngsān Zhangsan 'Zhangsan	gāo tall is thi	chū CHU ee cei	(*yú) YU ntimet	lĭsì Lisi ters tal	sān three ller th	límĭ. centimeter an Lisi.'	
	c.	zhāngsān Zhangsan 'Zhangsan	gāo tall is tal	(*yú) YU ler tha	guò GUO in Lisi	(*yú) YU i.') lĭsì. Lisi		

Sixth, as already mentioned in section 1, the $y\dot{u}$ comparative construction cannot take a differential expression after the standard of comparison, or elsewhere in the construction. This restriction applies not only to differential measure phrases (e.g. $s\bar{a}n \ limi$ 'three centimeters', *liǎng xiǎoshí* 'two hours'), as illustrated in (5) and (6) repeated below, but also to differential factor phrases (e.g. $y\bar{v}\ ban$ 'half', *liǎng bèi* 'twice, twofold'), as in (28).¹¹

(5)	a.	gēge	(*	sān límĭ)	gāo	yú m	ièime	i (*s	ān lím	ă).	
		brotł	ner th	ree cent	imeter	tall	YU si	ster	thr	ee cer	timete	er
		'The	broth	er is (inte	ended:	three o	centim	eters) talle	er than	the si	ster.'
	b.	xīn	kuǎn	xiàngjī	(*wů	kè)	qīng	yú	lǎo	kuǎn	(*wů	kè).
		new	style	camera	five	gram	light	YU	old	style	five	grar
			•									

'The new camera is (intended: five grams) lighter than the old version.'

¹⁰Grano and Kennedy (2012) took the co-occurrence of $ch\bar{u}$ and $gu\dot{o}$ to be natural, and provided an explanation of the co-occurrence. However, not every native speaker of Mandarin Chinese I consulted accepted such a co-occurrence. I leave to future research where this inter-speaker variation comes from.

¹¹I should note that the constraint against the $y\dot{u}$ comparative construction taking a differential expression only applies to its contemporary use. Ming Xiang (personal communication) pointed out that given the claim (in section 2) that the $y\dot{u}$ comparative construction was the only overt morpheme for (superior) comparison in Late Archaic and Han Chinese, it would be surprising if at that time the construction could not take a differential expression. For, if so, how would people at that time express difference between two entities under comparison with respect to a gradable property? In fact, Wei (2007) cited the following example from Han Chinese, which clearly illustrates compatibility of the $y\dot{u}$ comparative construction with a differential expression at that time. When and how the $y\dot{u}$ comparative construction lost its ability to combine with a differential expression is a topic that I have to leave for future research. The following discussion about the incompatibility of the $y\dot{u}$ comparative construction with a differential expression only applies to its contemporary use.

i. cháng yú hé yī liǎng chǐ.
long YU grain one two foot
'one or two feet longer than the grain (plant)'
(Wei 2007:(11), from Lun Heng in the 1st c. AD)

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- (6) xīn fángzi de jiàgé (*2000 kuài) gāo yú jiù fángzi de jiàgé (*2000 kuài). new house MOD price 2000 dollar high YU old house MOD price 2000 dollar 'The price of new houses is (intended: 2000 dollars) higher than that of old houses.'
- (28) chéngshì jūmín de shōurù (*sān bèi) gāo yú nóngcūn jūmín (*sān bèi). city resident MOD income three time high YU rural resident three time Intended: 'The income of urban residents is three times higher than that of rural ones.'

To summarize this section, the $y\dot{u}$ comparative construction shows several interesting properties. First, it is only compatible with monosyllabic predicates of comparison. I take this requirement to be idiosyncratic and do not attempt to provide an account of it. Second, when this monosyllabic requirement is met, the predicate of comparison can be of either positive or negative polarity. Third, maximum-standard adjectives, in contrast with relative- and minimum-standard adjectives, cannot serve as the predicate of comparison in the $y\dot{u}$ comparative construction. Fourth, the $y\dot{u}$ comparative involves explicit, rather than implicit, comparison. Fifth, the $y\dot{u}$ comparative cannot be conflated with any other comparative construction. Lastly, the $y\dot{u}$ comparative constructions in Mandarin Chinese.

4 Syntactic Representation

In the remainder of this paper, I will primarily focus on addressing the question of why the $y\dot{u}$ comparative construction, in its contemporary use, does not allow a differential expression in it. In addition, I will, albeit rather informally and tentatively, tackle the question of why this comparative construction is not compatible with maximum-standard gradable predicates. With regard to the first question, of course, one can choose to define the semantics of $y\dot{u}$ in such a way that there is no slot for a difference between the two entities under comparison. This, however, is at best an ad hoc solution. There is no conceptual prohibition against any comparative construction specifying a difference between the two entities under comparison. Why should the yú comparative construction constitute an exception? Moreover, note the pattern observed in section 1 with respect to the presence/absence of differential expressions in several closely related comparative constructions in Mandarin Chinese. An account that can capture the overall pattern should be conceptually preferred over an analysis that is only able to take care of a subset of the pattern. Given these considerations, in this paper I take a syntactic approach to the first question, by arguing that the restriction against a differential expression in the yú comparative construction actually arises from an illegitimate, double Case assignment to the standard-of-comparison phrase.

First, let me reiterate that $y\dot{u}$ is a preposition across all of its uses (Lü 1980). Then, it is no surprise that $y\dot{u}$ has the ability to assign a Case. What makes the comparative use of this preposition interesting is that in this use, $y\dot{u}$ seems to have no independent status and must affix to the predicate of comparison right before it. This is suggested by the coordination test. Assume *X G* $y\dot{u}$ *Y* to be the general form of the $y\dot{u}$ comparative construction. Two "*G* $y\dot{u}$ " chunks can be coordinated by using such conjunction words as *bingqiě* 'and' and *dànshì* 'but,' as in (29). By contrast, two " $y\dot{u}$ *Y*" chunks cannot be similarly coordinated together, as in (30), which would be surprising if $y\dot{u}$ were a "regular" independent preposition.¹²

¹²An anonymous reviewer suggested that $y\dot{u}$ forms a morphological adjectival compound with the preceding predicate of comparison. His/her main argument resides in the fact that $y\dot{u}$ does not form a constituent with the NP following it. As such, the reviewer further suggested, $y\dot{u}$ is invisible to syntax and cannot assign a Case of its own. According to his/her postulation, the $y\dot{u}$ comparative construction is a special case of the transitive comparative construction, and the standard-of-comparison phrase receives a Case from a covert head associated

- (29) gēge gāo yú, bìngqiě zhòng yú, mèimei.
 brother tall YU and heavy YU sister.
 'The brother is taller and heavier than the sister.'
- (30) *tā gāo yú mèimei (bìngqiě) yú dìdi.
 he tall YU sister and YU brother.
 Intended: 'He is taller than his brother and his sister.'

In this paper, I assume that the comparative constructions in Mandarin Chinese mentioned in section 2 all share the same basic underlying structure. This assumption has been adopted in previous works on comparative constructions in Mandarin Chinese and is not a novel move. For example, Xiang (2005:193) noted that "conceptually a unified analysis has obvious advantage because it reduces different patterns of comparatives to one single syntactic structure." This assumption entails that the basic structure should allow for a substructure accommodating a differential expression. Otherwise, a differential expression would be impossible in all comparative constructions, contrary to fact (recall Table 1). Rather, it is due to independent factors that a certain comparative construction requires, allows, or forbids, the appearance of a differential expression. According to Grano and Kennedy (2012), the transitive comparative construction requires a differential measure phrase because measure phrases come with a covert Case assigner, which is required for the licensing of the standardof-comparison phrase. The $ch\bar{u}$ morpheme in the $ch\bar{u}$ comparative may be taken to be a member of the same class as the covert Case assigner. I argue that the Case-based analysis by Grano and Kennedy, coupled with the affixal status of the preposition $y\dot{u}$, can provide an explanation why the *yú* comparative construction does not allow a differential expression.

A recent attempt to offer a unified account of certain comparative constructions in Mandarin Chinese is the so-called "DegP-shell" analysis proposed by Xiang (2005), modeled after Larson's (1988) VP-shell structure. Under Xiang's analysis, there are two degree projections in the syntactic representation of certain comparative constructions. The head of the lower DegP selects for a differential expression as its complement. The standard-of-comparison phrase appears in the specifier position of the projection. The lower DegP serves as the complement of an adjective, whose projection, in turn, is the complement of the higher DegP structure. The standard-of-comparison phrase raises to the specifier position of the AP. The higher Deg head can be filled by bi (for bi comparative sentences) or an adjective of a certain class via head movement from the AP (for transitive, $ch\bar{u}$, and $gu\dot{o}$ comparative sentences). (31a) and (31b) give the structural representations of (1a) and (2a), respectively.

a. gēge bi mèimei gāo (sān lími).
 brother BI sister tall three centimeter
 'The brother is (three centimeters) taller than the sister.'

with the predicate of comparison. I see at least two problems with the reviewer's suggestions. First, there is no a priori requirement that a Case assigner form a constituent with the element that checks the Case. There exist uses of $y\dot{u}$ as a preposition where it assigns a Case to an NP but does not form a constituent with the NP. For example, in the phrase *chénnì* $y\dot{u}$ *diànzi* $y\dot{o}uxi$ 'addicted to electronic games', $y\dot{u}$ and *diànzi* $y\dot{o}uxi$ do not form a constituent. However, without $y\dot{u}$ as a Case assigner, the phrase is degraded. Second, the reviewer treated the $y\dot{u}$ comparative as a special case of the transitive comparative. However, it is not clear to me whether and how the treatment can explain the fact that the $y\dot{u}$ comparative disallows, but the transitive comparative requires, a differential expression.

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(2) a. gēge gāo mèimei *(sān límǐ).
 brother tall sister three centimeter
 'The brother is three centimeters taller than the sister.'



Regarding the lower Deg head, Xiang (2005) took it to be a phonologically silent degree morpheme *exceed*, which, along with the predicate of comparison, undergoes head movement to the higher Deg head when the head is not filled (by *bi*). Grano and Kennedy (2012:242), by drawing on Svenonius and Kennedy's (2006) insight on the distribution of measure phrases, suggested the possibility of the lower degree head being filled by a null degree morpheme μ , which "is projected only when a measure phrase is present." The representations in (31a) and (31b) above conflate Xiang's DegP-shell analysis with Grano and Kennedy's. From the representations, it is obvious that the transitive comparative has a structure very similar to the *bi* comparative. The only difference is that for the transitive comparative, the adjective, along with the μ morpheme, moves to the higher Deg head. According to Grano and Kennedy (2012), in the absence of *bi*, this movement is required by the need for a Case on the part of the standard-of-comparison phrase; μ moves to the higher Deg head for Case assignment and takes the adjective along with it, due to the affixal nature of the morpheme.

The transitive comparative construction requires the presence of a measure phrase because the morpheme μ , which "requires and is required by" the projection of a measure phrase (Grano and Kennedy 2012:244), is obligatory for assigning a Case to the standard-ofcomparison phrase in the construction. The morpheme $ch\bar{u}$ may be taken to be an overt counterpart of μ . By contrast, when bi serves as the head of the higher Deg phrase, it is able to assign a Case to the standard-of-comparison phrase, and there is no need for μ to raise to assign a Case.¹³ Under the assumption that $ch\bar{u}$ is an overt counterpart of μ , the claim is supported by the grammaticality of the sentence in (32), in which both bi and $ch\bar{u}$ appear and $ch\bar{u}$ is separated from bi by the standard-of-comparison phrase and the gradable predicate.¹⁴

 13 Grano and Kennedy (2012) assumed that the Case-assigning capacity of μ is "suppressed" when μ does not raise. Exactly how the suppression comes about, I think, still remains an open question.

¹⁴An anonymous reviewer raised issues with the DegP-shell analysis proposed by Xiang (2005) and adapted by Grano and Kennedy (2012). More specifically, the reviewer pointed out that Xiang's analysis "wrongly rules out the well-known acceptability of adverbs preceding the adjectives" in the *bi* comparative construction (as in (i) below), because the standard-of-comparison phrase "occupies the specifier position of the AP." Grano and Kennedy (2012) actually entertained two possible ways of reconciling a similar objection raised by Lin (2009)

(32) zhōngguó shēchǐ pǐn de xiāoshòu jiàgé bǐ měiguó gāo chū liǎngbèi. China luxury goods MOD sale price BI USA high CHU twice 'The prices of luxury goods in China are twice more expensive than in USA.'

I adopt Xiang's (2005) DegP-shell proposal to represent the syntactic structure of the $y\dot{u}$ comparative construction. $Y\dot{u}$ is comparable to $b\check{t}$ in two regards. First, it is the head for the higher Deg phrase. Second, as a preposition, it has the ability to assign a Case. The syntactic structure of the $y\dot{u}$ comparative construction, therefore, is very similar to that of the $b\check{t}$ comparative construction without an accompanying measure phrase. At the same time, there is a key difference between $y\dot{u}$ and $b\check{t}$: the former is not an independent morpheme and must affix to the predicate of comparison. Due to this morphological status of $y\dot{u}$, the predicate of comparison raises in order to "host" $y\dot{u}$. Illustrated with (14a) (repeated below), the structure of the $y\dot{u}$ comparative construction is represented in (33a) below, with the vacuous lower DegP omitted.

(14) a. gēge gāo yú mèimei.
 brother tall YU sister
 'The brother is taller than the sister.'

We are now ready to explain why the $y\dot{u}$ comparative construction is not compatible with a differential expression. The degree morpheme $y\dot{u}$ is similar to the covert degree morpheme μ in certain aspects: both need to affix to the predicate of comparison, and both can assign a Case when appearing in an appropriate Case-assigning position. It is precisely these similarities that render the $y\dot{u}$ comparative construction unable to take a measure phrase in it. When a measure phrase is present in a $y\dot{u}$ comparative sentence, it introduces the covert degree morpheme μ , which in turn needs to affix to the predicate of comparison. The predicate of comparison further needs to raise to "host" $y\dot{u}$. However, doing so would bring μ to a Case-assigning position, and this leads to an illegitimate, double Case assignment to the standard-of-comparison phrase. This analysis is illustrated in (33b), representing the example sentence in (14a) with the measure phrase $s\bar{a}n limi$ 'three centimeters' added after the standard-of-comparison phrase *mèimei* 'sister'.

with the DegP-shell analysis. One especially plausible option is to claim that adverbs like geng and hai (both meaning 'even') are adjuncts in the AP projection. As supporting evidence, geng and hai can stack together. For instance, the sentence in (ii), from work by the Chinese philosopher and diplomat Hu Shih, contains both hai and geng occurring side by side to modify the adjective gao. I would like to thank Christopher Piñón for his helpful comments and guidance related to this footnote.

- i. gēge bĭ mèimei gèng/hái gāo.
 brother BI sister even tall
 "The brother is even taller than the sister."
- ii. róngrěn bǐ zìyóu hái gèng zhòngyào.
 tolerance BI freedom even even important
 'Tolerance is even more important than freedom.'





Based on this analysis, I make the following prediction. If a $y\dot{u}$ comparative sentence containing a differential expression has two gradable predicates, one hosting μ and the other hosting $y\dot{u}$, then there will be no double Case assignment, and the sentence should be acceptable. This prediction is borne out. The predicate of comparison in a $y\dot{u}$ comparative sentence can be reduplicated, as in (34).¹⁵ $Y\dot{u}$ affixes to the higher $g\bar{a}o$, and μ affixes to the lower $g\bar{a}o$. I assume that the lower $g\bar{a}o$ takes a null pronoun after it, to which a Case is assigned by μ .

(34) ?gēge gāo yú mèimei gāo sān límĭ.
 brother tall YU sister tall three centimeter
 'The brother is three centimeters taller than the sister.'

The analysis also explains why the $y\dot{u}$ comparative cannot be incorporated into the transitive comparative. Essentially, this is because the former construction disallows, but the latter construction requires, the occurrence of a differential expression. In the previous section, it was also observed that the $y\dot{u}$ comparative construction cannot be incorporated into the $b\check{i}$, $ch\bar{u}$, or $gu\dot{o}$ comparative constructions. The incompatibility of $y\dot{u}$ and $b\check{i}$ is a direct consequence of the postulation that they are degree morphemes occupying the same degree head position. The incompatibility of $y\dot{u}$ with $ch\bar{u}$ and $gu\dot{o}$ can be easily accounted for if we assume that $ch\bar{u}$ and $gu\dot{o}$ are affixes as well. Recall Grano and Kennedy's (2012) claim that though $ch\bar{u}$ and $gu\dot{o}$ are different in certain respects (see Table 1), they both belong to the same class as μ . Therefore, when $y\dot{u}$ co-occurs with $ch\bar{u}$ or $gu\dot{o}$, the predicate-of-comparison phrase takes two Case assigners for the standard-of-comparison phrase. Moreover, the two Case assigners eventually appear in the same Case-assigning position. This leads to an illegitimate, double Case assignment.

Before concluding this section, I would like to say a few words regarding the contrast between bi and $y\dot{u}$ with respect to their (in)compatibility of $ch\bar{u}$ and $gu\dot{o}$. Again, an important difference between bi and $y\dot{u}$ is that the latter is affixal in nature. In a $y\dot{u}$ comparative sentence, the predicate of comparison has to raise to the Case-assigning $y\dot{u}$ degree head so as to "host" the affixal $y\dot{u}$. This requirement disallows any other Case-assigning element such as $ch\bar{u}$ and $gu\dot{o}$ from combining with the predicate of comparison. By contrast, $b\check{t}$ is an independent morpheme. In a $b\check{t}$ comparative sentence, the predicate of comparison does not raise to

¹⁵Admittedly, the utterance in (34) is most natural with a pause before the second $g\bar{a}o$. Without such a pause, it is still at least marginally acceptable.

the Case-assigning bi degree head, and can stay in situ to serve as a "host" for affixal $ch\bar{u}$ and $gu\dot{o}$ in a duly manner.

5 Evaluativity of the yú Comparative: A Preliminary Analysis

In this section, I provide some rather preliminary and informal remarks regarding another peculiar property of the $y\dot{u}$ comparative construction discussed in section 3, namely, that the construction allows minimum- and relative-standard gradable predicates, but not maximum-standard gradable predicates, to serve as the predicate of comparison. This observation has already been illustrated by the acceptability contrast in (21) and (22) (repeated below). No other comparative construction in Mandarin Chinese (or in any other language to the best of my knowledge) has such a restriction on the predicate of comparison.

- (21) a. yìndù rénkǒu de zēngzhǎng sùdù kuài yú zhōngguó.
 India population MOD grow speed fast YU China
 'The population grows faster in India than in China.'
 - b. lóu nèi shènzhì zāng yú lóu wài qiángtǐ.
 building inside even dirty YU building outside wall.
 'The inside of the building is even dirtier than the outside wall.'
- (22) a. *yībānshuōlái, gāosùgōnglù zhí yú xiāngjiān xiǎo lù. generally speaking highway straight YU countryside small road Intended: 'Generally speaking, highways are straighter than small rural roads.'
 - b. *zhè ge xiāngzi míngxiǎn mǎn yú nà ge xiāngzi.
 this CL suitcase obviously full YU that CL suitcase
 Intended: 'Obviously, this suitcase is fuller than that suitcase.'

Most likely, it is something in the semantics of $y\dot{u}$ that is responsible for this restriction. Of course, one can choose to define $y\dot{u}$ with a presupposition specifying what types of gradable predicates can serve as the predicate of comparison in the $y\dot{u}$ comparative construction. Then, a natural question to ask would be what independent factors give rise to such a presupposition. In this paper, however, I take a different route by suggesting that the restriction arises from the evaluative property of the $y\dot{u}$ comparative construction. I base my suggestion on the observation that the pattern in (21) and (22) is strongly reminiscent of the (in)felicity pattern of gradable adjectives used in English sentences of the form *A*, but could be *A-er*. Both Kennedy (2007b) and Lassiter (2010) observed that minimum- and relative-standard gradable adjectives cannot. Obviously, the unacceptability of (35c) cannot be blamed on any prohibition of the comparative use of maximum-standard adjectives in comparative constructions, because such a use is indeed observed, as shown in (36). Rather, it is due to evaluativity present in the linguistic context.

- (35) a. The rod is bent, but it could be more bent.
 - b. This basketball player is tall, but he could be taller.
 - c. #The room is full, but it could be fuller.

(36) My glass could be fuller than it is now.

Here, I adopt Rett's (2008) definition of evaluativity: a degree construction is evaluative when it makes reference to a degree which meets the standard for the predicate of comparison. In the sentences in (35), the first clauses say that in the actual world the rod's degree of

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being bent, the basketball player's height, and the fullness of the relevant room equal or exceed the respective (contextual) standard, and the second clauses say that in a hypothetical world the degree could be higher. However, a maximum-standard gradable predicate, by its very nature, is associated with a standard which corresponds to the maximum value/interval on the relevant scale. Thus, there cannot exist any degree exceeding the standard, which explains why a maximum-standard gradable predicate cannot appear in the construction.

I hypothesize that the semantics of the $y\dot{u}$ comparative construction, of the form $X G y\dot{u}$ Y, has a similar evaluative component: Y's degree of being G meets the standard for G. At the same time, the semantics of the construction requires X's degree of being G to exceed Y's degree. By transitivity, this requires X's degree of being G to exceed the standard for G. However, when G is a maximum-standard gradable predicate, there exists no degree of being G for X that can exceed the standard for G. Hence, the sentence does not have a viable semantics, and is unacceptable.¹⁶

However, there is an obvious issue with claiming that the $y\dot{u}$ comparative construction is evaluative: a $y\dot{u}$ comparative sentence containing a relative-standard gradable predicate of comparison seems not to require either of the two compared items to meet the standard for the predicate. The sentence in (14), for instance, does not require the brother or the sister to be tall in the context. They both can be short, but the sentence is still true as long as the brother is taller than the sister. Here is a (rather ugly) stipulation to cope with this issue. I hypothesize that the $y\dot{u}$ comparative construction sets up a local comparison class consisting of the two compared entities only, and this comparison class is "impermeable" to other individuals. For a $y\dot{u}$ comparative sentence whose predicate of comparison is a relative-standard gradable predicate G, its standard is identified with Y's degree on the associated scale. Thus, it is trivially true that *Y*'s degree of being *G* equals or exceeds the standard for *G*. That is, the evaluative component holds vacuously, and makes no real contribution to the semantics of the sentence. However, when G is a minimum- or maximum-standard gradable predicate, the standard for G is lexically specified (Kennedy and McNally 2005) and cannot be identified with Y's degree of being G. Hence, the evaluative component is not trivially true and cannot be done away with.

6. Concluding Remarks

In this paper, I provided an empirical description as well as a (preliminary) theoretical analysis of the less-studied $y\dot{u}$ comparative construction in Mandarin Chinese. The emphasis is on the following two rather peculiar properties. First, the construction, of the form $X G y\dot{u} Y$, allows no differential expression to measure the difference between X and Y. The prohibition arises because the covert degree morpheme μ that comes with a measure phrase (Svenonius and Kennedy 2006) would affix to G and move to the same degree head position as $y\dot{u}$. This leads to an illegitimate, double Case assignment to Y. Second, only relative- and minimumstandard gradable predicates, as opposed to maximum-standard gradable predicates, can serve as G in a $y\dot{u}$ comparative sentence. Tentatively, I hypothesized that this restriction arises from an evaluative component in the semantics of the $y\dot{u}$ comparative construction. If on the right track, my analysis may well suggest another potential parametric variation of

¹⁶Christopher Piñón (personal communication) pointed out that my hypothesis discussed in this paragraph would predict the negative counterparts of sentences like (22a) and (22b) to be acceptable. Moreover, for the negative versions of the two sentences, small rural roads and the second suitcase would be predicted to be straight and full, respectively. However, the negative counterparts of (22a) and (22b) are ungrammatical (or at best slightly improved in terms of acceptability), which makes it difficult to judge whether the second prediction holds or not. Whether the observations challenge my (tentative) hypothesis or can be explained away independently is a topic that I leave for future research.

comparative constructions, in addition to those already discussed by such researchers as Kennedy (2007a) and Lin (2009): comparative constructions may be evaluative or non-evaluative. The $y\dot{u}$ comparative construction in Mandarin Chinese is evaluative, while all of the other comparative constructions in the language are non-evaluative.

There remain some open questions that call for further research. One question has to do with the stipulation discussed at the end of the previous section: that when a $y\dot{u}$ comparative sentence has a relative-standard gradable predicate as *G*, the (contextual) standard for *G* is identified with *Y*'s degree of being *G*. This stipulation very likely invites learnability complications. How is the identification warranted? How can a child language learner acquire it? Second, $y\dot{u}$ can also occur after an equative phrase, as in *děng yú* 'equal, equivalent to' and *xiāngdāng yú* 'equivalent to, amount to'. Given the range of uses of $y\dot{u}$, the relation between $y\dot{u}$ in the $y\dot{u}$ comparative construction and $y\dot{u}$ in such equative phrases is worth more investigation.

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Symbouletic Modality

Igor Yanovich

This paper argues for a novel semantic type of modality: symbouletic modality (from Greek $\sigma v \mu \beta o v \lambda \epsilon \dot{v} \omega$ 'to advise'). Symbouletic modals are a subtype of priority modals that do not just neutrally state the facts, but urge somebody to take a particular practical action. Thus symbouletics have close ties both to other priority modals and to performative verbs. A formal semantics for symbouletics is provided within the framework for performatives by Condoravdi and Lauer.

Keywords: symbouletic modality, advice, priority modality, grammaticalization, semantic maps

1 Symbouletic Modality: Performative Modality of Suggestion

Portner (2009) defends a classification of modality that features *priority modality* as one of the superclasses. Priority modals share the circumstantial modal base, and their ordering source, in Kratzer's semantics for modals, orders the practical options provided in that modal base according to some measure of goodness. Deontic modal statements describe what follows the rules best, as in (1). Teleological statements describe a means to reach a particular goal, as in (2). Bouletic statements describe desires, cf. (3).

- (1) **Deontic**: *Tax office's website*: Everyone **should** file their taxes by April 15.
- (2) **Teleological**: To get to the Polar Bear Park, you have to take a plane.
- (3) **Bouletic**: I **must** try this cake. I simply **must**.

Symbouletic¹ modals, as in (4), intuitively fit the general category of priority modality: they select one practical option as preferable.

(4) **Symbouletic**: You really **should** go to that concert!

What distinguishes them from other priority modals is that they do not just describe the best option, but also actively urge that it is actually chosen by the agent. Thus only symbouletics may be paraphrased by attitude reports with performative verbs like *advise*, *suggest* and *recommend*, as in (5).

- (5) *Reporting* (4):
 - a. I advise you to go to that concert.
 - b. I **suggest** that you go to that concert.
 - c. I recommend that you go to that concert.

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¹The term *symbouletic* is derived from Greek $\sigma v \mu \beta o v \lambda \epsilon \dot{v} \omega$ 'to advise'. I am grateful to Paul Kiparsky, p.c., for suggesting it.



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It is easy to check that none of the statements in (1)-(3) may be paraphrased that way. The reason is simple. The paraphrases in (5) do not directly express the idea that there are obligations, goals, or desires that make it necessary to go to the concert. But the message of (1)-(3) is irreducibly and directly about such obligations, goals or desires. I argue that symbouletic (4) may express a suggestion per se, without direct reference to desires, obligations, or goals. It is the suggesting itself that is the direct message of a symbouletic statement, or at least a part thereof.

Symbouletic modality may thus be also called the modality of suggestion and advice (as e.g. deontic modality is the modality of permission and obligation). A symbouletic, however, should not be confused with the various informal uses of the phrase "advice modal". For example, in the formal-semantic literature, von Fintel and Iatridou (2005) call "advice modal" the teleological modal in anankastic conditionals such as *If you want to go to Harlem, you must take the A train.* (Cf. also Traugott and Dasher 2002:ch.3). The modal in that example is not a symbouletic: it neutrally describes the (optimal) means to achieve the goal of getting to Harlem but does not urge the addressee to actually undertake the action. Similarly, in the descriptive, typological, and grammaticalization literature, certain modals are said to be able to express advice, for instance, (*'d) better* when analyzed by Palmer (1990:sect. 4.7) or van der Auwera et al. (2013). Often, such modals would indeed be symbouletics, which I will argue below have the same semantics as non-embedded ones, are less likely to be informally classified as expressing advice. To sum up, I will use *symbouletic* as the official name for the new type of performative modality.²

It is instructive to compare symbouletic modality, that is, the performative modality of advice and suggestion, with such a well-known performative type of priority modals as performative deontics. Both (6) and (7) are self-fulfilling statements: (6) both describes the order and issues it, and similarly (7) both describes and issues a suggestion.

(6) **Performative deontic**:

Context: today is New Year's Eve, and everybody in the house knows that the usual rules about bedtime do not apply on that day. Instead, the parent will issue a new rule about when the child goes to sleep.

Parent to the child: You **must** go to bed at 1am. (Because *I* set the rules.)

(7) Symbouletic:

Sarah to Mary: You really **ought** to quit that job.

Both deontic and symbouletic performatives may be reported using the corresponding performative verb, and the report would only feature the prejacent (i.e. the argument proposition) of the modal, but not the modal itself, as in (8)–(9). The semantics of the modal of the original utterance is captured by the semantics of the attitude verb in the report.

²Nuyts et al. (2005) argue for a division of the "wide deontic" category of modality into deontics proper, which they argue qualify their complement as (un)acceptable, and *directive* modality, which compared to deontics has an important "action plan". That understanding of the term *directive* differs from the usage I assume in the main text, where together with Condoravdi and Lauer I use *directive* to refer to performative attitudes of ordering. While symbouletic modality is also related to action, my notion is very different from Nuyts et al.'s: they do not view performativity as a necessary property of their directive modals; only a tiny portion of their directives are performative.

SYMBOULETIC MODALITY

- (8) *Reporting (6)*: The parent **ordered** the child to go to bed at one.
- (9) *Reporting* (7): Sarah **advised** Mary to quit that job.

Another property that symbouletics and performative deontics have in common with other performatives such as imperatives or performative verbs is that the speaker who issues claims with them cannot be accused of lying, though she can be accused of doing something wrong. When the speaker issues a performative statement, its self-fulfilling component cannot be a lie: it just happens by the virtue of the utterance having been asserted. However, the speaker may be criticized for what she's done by making her statement — for instance, with a reply like *What a silly idea*. In (10)–(14) we can see that symbouletics and performative deontics pattern with other performatives and not with non-performative modals with regard to how the speaker that issued them may be criticized:

(10) **Control 1a, imperative**: (Just) **go** to that concert!

- a. #You are lying!
- b. What a silly idea.

Reading 1: what a silly idea for you to tell me what to do Reading 2: what a ridiculous idea for me to go to that concert

(11) **Control 1b, performative verb**: I **name** this chair Cosmos.

- a. #You are lying!
- b. What a silly idea.

(12) **Control 2, descriptive deontic**:

(According to the city), cars **must not** be parked here overnight.

- a. You are lying!
- b. (^{OK} or #) What a silly idea.
 # if referring to the speaker's statement
 ^{OK} if targeted at the city, which in the speaker's opinion introduced a bad rule
- (13) **Performative deontics side with other performatives**: You **must** go to sleep at once!
 - a. #You are lying!
 - b. What a silly idea.

(14) Symbouletics also side with other performatives:

You really **should** go to that concert!

- a. #You are lying!
- b. What a silly idea.

Reading 1: what a silly idea for you to advise me Reading 2: what a ridiculous idea for me to go to that concert

Just like performative verbs, performative modals only give rise to a truly performative statement if particular conditions are met. The speaker must be licensed to issue an order or a suggestion in question, and the sentence must be in the present tense. When such grammatical preconditions are not met, we get a *report* of a performative statement. Just as reports in (8) and (9), such statements have no performative force of their own.

Despite similarities, there is also a difference between performative deontics and sym-

bouletics. It becomes apparent when we consider how they may, or may not, be used in a nonperformative context — for example, embedded under an attitude verb. Deontics are relative to obligations, symbouletics — to what is advisable (in the sense that we will formalize later). With a performative deontic, the obligation itself is created by the act of issuing the deontic statement. It does not exist without such a statement. But if Sarah thinks that it is advisable for Mary to quit her job, what she considers advisable would remain adviseable (as judged by Sarah) regardless of whether she actually has a chance to make the suggestion. The difference is illustrated in (15) and (16).

(15) Context: the parent has not yet issued the special bedtime rule for today. The parent thought that the child had to go to sleep at 1am.

> = Based on various considerations of what is best, the parent thought that 1am is the time to go to bed for the child. But the parent's decision to issue a special rule about that for today does not figure in those considerations, as it was not issued yet.

(16) Sarah thought that Mary **should** quit her job.

= It was compatible with Sarah's state of mind that it's advisable for Mary to quit her job. Even though Sarah hadn't issued a suggestion yet, what is advisable in her opinion is the same as it would be if she does provide advice.

As for other performatives, a crucial challenge in developing a proper semantics for symbouletics is to assign them a meaning which makes proper predictions both for performative and non-performative, reportative uses. In section 3, I will provide such a semantics within the framework for performatives by Condoravdi and Lauer (2011) and Condoravdi and Lauer (2012).

But before we turn to formulating the semantics, we should study the empirical properties of symbouletics a bit more. However, it is not particularly easy to do this in English. Symbouletics *should* and *ought* have many non-symbouletic meanings, so especially when they are used non-performatively, it may be hard to tease symbouletic from non-symbouletic instances. On the other hand, ('d) better, almost a specialized symbouletic, does not present such a problem, but instead it is quite restricted syntactically. Conveniently, in Russian we find a specialized symbouletic *stoit* which has few syntactic restrictions: it freely appears under negation, past tense, and attitudes. In the next section, we will look at its properties, and after that we will be in a better position to formulate a formal semantics for symbouletics in section 3.

2 Russian stoit: A Specialized Symbouletic

Russian impersonal verb *stoit* 'should; ('d) better' is a specialized symbouletic modal: it may be used in suggestions and advice, but it cannot express other priority modal flavors such as deontic, teleological, or bouletic. For example, *stoit* is entirely appropriate when you are suggesting to a friend that she should take a vacation, as in (17). But if you want to assert that the rules make it necessary for your friend to submit a report before tomorrow (i.e. if you want to make an objective, non-performative deontic statement), *stoit* is out, cf. (18).

(17) Tebe stoit poexatj v otpusk.you.DAT STOIT go to vacation'You should take a vacation.'

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(18) *Soglasno pravilam, tebe stoit sdatj otčot do zavtra.
 according rules you.DAT STOIT submit report before tomorrow
 'According to the rules, you should submit the report before tomorrow.'

When a parent uses *stoit* to tell a child that she should do something, this cannot be understood as a performative subjective deontic statement. The sentence may only be taken to convey a mild suggestion, where it is left to the child to decide what she would do.

 (19) Parent to the child: Tebe stoit pojti spatj. you.DAT STOIT go sleep
 # if the parent intends to issue an order/describe an obligation OK if the parent mildly suggests that it's better for the child to go to sleep

In the teleological context in (20), Russian priority modal *nužno* is used to describe the means to reach the goal stated in the purpose clause. The example is perfectly fine even when the speaker does not actually think that goal is a good one and does not endorse taking the action needed to reach it, as the second sentence of (20) shows. But if we replace *nužno* with *stoit*, as in (21), the example becomes bad. The continuation 'But I wouldn't advise her to do this' is incompatible with the *stoit* statement. Thus *stoit* cannot express regular teleological modality. When we replace a teleological modal with *stoit*, we turn it from a neutral description of what one needs to do in order to reach a certain goal into a genuine advice statement.

(20) Čtoby povysitj svoi šansy, Maše nužno kupitj vtoroj loterejnyj bilet.
 in.order.to improve her chances Masha.DAT NUŽNO buy second lottery ticket.
 No ja by ej ne sovetoval.
 But I would to.her not advise

'To improve her chances, Masha **has to** buy a second lottery ticket. But I wouldn't advise her to do that.'

(21) #Čtoby povysitj svoi šansy, Maše stoit kupitj vtoroj loterejnyj bilet. No in.order.to improve her chances Masha.DAT STOIT buy second lottery ticket. But ja by ej ne sovetoval.
 I would to.her not advise

Intended: the same meaning as in (20)

Bouletic meanings also cannot be expressed with *stoit*. Thus *objazana* 'obliged' in (22) may express such a meaning, but *stoit* in (23) creates the impression of a non-sequitur:³

- (22) Ja xoču poprobovatj etot pirog. Ja prosto **OBJAZAN** eto sdelatj! I want to.try this cake I just have.to that.acc do 'I wanna try this cake. I just have to!'
- #Ja xoču poprobovatj etot pirog. Mne prosto STOIT eto sdelatj!
 I want to.try this cake I.DAT just have.to that.Acc do
 Intended: the same meaning as in (22)

³Contrastive focus on the modal seems to greatly boost bouletic readings both in English and in Russian. With focus on the embedded VP, (23) becomes OK but still does not convey a statement about the desires. Instead, it asserts that the speaker has chosen a particular course of action.

We have established that *stoit* is a specialized symbouletic: it can be used in suggestions and advice, but it cannot express deontic, teleological, or bouletic meanings. This makes *stoit* a perfect item with which to study the properties of symbouletic modality. While some of *stoit*'s properties may be idiosyncratic to that word, at the least we can be sure that whenever we see *stoit*, we are dealing with a symbouletic, and not with any other kind of priority modal.

Below, I describe the following six semantic properties of *stoit*: (i) **Decision**, (ii) **Subject Benefit**, (iii) **Partial Rejection**, (iv) **Endorsement**, (v) **Embeddability**, and (vi) **Scope over Neg**. In what follows, let *stoit*(x, p) stand for 'x stoit p'.

Decision is the requirement that *x*, the subject of the *stoit* clause or the *suggestee*, has some control over whether *p*, the argument proposition, will be actualized or not. If that requirement is met, *x* faces a genuine *decision problem* where *p* is one of the possible choices. **Decision** may be violated in one of two ways. First, it may be that either *p* or $\neg p$ is not a metaphysical possibility, so objectively there is no choice. Second, it may be that metaphysically both *p* and $\neg p$ are possible, but it is not under *x*'s control which one will be actualized. (24) illustrates the second option: the acceptability of (24) depends on whether it is assumed in the context that the addressee has the control over getting employment.

(24) Tebe **stoit** nanjatjsja na rabotu. you stoit get-employed PREP job

'You stoit get a job'

 OK if it depends on the addressee to get a job: there are plenty of jobs around, she has relevant qualifications, etc.

if there just aren't any jobs around, and no qualifications would guarantee getting a place to work.

The property **Subject benefit** is that to assert stoit(x, p) properly, the speaker must believe that acting towards p is of direct benefit to x. Thus (25) is only OK if it's the addressee for who it'd be nice if he baked a pie. Whether there is somebody else who would benefit is irrelevant.

(25) Tebe stoit ispeč pirog. you stoit bake pie'You stoit bake a pie'

if the speaker wants a pie, but there's no direct benefit to the hearer in baking one.

 OK if the hearer feels down, and the speaker knows baking a pie always lets him up.

As we have seen for English in (14), the speakers of symbouletic statements cannot be accused of lying, and that is true for *stoit* as well, cf. (26a). But at the same time, their statement may be rejected as incorrect by pointing out that **Subject Benefit** was not met, cf. (26b). Thus the effect of a *stoit* claim is twofold: on the one hand, once the statement is issued, it cannot be contested that the suggestion has been given (this is the self-fulfilling part that cannot be rejected), but on the other, it can be contested that it'd be good for x to do p. We can call the property of conveying two things at once only one of which can be rejected, **Partial Rejection**.

(26) *Mary to Ann*: Tebe **stoit** sxoditj na etot koncert. you stoit go to that concert 'You *stoit* go to that concert.'

SYMBOULETIC MODALITY

a.	Ann:	#Ty	lžoš:	ty n	e pr	edlag	aeš mne	e tuda	pojti.			
		you	lie	you n	ot su	ıggest	me	there	go			
	'You ar	e lyir	ıg, yo	ou are	not s	sugge	sting th	at I go	there.'			
b.	Ann:	Ту	ošiba	ješsja	mn	e ne	nravits	ja etot	dirižor.	Ту	dala	mne
		you	are.w	vrong	Ι	NEG	like	that	conductor	you	gave	me
	nepravi	iljnyj	sove	t.								
	wrong		advi	ce								

'You are wrong, I don't like that conductor. You gave me wrong advice.'

The property **Endorsement** requires that the speaker of stoit(x,p) actually endorse x's acting towards p. The presence of such endorsement can be tested with suggestions, orders, etc. that specifically involve working towards $\neg p$. We have already seen an example that demonstrates **Endorsement** in (21). Another example is (27).

(27) #Tebe stoit ispeč pirog, no ne delaj etogo.you stort bake pie but not do that'You stoit bake a pie, but don't do that.'

So far, we have only seen *stoit* in proper performative contexts: in matrix clauses in the present tense. Moreover, the subject of *stoit* has always been a second person pronoun. Such contexts may be considered to represent the canonical advice situation. But *stoit* is not restricted to such contexts. For example, the subject of a *stoit* clause may denote an individual who the speaker doesn't think she will ever actually give advice to. For example. *stoit* is fine in (28): the sentence conveys that the speaker subscribes that the president take a particular action. If the president suddenly asks for her opinion, she would have to give the president the same advice.

(28) Presidentu stoit sozdatj agenstvo po zaščite prirody.
 president.DAT STOIT create agency for defense of.environment
 'The President should create an agency for the defense of the environment.'

Thus *stoit* is not just a word that directly marks the sentence as constituting actual advice. Instead, it is a lexical item with such semantics that creates the self-fulfilling effect in canonical advice situations, but need not be only used performatively — just as performative attitude verbs may be used both performatively or descriptively depending on the context. What demonstrates that even more is the property of **Embeddability**: *stoit* may be embedded under question operators, as in(29), and under past tense and attitudes, both illustrated in (30).

- (29) Stoit li mne zapisatjsja na etot klass?
 STOIT Q I.DAT register for that class
 'Should I register for that class (I wonder)?'⁴
- Maša teperj dumajet, što Ane stoilo tuda pojti.
 Masha now thinks that Anja STOIT.PAST there go
 'These days Masha thinks that (according to Masha's current information) that (given

 $^{^{4}}$ (29) may be either a genuine question asking for the addressee's opinion, or a question directed at oneself. This is similar to how *Should I go there?* may be used.

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the circumstances back then) Anya should have gone⁵ there.⁶

Finally, consider the property **Scope over Neg**: when *stoit* appears in the same clause with sentential negation, the modal always scopes over negation:

(31)	Context: The addressee has a choice of going to Boston, NYC, or Philadelphia.	
	Tebe ne stoit exatj v NYC. you.dat not stoit go to NYC	
	= 'You shouldn't go to NYC.'	$\Box > \neg$
	\neq 'It's not that going to NYC is your best option.'	$\neg > \Box$

Crucially, there is nothing wrong semantically with the absent scope construal: it would have conveyed that the speaker does not suggest going to New York. In (32) we can see that a meaning very similar to the one absent in (31) may be obtained if we embed *stoit* under an upper-clause negation. That means that **Scope over Neg** is a genuine constraint: it rules out what would've been a reasonable meaning for (31).

(32) Eto ne značit, što tebe stoit exatj v NYC, vedj v Bostone tože interesno. this not means that you.DAT STOIT go to NYC as in Boston also interesting 'That does not mean you should go to NYC, because in Boston it's also fun.'

Now that we have identified the properties of **Decision**, **Subject Benefit**, **Partial Rejection**, **Endorsement**, **Embeddability**, and **Scope over Neg**, two related questions arise. First, which of these follow directly from the semantics of *stoit*? The lexical meaning I propose in the next section would capture all properties but **Scope over Neg**, which I believe is due to an idiosyncratic constraint associated with the word.

The second question is, which of those properties belong to every symbouletic, and which are special for *stoit*? In the analysis that I propose, **Endorsement**, **Embeddability**, and the no-rejection part of **Partial Rejection** follow from the core symbouletic semantics. **Subject Benefit** and the rejection part of **Partial Rejection** do not; they are encoded into a separate, non-self-fulfilling clause of the meaning for *stoit*. A comparison of Russian *stoit* and English *better* and *should* will suggest that this is as it should be: those English symbouletics may urge action that is not of direct benefit to the subject of the symbouletic statement. Furthermore, while I predict that the semantic property of **Embeddability** follows from the symbouletic semantics, there may well be additional, possibly syntactic, constraints that prevent actual embedding. Thus (*'d) better* is more restricted than Russian *stoit*. Similarly, the symbouletic semantics as such does not preclude *stoit* from scoping under clausemate negation, but in reality such

⁵The translation is not fully accurate in that the Russian example does not convey counterfactuality. It would be more natural to assert (30) in a context where it's known that Anya didn't actually go, but the sentence is not incompatible with a situation where Anya actually went.

⁶There are three temporal indices that are relevant in (30): (i) it is from the perspective of the present that the relative goodness of different options is judged; (ii) it is the perspective of the past which determines the circumstances that are taken into account; and (iii) the event of Anya's going there is in the future from the time provided by the past perspective. The (ii) and (iii) are the familiar modal temporal perspective and temporal orientation — two parameters that are generally needed to account for modal semantics, Condoravdi (2002). What about (i)? After giving a formal analysis of *stoit*'s semantics in section 3, we will see that actually the present temporal perspective is only used by the attitude verb, and not the modal.

scoping is ruled out. Finally, the status of **Decision** is unclear, and will be discussed below.

3 Formal Semantics for Symbouletics

I will formulate the semantics for *stoit* using the framework for performative meanings developed in Condoravdi and Lauer (2011) and Condoravdi and Lauer (2012). I will now informally introduce that framework. A more formal exposition is provided in the works cited.

Two crucial notions of Condoravdi and Lauer's framework are *effective preference* and *public commitment*. Generally, people may have many various preferences. Those need not directly cause the agent to undertake any action. For example, I might prefer to be on the Hawaii islands just now, but there could be more important preferences of mine that override that one, and thus I won't take any practical steps towards getting to Hawaii. Importantly, as long as I need not act upon a set of preferences, my preferences need not be consistent. If I'm not going to decide whether to go to the movies or to read a book, I can prefer either option equally strongly. But if I need to choose what to do, I'd have to prioritize and select which preference I value more. We introduce the term *effective preference* to refer to preferences that directly guide actions: by its definition, to have an *EP* (=effective preference) for *q* is to have such a structure of preferences that *q* is a top priority in it, and there are no conflicting priorities of the same top rank. In other words, if I have an *EP* for *q* and I'm a rational being, then I will act towards achieving *q*.

The notion of *public commitment* arises in interpersonal interaction. I may have whatever preferences I like unbeknownst to you. But I may also publicly announce that I have a particular preference — or a particular effective preference, *EP*. A public announcement of an *EP* effectively commits me to particular actions, in the following way. As almost any statement, my announcement of EP(p) may be false. It will be false precisely when I don't actually have an effective preference for *p*. That, in its turn, will visibly manifest itself in my actions that do not lead towards *p*. So my statement of EP(p) will be found out to be false if I don't actually behave as if I value *p* more than any possible alternative. In particular, it will happen if I actively work towards $\neg p$, or do not care enough about $\neg p$ happening because of my inaction. Thus if I want my public announcement of EP(p) to be true, I will have to act in a particular way. So even though the announcement concerns my state of mind at the current moment, it at the same time restricts what I should do in the future. The public announcement of an *EP* is a promise about my actions.⁷

Having defined our crucial analytical notions, we can finally turn to the semantics of natural language expressions. In accounting for the behavior of performative verbs, it is a challenge to define their semantics so that it causes a performative effect when occurring in some contexts (e.g. *I promise to come*), while in others (e.g. *I promised to come*) it simply describes the facts, but does not create new ones.⁸ Effective preferences and public announcements allow Condoravdi and Lauer to answer that challenge in the following way.

The semantics of performative words is defined in terms of effective preferences. As such, that semantics is internally descriptive: it simply states the facts regarding people's mental states. However, when a person makes the public announcement that she currently has an *EP*,

⁷What about regular assertions that are not about effective preferences? In Condoravdi and Lauer (2011)'s framework, a simple assertion of p is analyzed as a public commitment to a belief in p (or knowledge that p, or whatever else your favorite norm for assertion requires).

⁸Except, of course, for the facts that arise as the result of any assertion being made - e.g., the fact that the speaker uttered something, and so forth.

the commitment to an *EP* entails being committed to certain practical actions in the future, as we described above. Even though the semantics itself is descriptive, the *EP*s described by it, if they truly exist, will inevitably cause certain actions. Thus publicly committing to one's own EP(p) creates the performative effect: a state that is asserted to exist can only be truly present if the speaker's future actions are towards p, the object of the described *EP*. To put this in a different way, the performative effect arises when an individual controls the actions that determine whether an *EP* actually existed. Consequently, when we describe other people's *EP*s (or our own *EP*s in the past), no performative effect arises: for our statement to be true, the actions by other people (or our own actions in the past) must be in a particular way, and we cannot directly affect that.⁹

Here is how this works for commissives (promises) and directives (orders): I adapt the analysis of Condoravdi and Lauer (2011) in (33) and (34). A *commissive* describes an *EP* for the subject of the performative verb towards p denoted by the embedded clause. If I commit to an *EP* for p, but then do not work towards p, I must have lied. So the truth conditions of my utterance of (33a) are such that it is only true if I act in a certain way, namely towards p. My promise that p is only true if I actually do my very best to achieve p.¹⁰

(33) Commissives:

- a. *I promise that p.*
- b. [[promise]] = $\lambda p \lambda x. EP(x, p)$
- c. [[(33a)]] = EP(sp, p), where *sp* is the speaker
- d. Asserting (33a) makes *sp*'s *EP* a public one, abbreviated *PEP*. The *PEP* constrains future actions by *sp*: if *sp* doesn't act towards *p*, that makes (33) false.

The meaning of a *directive* is a bit more involved: it describes an *EP* on the part of the subject towards the object uptaking an *EP* towards *p*. In other words, it is stated that it is among the subject's top priorities that the object start working towards *p*. When we say past-tense *Ann ordered Bill to submit the report tomorrow*, we are simply describing the situation in terms of the effective preferences of its participants. But when we say (34a), by publicly committing to an *EP* we undertake particular practical obligations.

(34) Directives:

- a. I order you to q.
- b. [[order]] = $\lambda p \lambda y \lambda x . EP(x, EP(y, p))$
- c. [[(34a)]] = EP(sp, EP(hearer, q))

⁹What about the cases where a performative is issued on behalf of another person? E.g., an ambassador might sign a treaty or make an oath on behalf of the queen. In such cases, the performative effect arises for the queen, not the ambassador, and that happens because the power to make public announcements regarding certain types of our effective preferences may be delegated to others.

¹⁰The semantics of English *promise* is surely more involved than (33c). First, it is usually presupposed that the person making a promise that p can actually make p happen. This component is not represented in (33) at all. Second, there are different verbs of promising, including *swear*, *vow*, etc., and it is expected that they would all have slightly different semantics. Future work should show what kind of micro-differences between different promise verbs actually obtain, and how they may be formally captured. What the analysis in (33) is intended to be is a template highlighting the crucial part of any commissive's semantics rather than the semantics of a particular lexical item. When we turn to the semantics of symbouletics, we will distinguish between the semantics for *stoit* as a particular lexeme and the core symbouletic semantics which forms a part of *stoit*'s meaning that I take to be common to all symbouletics.

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d. Asserting (34a) commits *sp* to an *EP* for the hearer to commit to *q*; if *sp* has authority to make orders to the hearer, that is enough to actually constitute an order.

Thus in Condoravdi and Lauer (2011)'s framework, all performatives are essentially promises. Promises proper are the simplest kind because they commit the agent to an EP towards the proposition directly denoted by the clausal complement. Directives are more involved as they are promises to do everything possible to make the object to act towards the p expressed by the embedded clause.

With the framework in place, I turn to formulating the new semantics for Russian *stoit* within it. I propose that the word's semantics consists of two asserted conjuncts, given in (35a); one idiosyncratic scope constraint, in (35b); and one non-assertive condition of uncertain nature, in(35c). I will explain each component in turn, starting with definitions for *best* and *advise* used in (35a). For simplicity I will leave out the temporal indices until we reach the discussion of (40) and (41).

(35) Formal analysis of *stoit*:

- a. $[[\text{stoit}]] = \lambda p.\lambda t.\lambda x.\exists t' > t : best(x, p(t'))(t) \land advise(SU, x, p(t'))(t),$ where *SU* (from *SUggest-er*) is the subject in a matrix context and the attitude bearer under attitudes.
- b. stoit always scopes over the clausemate negation.
- c. To believe in '*stoit*(x, p)', one has to believe that it is in x's power to influence whether p will be actualized or not.

I use best(x, p) as a primitive predicate standing for '(proposition) p is best for agent x'. The notion can be formalized further, but I do not see a direct benefit from that for our understanding of *stoit*'s semantics. The direct assertion of best(x, p) is what explains the **Subject Benefit** property discussed in the previous section, and one half of **Partial Rejection**. As asserting best(x, p) is not self-fulfilling in any way, that conjunct can be targeted by a responder in the same way as any other asserted proposition. Hence if the addressee believes that best(x, p) is false, she may properly disagree with the speaker, as can be seen in (26b).

I do not take best(x, p) to be a part of the symbouletic semantics proper. The reason for that is that English symbouletic '*d* better doesn't seem to contain such a meaning component. Namely, the symbouletic in (36) does not normally allow a response with, while a simple assertion of relative goodness (37) can be rejected that way.¹¹

- (36) Mary: You better go to that concert!Ann: #You are wrong: I don't like the conductor.
- (37) *Mary*: It is better for you to go to that concert!

¹¹Of course, with some amount of creativity one can save the *You are wrong* response in (36). This is similar to what happens in the exchange in (i). In that dialogue, it is not that Ann is targeting Mary's imperative with her answer, and the imperative semantics surely does not include a hard-wired statement that the speaker of *Bring me* X needs X. Ann is simply targeting a proposition that she thinks is one of Mary's beliefs, and has caused Mary to issue the imperative.

(i) Mary: Bring me that book, please!
 Ann: #You are wrong: you don't really need it.

Ann: You are wrong: I don't like the conductor.

Formula advise(SU, x, p) is the core symbouletic meaning, formulated so as to encode the performative effect, as well as **Endorsement** and **Embeddability**. The definition I propose for advise(SU, x, p) is as follows:

(38) $advise(SU, x, p) := EP(SU, \bigwedge_{q} best(x, q)) \rightarrow EP(SU, EP(x, p))$

Let's consider the parts of (38). Formula $\bigwedge_q best(x,q)$ simply refers to the proposition containing all and only worlds where all best things for x are actualized. We can paraphrase that formula as 'all that is best for x'. Thus $EP(SU, \bigwedge_q best(x,q))$ means 'SU prefers all that is best for x, and moreover is going to act to achieve that'. This formula serves as the antecedent of the conditional that forms advise(SU, x, p), so the whole definition says that *if* it is the case that SU has an EP for what is best for x, then the consequent is true.

Turning to the consequent EP(SU, EP(x, p)), it is essentially the meaning of a directive, as we saw in (34) above. Now we can paraphrase the conditional as a whole: 'if *SU* worked in the best interests of *x*, *SU* would have tried all in her power to get *x* to work towards *p*'.

This formalization of what it means to advise x to do p does not say that the adviser, SU, is *actually* doing everything they can to achieve what's best for x. In fact, in most real-life advice situations, that would not be true: the adviser may be willing to provide advice, but not to give up on all of their other top interests in order to achieve what's best for x. Thus our definition only says that *if* the adviser were to do so, *then* one of the topmost things on her list of priorities would be getting x to work towards actualizing p. Under this analysis, by issuing advice the adviser does not directly commit herself to any *immediate* action — but she does make a *conditional* commitment.

As advise(SU, x, p) is strictly weaker than order(SU, x, p) (which is equal to EP(SU, EP(x, p)), cf. (34)), issuing advice may lead to a scalar inference. For example, you can order the child to go to bed. If instead of that you only suggest that she goes to bed, you may then be taken to have implicated that you will not (yet) do all you can to get the child to bed — as would have been the case had you issued a directive. This prediction of our semantics agrees with the intuitions.

At the same time, if it is clear in the context that you are doing all in your power to fulfill the child's best interests (as you understand them) — for instance, if you are positively glowering when making your suggestion — then a directive and a symbouletic are predicted to collapse. Again, this seems to be what happens: '*You* stoit *go to sleep*' or '*You'd better go to sleep*' from a glowering parent comes close to downright telling the child to (go brush her teeth and) go to bed already.

The property **Endorsement** is explained as follows. advise(SU, x, p) entails that as far as the suggester can tell, p is good for x. In a normal situation, the suggester is providing advice in the addressee's interests, even if not committing to an EP for those. So it would be weird for her to suggest or issue a directive or an imperative for the opposite of p after giving advice for p. This explanation makes the following prediction: when the context determines that the suggester is *not* concerned with x's benefit, a directive for x to actualize $\neg p$ should become OK. This is indeed what happens: while (27) is bad out of the blue, it starts to sound better if the context makes it clear that the suggester does not value the suggestee's interests very much, as in (39):

(39) Context: the speaker runs a sweatshop bakery, and the addressee is his employee. In the

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past, the speaker didn't care a bit about making the employees happier.

Tebe stoit ispeč pirog, no ne delaj etogo. (Ja xoču, čtoby ty ispek pečenje, xotja you stoit bake pie but not do that I want that you bake cookies though tebe eto i ne nravitsja.) you.DAT that PART not like

 \approx '(Given your interests,) you should have baked a pie, but don't do that. I want you to make cookies, even though you don't like doing that.'

As for **Embeddability**, our semantics accounts for it because of the very fact that nothing in it precludes embedding. Just as performative verbs, symbouletics have no semantic reasons to be non-embeddable. Consider (40) and (41), the meanings that our semantics derives for the two examples with embedded *stoit* that we considered above.¹²

 (40) a. (29) in quasi-Russian: 'Stoit I register for that class?'
 b. [[(29)]] = {∃t' > now : best(x, p(t'))(now) ∧ advise(addr, x, p(t'))(now), ∀t' > now : ¬best(x, p(t'))(now) ∨ ¬advise(addr, x, p(t'))(now)}

The question denotation in (40b) has two propositions in it. The first of them is that it is good for the speaker to register, and that if the addressee were to act in the speaker's best interests, she would make her register. The second proposition is that there is no such moment in the future where having registered would be good for the speaker, or the addressee's working in the speaker's best interests would entail getting the speaker to register. If the addressee resolves the question, that would make it clear whether she advises the speaker to register or would refrain from that. This is indeed what the intuitions about the original question are.

The case of *stoit* embedded under an attitude verb and a past tense is technically more complicated, but again, the predictions of our analysis match the intuitions without any additional assumptions:

(41) a. (30) in quasi-Russian: 'Masha now thinks that Anya stoit.PAST go there'

b. [[that Anya stoit.PAST go there]] = λt . $\exists t_{past} < t : \exists t' > t_{past} : best(Anya, go(Anya)(t'))(t_{past}) \land advise(SU, Anya, go(Anya)(t'))(t_{past})$

c. [[(30)]] = in every world compatible with Masha's beliefs at t_{now} , it is true that: $\exists t_{past} < t_{now} : \exists t' > t_{past} : best(Anya, go(Anya)(t'))(t_{past}) \land$ $\land advise(Masha, Anya, go(Anya)(t'))(t_{past})$

In (41c), Masha's belief worlds are those worlds that she considers possible at the current moment t_{now} , given all her information. In all of those worlds, it was objectively best for Anya at a past time t_{past} to go there at some later time t' (and we do not know whether t' is earlier or later than t_{now}). Furthermore, in all of those worlds, if Masha were to adopt an *EP* for Anya's best interests at that past moment, it would have followed that she would, at the same t_{past} , urge Anya, or order her if she had the authority, to go there. So the facts that determine what is best for Anya and what Masha would have done were she to act in Anya's best interests, are

 $^{^{12}}$ In questions with *stoit*, *SU* is resolved as the addressee. This is parallel to how other shiftable elements shift towards the addressee in questions. If *embeddability-question* is used as a question to oneself, which it can be, then the addressee of the question is the same as the speaker.

determined from the past temporal perspective. That perspective is forced by the past tense in the embedded clause. However, what exactly those facts were at that time in the past is determined from Masha's present point of view: it is an assessment of the past facts that is made from the present. The perspective of that assessment is provided by the tense on the matrix attitude verb. Finally, the going event is placed in the relative future from t_{past} , in accordance with the normal future orientation of *stoit*. Thus the interplay of the attitude semantics, the embedded past tense, and the temporal orientation of the modal make three temporal parameters relevant in (30), repeated in (41).

As we have just seen in (40) and (41), the proposed meaning for *stoit* embeds easily as far as the semantics goes. This concerns both the meaning as a whole, and the specifically symbouletic part *advise*(SU, x, p). Nevertheless, symbouletics often do not embed easily: for instance, English (*'d*) *better* cannot appear in the past tense. I conjecture that all such restrictions should not be accounted for in the core symbouletic semantics: the variation between different symbouletics regarding embeddability is significant without clear evidence that it follows directly from the semantics. For example, it is not clear what exact semantic property could prevent ('d) better from appearing in the past tense, while *stoit* can. At the same time, such restrictions may often be explained from the properties of the constructions that served as diachronic sources for symbouletics. For example, given that the source for ('d) better was a past tense construction *had better*, it is not surprising that even the form without *had* or 'd cannot cooccur with the past tense in Present-Day English, even though semantically that would have been fine.

Similarly, **Scope over Neg** requiring *stoit* to scope over clausemate Neg does not follow from the semantics. The missing reading *NEG*(*stoit*(*addr*, *NYC*) for (31) would be as follows:

(42) $\forall t' > now : \neg best(addr, NYC(t'))(now) \lor \neg advise(sp, addr, NYC(t'))(now)$

This is a perfectly normal reading: it simply says that either going to NYC is not in the addressee's best interests, or the suggester would not go as far as do all in her power to get the addressee to go to NYC even if she worked for the addressee's best. Given that there is nothing wrong with this meaning, I propose to analyze **Scope over Neg** as an idiosyncratic constraint of *stoit*, given in (35b).

Finally, let us turn to the condition (35c), repeated here as (43):

(43) To believe in '*stoit*(*x*, *p*)', one has to believe that it is in *x*'s power to influence whether *p* will be actualized or not.

The way (43) is formulated, it is very close to the presupposition that it is in x's power to influence whether p will happen. However, it is not easy to tell whether we are dealing with a presupposition, an entailment, or some sort of implicature. For example, the condition that x should have (at least some) power over p seems to project as a presupposition: (44) as a whole does not presuppose that it's up to the addressee whether to get a job.¹³

(44) If it is under your control whether to get a job, then you **should** get a job.

Similarly, the condition in (43) passes the "wait a minute" test by von Fintel (2004), as presuppositions would:

¹³This is shown with English *should*, with the assumption that the modal is read symbouletically. The facts for *stoit* are the same.
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(45) Ann: You **should** get a job!

Mary: Wait a minute. It's not up to me - in fact, I'm very actively looking for one.

However, that x should have control over whether p happens may also be deduced from the fact that x's EP towards p is being discussed in the first place. After all, it doesn't make sense to have EP(p) if you have no control over p. We can compare the behavior of *stoit* and symbouletic *should* to that of directives:

- (46) Context: the addressee cannot get to the top of the hill because the only road is blocked, and there is no other way.
 #I order you to get to the top of the hill!
- (47) If you can get to the top if you try hard enough, then I order you to get to the top.
- (48) Ann: I order you to get to the top of the hill!Mary: Wait a minute. That's impossible. Nobody can do that.

Does this behavior of *order* mean that it presupposes the feasibility to actualize p on the part of x? It is not obvious, to say the least.

Returning to (43), logically we have (at least) three possible formal analyses. (i) stoit(x, p) may trigger the presupposition that x has influence over whether p is actualized. (ii) stoit(x, p) may implicate that the suggester believes that x has influence over whether p happens. The implicature would be derived as follows: if the suggester hadn't believed that, the suggestion would have been unrealizable, and thus it would have made no sense to make it. (iii) Finally, one can argue that reasoning similar to the one just sketched derives a direct entailment rather than an implicature. If we adopt reasonable assumptions regarding the consistency of people's mental states, it would follow from the fact that y believes advise(y, x, p) that y believes that x's actions affect whether p happens. Personally, I find the last option most promising, but at the moment I cannot tease the three apart with certainty.

4 Conclusion: Symbouletics within the Modal System

In this paper, I have argued for the existence of a special semantic subtype of modality: symbouletic modality, or, informally, the modality of advice and suggestion. The two related crucial properties of symbouletics are: (i) symbouletic statements, unlike other modal statements, may be reported with attitude verbs such as *suggest*, *advise*, and *recommend*; (ii) symbouletic statements in the present tense and in a proper context have a (partially) self-fulfilling effect, and therefore cannot be challenged.

I provided the semantics for symbouletics in general and for Russian symbouletic *stoit* in particular within the framework of effective preferences and public commitments by Condoravdi and Lauer (2011) and Condoravdi and Lauer (2012). The core symbouletic semantics is given by the predicate *advise* as described in (38). Informally, it amounts to the following: "If the suggester's top priority were the suggestee's well-being, the suggester would have made everything possible to make the suggestee to commit to working towards the said proposition". When this meaning is asserted in the present tense and by a person who may speak for the suggester, a performative effect is created: the speaker obliges the suggester to back up the statement with practical actions in case she works in the suggestee's best interests. When the same meaning is embedded, no performative effect arises, and such statements only describe the suggester's mental state. As the proposed symbouletic meaning is strictly weaker than the

meaning of a directive such as *I order you to p*, we predict that symbouletics may give rise to the implicature that the directive would have been inappropriate, which fits the data.

I have also provided an analysis of the Russian specialized symbouletic *stoit*. The semantics of that modal consists of: (i) the core symbouletic semantics; (ii) the assertion that the suggested proposition is of direct benefit for the suggestee. In addition, *stoit* obeys the constraint that requires it to scope over the clausemate negation if there is one. Finally, when stoit(x, p) is used, the suggester needs to believe that the suggestee has some control over whether the suggested proposition is actualized.

What is the place of symbouletics in the larger modal system, and what kinds are there? Divided by their diachronic source, we can identify at least the following types, : (1) deontic-source symbouletics, as English *should* and *ought*; (ii) expressions of cost and worth, including Russian *stoit*, Polish *warto* 'worth' and cognate Ukrainian *varto* 'worth', and Finnish *kannattaa* 'to be profitable, to pay off'; and (iii) expressions of relative goodness, as English ('d) better.

For modals, it may be not easy to determine when exactly they acquire symbouletic meanings. For example, Bosworth and Toller (1898)'s meaning II.4 for Old English *sculan* (> modern *shall*) already features some uses classified by the authors as "bidding, commanding". But as a true deontic may in principle give rise to a symbouletic meaning via an implicature, as in (49), an examination of primary evidence is needed to determine how early symbouletic meaning for *shall/should* started to appear.

(49) You must do *p* because you're obliged to \Rightarrow (*implicature*) You better do *p*.

In Yanovich (2013:chap. 5.4), I showed that at least in some cases it is possible to determine the period when a word becomes a symbouletic. I analyzed the rise of symbouletic *stoit* using the Russian National Corpus, www.ruscorpora.ru, and found the following trajectory of modalization (below I provide English quasi-translations for the historical Russian examples):

(50) The rise of symbouletic construction '(X.DAT) stoit INF':

a. **Prehistory**:

- Non-metaphorical statements about cost:
 '[This book].NOM stoit (=costs) [two roubles].Acc'
- Metaphorical statements about worth: 'Here, [human dignity].NOM *stoit* (=is worth) nothing.Acc'

b. Infinitival subjects and objects:

• Subject infinitives:

(a1820) 'But what.acc did [lead.inf you to the victory](.nom) *stoit* (=cost) us.dat?"

• Object infinitives:

(1814) 'You.NOM do not *stoit* (=worth) [to be in my circle (of friends)].ACC'

c. **Immediate precursors**: cost statements with overt or implied object DP "the effort"; may be taken to imply a symbouletic meaning:

(1833) 'Exceptions are so rare that even [to mention them].NOM does not *stoit* (=worth) (the effort.Acc)'

d. **True symbouletic statements**, no longer compatible with object "the effort": (1915) 'It would be good to ring the bells today!.. Which day is it? Wednesday?



Figure 1 The place of symbouletics within the modal domain of meanings

If it's Wednesday, then stoit (= should) not...'

While in the mid-19th century, *stoit* could at best implicate a symbouletic statement, at the beginning of the 20th century examples occur where it can no longer be analyzed using its old meaning, as in (50d). The new modal first could only appear without a subject denoting the suggestee. But in the mid-20th century, *stoit* "picks up" a construction with a dative subject, very common for Russian modal words, resulting in the modern day pattern '(*X*.DAT) *stoit* INF'. The whole process of creating the new modal took no longer than a century.

The fact that symbouletics with very similar semantics (cf. Russian *stoit* and English *should* under its symbouletic meaning) may arise from quite different sources underscores their naturalness. Symbouletic meanings are a good fit for many practical situations, hence they are often implicated, and regularly grammaticalized. This makes them similar to other semantic types of modals: for example, ability modals commonly arise from verbs with meanings as seemingly dissimilar as 'know' (as happened to *can*) and 'prevail' (as was the case for *may*, which in Old English was an ability modal).

In the typological and grammaticalization traditions, it is common to draw 'semantic maps' of a particular grammatical domain, where adjacent meanings may be expressed by the same word in some languages, and arrows indicate attested trajectories of semantic change. I would like to close this paper with such a (simplified) map for necessity modality including symbouletics, as shown in Figure 1.¹⁴ More on semantic maps for modality may be found in Bybee et al. (1994), van der Auwera and Plungian (1998), Hansen (2004), and van der Auwera et al. (2009).

 $^{^{14}}$ The link to the optative is added on the basis of van der Auwera et al. (2013), who show that the marginal optative meaning of (*'d*) *better*, as in "*It better be important. I hope it is*", is diachronically recent, and thus likely stems from the suggestion meaning. As this has not yet been established firmly, the link is shown using a dotted arrow.

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Evidentiality as a Causal Relation: A Case Study from Japanese *youda*

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This paper explores the nature of indirect evidentiality on the basis of the Japanese evidential marker *youda*. We argue that the indirect evidentiality of *youda* can only be explained by reference to causal relations, rather than modal, probabilistic, or conditional dependencies.

Keywords: indirect evidentiality, causation, modality, naturalness rating study

1 Introduction

This paper gives an analysis of the Japanese evidential marker youda, illustrated in (1).

 Kinou John-wa wain-o takusan nonda youda. yesterday John-тор wine-ACC many drank youDA '(It seems that) John drank a lot of wine yesterday.'

The use of *youda* makes requirements on the nature of the evidence upon which the speaker bases his assertion, as witnessed by the contrasting felicity of (1) in the contexts in (2).

- (2) a. #Witness: The speaker directly witnessed John drinking a lot.
 - b. #General Knowledge: John likes wine very much.
 - c. Indirect Evidence: There are a lot of empty wine bottles in John's room.

The use of *youda* is infelicitous for assertions where the speaker has direct evidence (2a) or which are made on the basis of general background knowledge (2b). The use of *youda* seems to require that the assertion be made on the basis of indirect evidence (2c).

In this paper, we investigate how exactly *youda* marks a proposition as being based on 'indirect evidence'. We argue for two main conclusions: (i) *youda* does not mark any kind of epistemic commitment on the part of the speaker, and (ii) *youda* marks indirect evidence by indicating a causal relation between its propositional complement and a contextually salient evidence source. Before providing evidence for these two conclusions, we first give a brief overview of previous accounts of *youda* in section 2, focusing particularly on the account of McCready and Ogata (2007). Following Waldie (2012), we argue that evidentials in general encode a tripartite relationship between an agent *a*, an evidence source *e*, and target proposition *p*. We discuss the kind of relations that previous accounts posit between these three elements, before going on to discuss each one in detail, on the basis of both intuitionistic and experimental evidence. In section 3, we provide experimental support for the basic paradigm in (1). This paradigm establishes that *youda* requires a *specific* evidence source, rather than mere background knowledge on the part of the speaker. It furthermore establishes that the relationship between the evidence

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source *e* and target proposition *p* is fundamentally *indirect*, in that the evidence source must be a situation/event distinct from that described by the target proposition. Section 4 provides evidence for the claim that *youda* does not require any epistemic commitments on the part of the agent toward the target proposition, and that *youda* thus has no epistemic modal component linking the agent *a* and the target proposition *p*. Section 5 provides evidence that the relation linking the evidence source and the target proposition is not based on a purely probabilistic or conditional dependency, contra the proposals of McCready and Ogata (2007) and Takubo (2009). While these accounts predict that a probabilistic correlation or a biconditional dependency between evidence source and target proposition are sufficient to license *youda*, we argue that in fact the relation is an asymmetric one based on causation, in which the target proposition describes a type of situation which is a possible cause for the evidence source. In section 6, we provide a semantics of *youda* that spells out a causal link between a contextual evidence source and the target proposition. Section 7 concludes.

2 Overview of Previous Accounts

Aoki (1986) argues that the use of *youda* indicates that there is "some visible, tangible or audible evidence collected through [the speaker's] own senses to make an inference" (Aoki 1986:231). According to this description, there are two restrictions on the evidence indicated by *youda*. First, there is a restriction on the way in which this evidence has been acquired: the speaker's own vision, touch, or audition. Second, the evidence provides the basis for an inference; the inference here is one from the evidence itself to the proposition encoded by the sentence to which *youda* attaches.

This two-part description finds a more formal characterization in McCready and Ogata (2007) (henceforth M&O), who give a Bayesian modal semantics for a number of Japanese evidentials, including *youda*. In this account, evidentials serve to link their propositional complement p to a contextual agent a via an evidence source e. The evidence source e serves as evidence for p just in case it changes the subjective probability (degree of belief) of a towards p, $P_a(p)$. Evidentials differ in (i) the *type* of evidence allowed (i.e. the way in which the evidence can be acquired by the agent), and (ii) the degree of belief in p resulting from the acquired evidence. For *youda*, this two-part semantics is sketched in (3).

- (3) *p-youda*, relativized to agent *a*, indicates that:
 - a. some information *e*, acquired in a manner compatible with the lexical restrictions of *youda*, has led *a* to raise the subjective probability of *p*.
 - b. *a* takes *p* to be probably but not certainly true $(.5 < P_a(p) < 1)$ after learning *e*.

This account is illustrated by the example in (4).

(4) Context: Looking at a wet street. Ame-ga futta youda. rain-NOM fell YOUDA 'It seems that it rained.'

In this example, *youda* attaches to a propositional complement meaning 'it rained'. According to M&O, the resulting utterance is interpreted as follows: (i) the information 'the streets are wet' has led the speaker to raise her subjective probability for the proposition 'it rained', (ii) the resulting subjective probability for 'it rained' is greater than .5 but less than 1, and (iii) the

speaker has accessed the information 'the streets are wet' in a manner compatible with the lexical restrictions peculiar to *youda* (i.e. 'visible, tangible, or audible evidence', following Aoki). Putting aside the details of formal implementation, the theory spells out what we think are three crucial components of any theory of evidentiality, shown graphically as follows:



In this view, any evidential must be defined in terms of the relationships that hold between an agent a, a target proposition p, and an evidence source e. The tripartite relationship sketched here is in broad outlines the same as the view advanced by Waldie (2012), although Waldie's approach contains certain additional complications, including the use of an 'origo' rather than a simple individual to model what we term the agent, and a distinction between centered and uncentered propositions. A discussion of these differences is beyond the scope of this paper; we refer the reader to Waldie (2012) for detailed discussion and motivation for the origo-based version of the basic picture sketched here.

The relation between *a* and *e* specifies the means by which the evidence has been acquired; among these are such modalities as visual, auditory, tactile, and so on. The details differ for each evidential morpheme, and according to M&O must essentially be listed on an item-by-item basis, without anything more of theoretical interest to be said. M&O provide some data pertaining to the means by which evidence can be acquired for different evidentials in Japanese, and we will have nothing more to say about it here; in what follows, we will talk about this dimension of *youda*'s meaning as the 'lexical requirements' of *youda*, referring the reader to M&O for further details.

The relationship between e and p expresses the exact sense in which e counts as evidence for the target proposition; we refer to this as the *evidential relation* encoded by the morpheme in question. As with the relation linking a and e, we can imagine a number of possible ways in which e and p could be linked, including by way of inference (the existence of e allows one to infer that p), identity (the proposition p itself describes the evidence source e), etc. We note that descriptive inventories of evidential morphemes tend to conflate this dimension, which is where terms such as 'inferential' or 'indirect' apply, with the prior one, which is where terms such as 'visual' or 'auditory' apply. For *youda*, Aoki describes the connection between e and pas one of 'inference', and in M&O's theory of *youda* and other Japanese evidentials, this relation is spelled out as one of Bayesian belief update; e constitutes evidence for p just in case learning e causes the agent to increase their subjective probability for p. The theory of Takubo (2009) provides an account of this relation based on abduction. In what follows, we will show that these views overgenerate in the case of *youda*, and that the relation holding between e and p is one based on causation.

The relationship between a and p is an epistemic one; it is here that restrictions can be placed on the epistemic attitude expressed toward the target proposition. In M&O's theory, *youda* requires a subjective probability greater than .5 but less than 1. In Izvorski's (1997) theory of indirect evidentiality, the commitment is a necessity modal, while in Matthewson et al.'s

(2006) theory of evidentials in St'át'imcets, there is simply an underdetermined (contextually determined) epistemic force. In all of these theories, however, evidentials have a fundamentally *epistemic modal* component, making some requirement on the epistemic commitments of *a* towards the target proposition *p*. We will argue in what follows that *youda* lacks any kind of epistemic requirements; the tendency for the use of *youda* to express epistemic commitments is a conversational implicature, and can be cancelled.

Before moving on to a detailed discussion of the evidential relation and (lack of) epistemic commitment encoded by *youda*, the next section reports the results of an experiment that verifies the basic distribution of *youda* as an indirect evidential.

3 Youda Requires Specific Indirect Evidence

This section reports the results of an experiment showing that *youda* requires a specific source of indirect evidence for the target proposition, rather than direct evidence or general background knowledge. A naturalness rating experiment was conducted in which native speakers of Japanese judged the naturalness of different combinations of contexts (Witness, Indirect Evidence, General Knowledge) and sentence-final evidential markers (bare assertion, *youda, darou, ndarou*).

Witness contexts describe situations where the speaker directly witnesses the event or situation described by the target proposition. Indirect Evidence contexts are ones in which the speaker has concrete evidence for the target proposition, but does not witness it directly. General Knowledge contexts are ones in which the speaker is making an inference from background knowledge, without having observed any particular piece of concrete evidence in the context. The choice of sentence final markers was made for the purposes of another study in which the evidential properties of these other markers were investigated. Intuitively, bare declaratives tend to indicate the presence of direct evidence, while *darou* tends to indicate the *absence* of any particular evidence. As has been described, *youda* seems to require specific indirect evidence. The inclusion of *ndarou* was made for the purposes of a separate study, and it is ignored in what follows. The predictions for the distribution of sentence type and context are as follows:

- (5) a. Bare declaratives should be rated more natural in Witness contexts than in other contexts, and other sentence endings should be rated less natural than bare declaratives in this context.
 - b. Sentences with *youda* should be rated more natural in Indirect Evidence contexts than in other contexts, and other sentence endings should be rated less natural than *youda* in this context.
 - c. Sentences with *darou* should be rated more natural in General Knowledge contexts than in other contexts, and other sentence endings should be rated less natural than *darou* in this context.

3.1 Experiment I: Method

Stimuli The stimuli had two fully-crossed factors— three contexts (Witness, Indirect Evidence, and General Knowledge) and four sentence-endings (bare/ \emptyset , *youda*, *darou*, and *ndarou*), which resulted in 12 conditions. Each condition had 12 items, resulting in 144 target sentences (12 items × 12 conditions). 48 items from Experiments II and III were also included. The following are examples from one item set:

- (6) Contexts:
 - a. Witness (Direct Evidence) Context: A wa kinoo Yamadakun ga udetatefuse o hyakkai yatteiruno o mita:

'A saw Yamada doing 100 push-ups yesterday:'

b. Indirect Evidence Context: A wa kinoo Yamadakun ga kurushisoo na koe de hyakkai kazoeruno o kiita:

'A heard Yamada counting up to 100 in an agonized voice:'

c. General Knowledge Context: A wa Yamada kun ga undoo zuki nano o sitteiru: 'A knows that Yamada likes sports:'

(7) Target Sentence:

Yamada-kun-wa kinoo udetatefuse-o hyakkai yatta Ø / youda / darou / Mr.Yamada-тор yesterday push-ups-Acc one.hundred.times did Ø / youDA / DAROU / ndarou.

NDAROU

'Yamada did 100 push-ups yesterday.'

Procedure The rating experiment was conducted in a quiet classroom at City University of Hong Kong. The stimuli were presented via a web-based online survey system, Qualtrics.¹ The first page of the test showed the instructions. In the main section, the participants were asked to read the context and target sentence, and then judge the naturalness of stimuli under the given context on a 7-point scale: 7 as very natural and 1 as very unnatural (provided in Japanese). The experiment was organized into 12 blocks separated by break signs. Each block contained 16 items. None of the stimuli were repeated and the order of the stimuli within each block was randomized by Qualtrics. No minimal pair sentences appeared next to each other.

Participants Fourteen native speakers of Japanese participated in the rating experiment and received 80 Hong Kong dollars as compensation.

Statistics To analyze the results, a general linear mixed model (Baayen 2008, Baayen et al. 2008, Bates 2005) was run using the lme4 package (Bates et al. 2011) implemented in R (R Development Core Team 2011). Contexts and sentence-endings were the fixed factors. Speakers and items were the random factors. The *p*-values were calculated by the Markov chain Monte Carlo method using the LanguageR package (Baayen 2009).

3.2 Results

Figure 1 shows the average naturalness ratings in each condition for sentences with each of three endings. The discussion above leads to the prediction that the use of *youda* is more natural in the Indirect Evidence context than in either the General Knowledge or Witness contexts. This prediction was confirmed; *youda* utterances were rated most natural in Indirect Evidence contexts (compared with Witness: t = -12.37, p < 0.001; with General Knowledge: t = -9.20,

¹The output for this paper was generated using Qualtrics software, Version 52412 of the Qualtrics Research Suite. ©2014 Qualtrics. Qualtrics and all other Qualtrics product or service names are registered trademarks or trademarks of Qualtrics, Provo, UT, USA. http://www.qualtrics.com



Figure 1 Rating of bare, *youda*, and *darou* sentences by context

p < 0.001).²

Discussion The experimental results described above establish that *youda* marks the proposition in its scope as being based on concrete but indirect evidence. The concreteness of the evidence source is shown by the fact that *youda* is infelicitous in contexts where the evidence is based on general background knowledge. The indirectness is established by the infelicity of *youda* in contexts where the speaker has directly witnessed the situation/event described by the target proposition. These results provide a solid empirical footing for the pre-theoretical description of *youda* as an indirect evidential. In the following sections, we explore the kind of indirect evidentiality encoded by *youda* in more detail; the next section shows that, contra M&O, it makes no epistemic requirements on the agent toward the target proposition.

4 Epistemic Commitment

4.1 Epistemic Commitment is Cancellable

According to M&O, *youda* imposes a minimal degree of commitment toward its propositional complement; putting aside the exact degree required (this is conceivably contextually variable), the theory gives to evidentials an epistemic component, predicting that utterance of *p*-*youda* will entail *might*(*p*). A commitment to *might*(*p*) in turn contradicts a commitment to $\neg p$, as illustrated by the following example. Notice that in English, the sequence becomes acceptable if the epistemic modal 'might' is replaced by the evidential-like 'seems like' construction:

- (8) a. #It might be raining but in fact it isn't.
 - b. It seems like it's raining but in fact it isn't.

An utterance of *p*-*youda* is thus predicted to be incompatible with a subsequent utterance of $\neg p$, if in fact *p*-*youda* requires a minimal epistemic commitment to *p*. This is not, however, the case, as illustrated by the acceptability of the following example:

²Witness contexts made bare utterances most natural (compared with Indirect Evidence: t = -8.448, p < 0.001; with General Knowledge: t = -13.548, p < 0.001). General Knowledge contexts made *darou* utterances most natural (compared with Witness: t = -11.130, p < 0.001; with Indirect Evidence: t = -0.849, p = 0.397).

(9) Context: There are a lot of empty wine bottles in John's room. Kinou John-wa wain-o takusan nonda youda kedo, jitsu-wa nondeinai. yesterday John-TOP wine-ACC many drank YOUDA but really-TOP has.not.drank 'It looks like John drank a lot of wine yesterday, but in fact he didn't drink any.'

Here, the speaker is saying that while it *appears* (based on the evidence of the empty bottles) that John drank a lot of wine the previous night, John did not in fact drink, appearances notwith-standing. The felicity of this sequence can be contrasted with other elements which can pre-theoretically be described as either evidential or modal markers. For example, the particle *darou*, which according to Hara (2006) generates a minimal epistemic commitment on the part of the speaker, is not felicitous with a subsequent denial of its propositional complement:

(10) Context: John often drinks wine.
 #Kinou John-wa wain-o takusan nonda darou kedo, jitsu-wa nondeinai.
 yesterday John-TOP wine-ACC many drank DAROU but really-TOP has.not.drank
 'John probably drank a lot of wine yesterday, but in fact he didn't drink any.'

Infelicity is also seen with other elements that contribute an epistemic requirement on their propositional complements, such as *kamosirenai* 'might' (11) and *hazu* 'should' (with an epistemic interpretation) (12):

- (11) ??Kinou John-wa wain-o takusan nonda kamosirenai kedo, jitsu-wa nondeinai. yesterday John-тор wine-Acc many drank might but really-тор has.not.drunk 'John might have drunk a lot of wine yesterday, but in fact he didn't drink any.'
- (12) ??Kinou John-wa wain-o takusan nonda hazu da kedo, jitsu-wa nondeinai. yesterday John-тор wine-ACC many drank should сор but really-тор has.not.drunk 'John should have drunk a lot of wine yesterday, but in fact he didn't drink any.'

The above intuitions were verified by an experiment run alongside the previously described Experiment I. We now provide the results of that experiment.

4.2 Experiment II: Method

Stimuli The stimuli had three conditions depending on the sentence-ending: bare/ \emptyset , *youda*, and *darou*. Each condition had 12 items, resulting in 36 target sentences (12 items × 3 conditions). 144 items from Experiments I and III were also included. An example item is given below:

(13) Yamadakun-wa kinoo udetatefuse-o hyakkai yatta (Ø/youda/darou) kedo, Mr.Yamada-TOP yesterday push.up-ACC one.hundred did (Ø/YOUDA/DAROU) but jitsu-wa yatte-nai. truth-TOP did-NEG
'Mr. Yamada did 100 push ups yesterday (Ø/youda/darou), but in fact he didn't.'

In each item, a sentence with one of the three endings is combined with a negation of that sentence. Given the intuitions above, we predict that such sequences will be rated more natural for sentences ending in *youda* than either bare declaratives or those ending in *darou*.

The procedure, participants and statistics were the same as Experiment I.

Figure 2

Rating of bare, *youda*, and *darou* sentences with subsequent cancellation



4.3 Results

Figure 2 shows the average naturalness ratings in each condition. The cancellation of *youda*-sentence was judged the most natural (compared with *darou*: t = -6.285, p < 0.001; with the bare assertion: t = -11.117, p < 0.001).

4.4 Discussion

The felicity of *p*-youda & $\neg p$ sequences suggests that youda is not an epistemic modal of any kind, whether a classical possibility modal, a probabilistic minimal-commitment modal, or even an epistemic modal that is unspecified for quantificational force, as in Matthewson et al.'s (2006) theory of evidentials in St'át'imcets. Although Matthewson et al. (2006) argue that evidentials in St'át'imcets do not encode quantificational force, they are nevertheless shown to be incompatible with contexts in which it is known that their propositional complement is false:

(14) Context: You had done some work for a company and they said they put your pay, \$200, in your bank account. But actually, they didn't pay you at all.
*um'-en-tsal-itás ku7 i án'was-a xetspqíqen'kst táola, t'u7 aoz kw give-DIR-1SG.OBJ-3PL.ERG REPORT DET.PL two-DET hundred dollar but NEG DET s-7um'-en-tsál-itas ku stam' NOM-give-DIR-1S.OBJ-3P.ERG DET what
'They gave me \$200 [I was told], but they didn't give me anything.' (Matthewson et al. 2006:20)

This difference suggests that *youda* does not encode epistemic modality of any kind, whether couched in a traditional Kratzerian (1991) framework (Izvorski 1997, Matthewson et al. 2006, a.o.) or a probabilistic framework (McCready and Ogata 2007). The logic here follows that of Faller (2002), who shows that the Cuzco Quechua reportative evidential *-si* can mark propositions known by the speaker to be false. Faller argues on the basis of this fact that use of the Cuzco Quechua reportative evidential entails no epistemic commitment on the part of the speaker toward the proposition expressed; it is instead "presented" to the listener. Murray (2010) presents similar arguments for the Cheyenne reportative evidential; following Faller, she uses deniability facts like those discussed here for *youda* to argue against an epistemic modal analysis of

reportative evidentials in Cheyenne.

Matthewson (2012) has recently called into question this line of argument, putting forth the strong thesis that all evidentials are epistemic modals, even those whose deniability behavior has been taken to argue against such an analysis. Matthewson's argument is based primarily on the apparently non-modal St'át'imcets evidential lákw7a, which like youda is can be used felicitously with a proposition that is subsequently denied. Matthewson follows the approach of Kratzer (2012), according to which the truth-conditions of an epistemic modal are dependent on a conversational background, which can be realistic or informational. Given that it is only modals with a realistic conversational background that commit speakers to the truth of their propositional complements, evidentials allowing for deniability, such as youda, can still be given an epistemic modal semantics, with the caveat that they allow for an informational conversational background. The point is taken; the evidence cited above at most shows that it is *possible* that youda is not an epistemic modal. As we show below, youda requires that a non-trivial relation hold between the evidence source and the target proposition. When the semantics of this relationship is spelled out explicitly, we can account for the other features of youda's meaning without appealing to an additional epistemic modal component. We thus conclude that no such meaning component is necessary in describing the semantics of *youda*.

5 An Asymmetric Evidential Relation

5.1 An Asymmetry

Having established that *youda* makes no requirements on the beliefs of the agent toward the target proposition, we now turn to the connection between the target proposition p and the evidence source e. According to M&O, this connection is based on Bayesian belief revision, with a piece of information e serving as evidence for the target proposition p just in case learning e causes an increase in the subjective probability assigned to p. This was illustrated with the example in (4), repeated below:

 (15) Context: Looking at a wet street. Ame-ga futta youda. rain-NOM fell YOUDA
 'It seems that it rained.'

According to M&O, the information that the street is wet serves as evidence for the proposition that it rained just in case learning this fact increases the subjective probability that it rained. In the following example, we have switched the target proposition and evidence source:

(16) Context: Looking at falling raindrops.
 #Michi-ga nureteiru youda.
 streets-NOM wet YOUDA
 'It seems that the streets are wet.'

The resulting utterance is predicted to be felicitous under M&O's account, given that the speaker has witnessed it raining in a manner compatible with the lexical restrictions of *youda*, and that its having rained is sufficient evidence to bump up the probability that the streets are wet. The reasoning is spelled out as follows: (i) the information 'it is raining' has led the speaker to raise her subjective probability for the proposition 'the streets are wet', (ii) the resulting subjective

probability for 'the streets are wet' is greater than .5 but less than 1, and (iii) the speaker has accessed the information 'it is raining' in a manner compatible with the lexical restrictions peculiar to *youda*. The sentence is, however, infelicitous. The infelicity here reflects a general fact about *youda*: the target proposition and evidence source cannot generally be switched, even in contexts where the original target proposition can be understood as forming evidence (in the sense of M&O) for the original evidence source. We argue that this asymmetry is due to the fact that *youda* encodes an asymmetric *causal relation* between the target proposition and the evidence source; the asymmetry of this causal relation explains why switching the target proposition and evidence source to the target proposition for the original to verify the intuition that *youda* links evidence source to the target proposition by means of an asymmetric causal relation.

5.2 Experiment III: Method

Stimuli The stimuli had two conditions, *p*-youda and *q*-youda for each causal relation CAUSE(p, q), which holds just in case *p* can be taken as being part of a causal explanation for *q*. Each condition had 12 items, resulting in 24 target sentences (12 items × 2 conditions). 144 items from Experiments I and II were also included.

- (17) a. *p-youda* Context: A wa kinoo Yamada kun ga kurushisoo na koe de hyakkai kazoeruno o kiita:
 'A heard Yamada counting up to 100 in a struggling voice:'
 b. Yamada-kun-wa kinoo udetatefuse-o hyakkai yatta youda. Mr.Yamada-TOP yesterday push.up-ACC one.hundred.times did YOUDA 'Yamada did 100 push ups yesterday *youda*.'
 (18) a. *q-youda* (Reverse) Context: Yamada kun wa kinoo udetatefuse o hyakkai yatta. 'Yamada did one hundred push ups yesterday.'
 - b. kinoo tonari-no heya-no Yamadakun-ga kurusisouna koe-de hyakkai yesterday next-GEN room-GEN Mr.Yamada-NOM struggling voice-in one.hundred made kazoeta youda. up.to count youDA

'Yamada counted up to 100 in a struggling voice next door yesterday youda.'

Each of the above sentences involves a relationship between two propositions, p = 'Yamada did 100 push ups yesterday' and q = 'Yamada counted up to one hundred in a struggling voice next door yesterday.' Intuitively, p serves as part of a causal explanation for q, but not vice-versa; Yamada can be said to have counted to 100 because he did 100 push ups, but cannot be said to have done 100 push-ups because he counted to 100. The proposition p is thus naturally understood as part of an asymmetrical causal explanation for q, but not vice versa. We hypothesize that *youda* must mark p in such relationships, and thus that p-youda will be rated more natural than q-youda.

The procedure, participants and statistics were the same as Experiments I and II.

5.3 Results

Figure 3 shows the average naturalness ratings in each condition. Given CAUSE(p, q), *p*-youda sentences were judged more natural than *q*-youda sentences (t = -11.77, p < 0.001).

Figure 3

Ratings of *p*(cause-event)-*youda* and *q*(effect-event)-*youda* sentences



5.4 Discussion

The results of Experiment III confirm that the relation between the prejacent proposition p and the evidence information q is asymmetric. Given a causal relation where p causes q, youda can be attached to a proposition p which is inferred from an evidence source described by q; in the reverse situation, naturalness drops significantly. According to M&O, however, the relation between the prejacent proposition p and the evidence information q is in principle symmetric, given that learning p leads to an increased probability for q and vice-versa. The asymmetry observed here is left unexplained.

This problem is not limited to theories based on Bayesian probabilities. It also holds for theories that model a dependency using more traditional logical tools, for example, the conditional relations employed by Takubo (2009). According to Takubo (2009), *youda* can be attached to a sentence denoting the conclusion p when there is a piece of information q that abductively derives p from the background knowledge $p \rightarrow q$. For instance, in (15), we have a major premise 'If it rains, the streets are wet' as background knowledge. The new information 'the streets are wet' counts as abductive evidence for the propositional complement of the *youda*-utterance in (15).

(19) Abductive reasoning

Major premiseIf it rains, the streets are wet.Minor premiseThe streets are wet.ConclusionIt rains.

In (16), given the same major premise 'If it rains, the streets are wet', the prejacent proposition 'The streets are wet' is a conclusion derived by deductive reasoning, not abduction, and hence *youda* cannot be attached.

Although we think Takubo's insight on the directionality of the inference is on the right track, the modeling of this asymmetry in terms of logical abduction is not strong enough to predict the correct distribution of *youda*-sentences. Consider the following biconditional, which could reasonably be part of a speaker's background knowledge.

(20) You have red-brown spots on the skin \leftrightarrow You have measles

Given the bidirectionality of (20), there are two conditional statements which are part of our background knowledge. One is that if you have measles, you have red-brown spots on the skin. If the speaker a perceives that Taro has red-brown spots on the skin, a can abductively derive a conclusion that Taro has measles:

(21)	Major premise	If one has measles, then one has red-brown spots on the skin.
	Minor premise	Taro has red-brown spots on the skin.
	Conclusion	Taro has measles.

Thus, Takubo's analysis correctly predicts that *youda* can be attached to the abductive conclusion:

(22) Context: Looking at Taro's skin. Taro-wa hashika no youda. Taro-TOP measles COP YOUDA 'Taro seems to have measles.'

In contrast, the other direction of the biconditional is problematic for Takubo's analysis. The background assumption in (20) licenses the abductive inference in (23):

(23)	Major premise	If one has red-brown spots on the skin, then one has measles.
	Minor premise	Taro has measles.
	Conclusion	Taro has red-brown spots on the skin.

Thus, according to Takubo's analysis, if the speaker perceives a situation where Taro has measles, she could abductively conclude that Taro has red-brown spots. In turn, *youda* should be able to attach to this conclusion. However, this is the wrong prediction:

 (24) Context: Looking at Taro's medical certificate saying 'measles' #Taro-wa akachairo-no shisshin-ga aru youda. Таго-тор red-brown-gen spots-NOM exist YOUDA 'Taro seems to have red-brown spots.'

The crucial difference between (22) and (24) is that the conditional relation $p \rightarrow q$ employed for the inference in (22) is based on a causal relation. Thus, causality seems to be indispensable in defining the indirect evidentiality of *youda*. On the basis of this observation, we propose that for the purposes of using *youda* a piece of information q can be regarded as indirect evidence for p just in case q situations/events are caused by p situations/events, CAUSE(p, q).

6 Proposal: Indirect Evidence via Causal Connection

6.1 A Causal Semantics of youda

The evidence adduced in the previous sections shows that *youda* does not seem to demand the kind of epistemic commitment on the part of the speaker that would be expected according to analyses based on epistemic modality (including those based on probabilistic belief commitment). Moreover, the connection between the evidence source e and the target proposition p is asymmetrical in a way that is left unexplained by theories of evidence based on probabilistic or conditional dependencies between propositions.

In this section we propose a semantics of youda that links the evidence source and target

proposition via an asymmetric relation of causation. The idea is that the target proposition p can be taken under normal circumstances as a plausible cause for the perceived evidence source e. What *youda* does is first to state the existence of an evidence source e, knowledge of which has to have been acquired by the agent a in a way compatible with the lexical restrictions of *youda* (visual, auditory, tactile, etc). It then says that there is some property q of the evidence source which stands in a causal relation with p, such that p events cause q events. These ideas are spelled out in the following denotation:

- (25) Let *s* be the semantic type of events/situations:
 - a. $[[youda]]^a = \lambda p_{(s,t)} \lambda e_s$. PERCEIVE(a, e) & $\exists q [q(e) \& CAUSE(p,q)]$
 - PERCEIVE(*a*, *e*) is true iff
 a perceived *e* in a manner compatible with the lexical restrictions of *youda*.
 - c. CAUSE(p,q) is true iff for some c in p and some e in q, c causes e. (modified from Lewis 1973:558)

The particular conditions required by PERCEIVE(a, e) are ignored in what follows. We focus our attention on CAUSE(p, q), which is the means by which *youda* indicates the existence of evidence for the target proposition p. The relation is defined between propositions (properties of events/situations) and requires that some p events/situations cause some q events/situations.³ Causation as such is thus a relation that holds between particular events/situations; the CAUSE relation holds between propositions p and q, and makes an existentially quantified claim about the sets of situations characterized by p and q. The assertion of p-youda does not entail that there exists a particular p event c which causes the particular q event e that is perceived by agent a; it only requires that some p events are in a causal relation with some q events.

The above denotation includes no statement of an epistemic attitude on the part of the agent a towards p. Moreover, there is no encoding of 'evidence' as such. Instead, these features of interpretation (that the perceived event counts as evidence for p, and that the agent has some resulting epistemic commitment toward p) are left as implicatures deriving from the causal relation that *youda* encodes. That is, *youda* acts as an indirect evidential by indicating a causal connection between the evidence source and the target proposition. In cases where a is understood as the speaker, the assertion that a perceived some situation of a kind that is normally caused by p situations/events generally licenses a conclusion that the speaker thinks there is some evidence for p, and has a corresponding commitment to its truth.

We now show how this semantics applies to some of the examples considered so far, and how it can explain the facts observed earlier in the paper.

6.2 Cancellable Commitment

We first apply the above semantics to (4), repeated in (26).

(26) Context: Looking at a wet street. Ame-ga futteru youda.rain-NOM falling YOUDA'It seems to be raining.'

 $^{^{3}}$ We assume the view of situations outlined in Kratzer (1989); Davidsonian events and Kratzerian situations are not distinguished, and are given the primitive type *s* in our model.

In this and the following examples, the agent *a* is resolved to the speaker. The target proposition p = 'it is raining', and the evidence source *e* is the wet street observed by the speaker; *e* thus has the salient property *q*, where q = 'the streets are wet'. The use of *youda* requires that CAUSE(*p*, *q*) is true, meaning that situations in which the streets are wet are caused by events/situations in which it is raining. Since this is true, the sentence as a whole can be judged true (given that the wet streets were observed by the speaker in a way compatible with the lexical restrictions of *youda*).

As a pragmatic implicature, the speaker is understood to be providing evidence for the proposition that it rained, and also to be committed to the likelihood or possibility of it actually raining. But as observed earlier, this commitment seems to be cancellable, meaning that it should not be included as an entailment or presupposition of the sentence:

(27) Ame-ga futteru youda kedo, jitsu-wa futteinai. rain-NOM falling YOUDA but truth-тор not.falling 'It seems to be raining, but it's not.'

Although such cancellations were shown in Experiment II to be judged significantly more natural than ones involving bare declaratives or declaratives marked with *darou*, the average rating (around 4.5 out of 7) indicates that speakers still feel that such cancellations are less than perfect. We think this is similar to other cases in which a conversational implicature is cancelled:

(28) ?Some people came to the party, and in fact everyone came.

We note that the slight infelicity resulting from the cancellation of *youda* sentences disappears in examples like the following, in which *youda* is replaced by *youni mieru*, a sentence ending built from an adverbial form of *youda* plus *mieru*, meaning 'to appear':

(29) Ame-ga futteru youni mieru kedo, jitsu-wa futteinai. rain-NOM falling YOUDA appear but truth-тор not.falling 'It looks like it's raining, but it's not.'

We suspect that these two forms, *youda* and *youni mieru*, compete with each other pragmatically. Since the more marked form *youni mieru* tends to indicate a lack of commitment to the truth of *p*, the less marked form comes to indicate some commitment to its truth.

6.3 Causal Asymmetry

As seen in the following example, *youda* is unacceptable if we reverse the propositions p = 'it is raining' and q = 'the streets are wet' from the above example:

(30) Context: Looking at falling raindrops.
 #Michi-ga nureteiru youda.
 streets-NOM wet YOUDA
 'It seems that the streets are wet.'

In this example, the speaker witnesses rain, and infers wet streets. Although this is acceptable as a general kind of reasoning, use of *youda* for the proposition 'the streets are wet' is infelicitous. This follows directly from our account, since use of *youda* in this example would indicate that wet streets cause rain. More generally, given that causation is asymmetric, we predict that the

evidence proposition and target proposition cannot be switched on a felicitous *youda* sentence to produce another felicitous *youda* sentence. The evidential relation encoded by *youda*, based on causation, is intrinsically asymmetrical.

6.4 Embeddability

Our proposal makes the semantic contribution of *youda* a truth-conditional, assertional part of the resulting sentence, rather than a presupposition or a conventional implicature. Although it is beyond the scope of this paper to discuss the compositional semantics of *youda* in embedded contexts, the following examples show that *youda* can be semantically embedded under past tense (31), negation (32), and in the antecedent of conditionals (33), facts that fall out naturally under an account in which the semantic content of *youda* is a truth-conditional component of the at-issue assertion.

- (31) Embedding under past tense: Ame-ga furu youda-tta.
 rain-NOM fall YOUDA-PAST
 'It seemed that it was going to rain.'
- (32) Embedding under negation (see McCready and Ogata 2007, Hara 2006): Ame-ga furu youja-nakat-ta.
 rain-NOM fall YOUDA-NEG-PAST
 'It didn't seem that it was going to rain.'
- (33) Embedding in the antecedent of a conditional (see McCready and Ogata 2007): Ame-ga futta youda-tta-ra, hana-ni mizu-wa yara-nai. rain-NOM fell YOUDA-PAST-if, flower-DAT water-TOP give-NEG
 'If it seems that it has rained, I won't water the flowers.'

6.5 Evidence via Causation

In much of the previous literature on evidentiality, the notion of indirect evidentiality has been left unanalyzed, as pointed out by McCready (2010). McCready and Ogata (2007) provide a concrete analysis of indirect evidentiality based on Bayesian probabilities; as has been shown, this account cannot explain the asymmetry of the evidential relation encoded by *youda*. In this paper, we have claimed that the notion of asymmetric causation is indispensable in characterizing at least one kind of evidentiality: a piece of information e is regarded as evidence for the proposition p just in case the agent a perceives the situation e, which has a property q, and q situations are caused by p situations. What then is a causal relation? In this paper, we leave causation as a primitive, though we note in passing that causal relations have often been considered a formative feature of natural language semantics.

One of the most influential analyses of causation is Lewis's (1973) counterfactual theory:

(34) Where *c* and *e* are two distinct possible events, *e* causally depends on *c* if and only if, if *c* were to occur, *e* would occur; and if *c* were not to occur, *e* would not occur. (from Menzies 2014)

For instance, the lighting of a match causally depends on someone's striking it if and only if, if she struck the match, it would light; and if she did not strike the match, it would not light.

Kaufmann (2013) reverses Lewis's (1973) idea, deriving the interpretation of counterfactuals from causality.

There are also philosophical and linguistic discussions on what count as causal relata, that is, what kinds of semantic objects can be the arguments of causal relations. Some argue that causal relata are *events* (Davidson 1967, Lewis 1973). Others argue that they are *facts* (Bennett 1988, Mellor 1980), and there are a large number of other proposals besides (see Hara et al. 2013 for an overview of different approaches). Under the events-as-causal-relata approach, causation is understood as a relation between concrete objects located in space and time. It is beyond the scope of this paper to develop an analysis of causation itself; we note only that recent work such as that of Kaufmann (2013) suggests treating causation as a cognitive primitive, and building other linguistic notions, such as counterfactuality, on the basis of it. We think this is the right approach for the kind of evidentiality encoded by *youda*.

There are other phenomena in the grammar of Japanese suggesting a close link between evidentiality and causation. Tenny (2006), for example, argues that the Japanese causal connective *node* bears an evidential meaning. One of the characteristics of Japanese evidential morphemes is to lift the person constraint of predicates of direct experience:

(35)	a.	*Taroo-wa kanasii/uresii/sam	uui.	
		Taro-тор sad/glad/cold		
		'Taro is sad/glad/cold.'		(adapted from Shibatani 1990:384)
	b.	Taroo-wa kanasii/uresii/sam	ui youda.	
		Taro-тор sad/glad/cold	YOUDA	
		'Taro seems sad.'		(adapted from Shibatani 1990:384)

Tenny (2006) shows that sentence final auxiliaries are not the only category which has this property; the effect is also ameliorated by the causal connectives *kara/node*. Take the following pair of examples. In (36a), where the adjunct clause is headed by the temporal *toki*, the predicate *samui* 'cold' can only be interpreted non-thematically, 'it was cold'. That is, the third person *kare* cannot be the experiencer. In (36b), on the other hand, both non-thematic and thematic interpretations are possible.

(36)	a.	Kare-wa samukatta toki, dambou-o ireta.	
		he-тор cold.past when, heater.acc put.on-past	
		'When it was cold, he put on the heat.'	
		*'When he felt cold, he put on the heat.'	(Shinko Tamura, p.c. to 2006)
	b.	Kare-wa samukatta node, dambou-o ireta.	
		He-тор cold.past because, heater-асс put.on.past	
		'Because it was cold, he put on the heat.'	
		'Because he felt cold, he put on the heat.'	(Shinko Tamura, p.c. to 2006)

As discussed by Hara (2008), the crucial semantic difference between the temporal and causal adjuncts seen in (36) is that sentences with a temporal adjunct express quantification over event properties, while sentences with a causal adjunct express a relation between closed propositions (see also Johnston 1994). Unlike temporal quantification, a causal relation is established when a cognitive agent perceives a particular event described in the complement sentence and causally connects the event to another event. In this sense, the causal connective plays a

role as an evidential marker.

7 Conclusion

We have investigated the nature of indirect evidentiality on the basis of the Japanese evidential marker *youda*. We frame our analysis in terms of three components: an agent *a*, a target proposition *p*, and an evidence source *e*, and three relations among them. The means of acquiring evidence, that is, the relation between *a* and *e*, is lexically specified by *youda*, although we left the details of this meaning dimension aside in this paper. We proposed that *youda* expresses *a*'s epistemic commitment to *p* as a cancellable implicature. A modalized statement like *might*(*p*) encodes the agent's epistemic commitment to *p*, which is not cancellable, that is, *might*(*p*) & ¬*p* is a contradiction. A treatment of *youda* as a species of epistemic modal would semantically encode the agent's epistemic commitment to *p*, making subsequent denial of *p* infelicitous; the results of Experiment II show that this is a wrong prediction.

Finally, we claim that the evidential relation between p and e is asymmetric and based on a causal relation holding between p and some salient property q that characterizes e. Given the inherent asymmetry of causation, this account correctly predicts the observation confirmed in Experiment III that one cannot switch the target proposition and evidence proposition of a *youda* sentence felicitously. This asymmetry is not predicted by the account of McCready and Ogata (2007), in which the evidential relation for *youda* and other evidentials is defined in terms of Bayesian probabilities, since they are in principle symmetrical, being based only on the effect that learning one piece of information has on the subjective probabilities assigned to another proposition. We also showed that the abduction-based account of Takubo (2009) is not strong enough, due to the fact that dependencies between propositions in this account are based on conditional statements, and hence in principle symmetric, since bi-conditional generalizations can be part of our background knowledge.

In summary, we have argued that the indirect evidentiality of *youda* can only be explained by reference to asymmetric causal relations, rather than epistemic, probabilistic, or conditional dependencies. A piece of information e is regarded as indirect evidence for the prejacent proposition p just in case the agent a perceives e, which has a property q, and q situations are often caused by p situations. Since *youda*-utterances merely assert the existence of a potential causal relation between the perceived situation and the prejacent proposition, the speaker is not epistemically committed to p itself; the evidential and epistemic components of *youda* are derived as implicatures from a core semantics based on causation.

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Refining Contrast: Empirical Evidence from the English *it*-Cleft

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This paper is concerned with the contrastive component associated with English *it*-cleft sentences. We argue for a more complex notion of contrast than has previously been used in much of the semantic literature and provide empirical evidence showing that defining contrast in purely semantic terms cannot fully explain the felicity of clefts and their competition with canonical sentences. On the notion we support here, expressions are contrastive to the extent that they conflict with expectations. Crucially, this allows for *degrees* of contrast, corresponding to stronger or weaker conflict with expectations; and it permits us to consider, not only expectations about the world, but also metalinguistic expectations about the discourse itself. This scalar and multifactorial notion of contrast allows us to make better predictions about the contexts in which clefts are judged to be felicitous.

Keywords: contrastive focus, *it*-cleft, speaker's expectation, at-issueness, English

1 Introduction

The English *it*-cleft, exemplified in (1), is generally seen as indicating *identificational focus* (Kiss 1998). Following Kiss, we assume that identificational focus has two distinctive semantic and pragmatic components: it leads to an exhaustive interpretation of the sentence as in (1a) and in some cases can also indicate contrast, as in (1b). In this paper, we are specifically interested in the second component, contrast. Our goal is twofold; we refine the definition of contrast and investigate what the connection is between contrastivity and the cleft, given that, in English, not all clefts are required to be contrastive.

- (1) It was John who cooked the beans.
 - a. \rightarrow Nobody other than John cooked the beans.
 - b. \rightarrow The fact that John cooked the beans contrasts with something in the discourse context.

In the previous literature, the contrastive component of an *it*-cleft's meaning is generally modeled as a categorical discourse constraint, a necessary *but not sufficient* condition which must be met by the discourse context for a cleft sentence to be uttered. Often, it is formalized using the same mechanisms that are used for anaphora. A cleft sentence, on this analysis, must find an antecedent in the immediate discourse context; and this antecedent must be one of its focal alternatives.

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This anaphoric analysis of contrast accounts for some important judgments. For instance, it explains why clefts often sound odd as direct answers to overt questions, as in (2). A question alone does not provide the right kind of antecedent; and with no antecedent available, the cleft is infelicitous.

(2) A: Who cooked the beans?B: #It was John who cooked the beans.¹

And on the other hand, it explains why clefts often sound good as corrections, as in (3). The previous utterance being corrected provides exactly the right kind of antecedent.

(3) A: I wonder why Alex cooked so much beans.B: Actually, it was John who cooked the beans.

But there are also facts which it does not account for. Here is one: in contexts in which an antecedent *is* available, speakers may nevertheless choose not to use a cleft. Indeed, in some such contexts, clefts seem actively dispreferred, and their use sounds stilted and odd. For instance, (4b), while still perhaps technically felicitous, does not strike us as good idiomatic English; and in the rating experiment which we describe in this paper, (4b) was actually given a lower naturalness rating than (5b), despite the fact that (4b) has an antecedent available (viz. Canada) and (5b) does not.

- (4) A: Darren sounded really excited about his vacation. I think he might be going to Canada.
 - a. B: Actually, he's going to Mexico.
 - b. B: ? Actually, it's Mexico that he's going to.
- (5) A: We were planning Amy's surprise party for weeks. I can't believe she found out about it. Who told her about it?
 - a. B: Ken told her about it.
 - b. B: It was Ken who told her about it.

And even when a cleft does not sound noticeably odd, if we consider the rate at which clefts are actually produced, we find that there are dramatic differences between contexts. In a pilot production study, we restricted our attention to contexts in which a suitable antecedent is present and still found that some such contexts induce a much higher rate of cleft production than others.

Our intuition to account for these observations is that clefts are optimal candidates in contexts where they do more than just introduce a *linguistic* contrast but also perform a *metalinguistic* contrast, which we conceptualize in terms of speaker-hearer's expectations. This idea is already present in the work by Zimmermann (2008, 2011) who argues that the classic analysis of contrast in purely semantic terms (i.e. via the introduction and subsequent exclusion of alternatives) is not well suited to fully explain the variation observed in the marking of focus in the Chadic languages that he explores. Instead, Zimmermann proposes a more elaborate treatment of contrast as a discourse-semantic phenomenon in terms of speaker-hearer mismatch: according to the *Contrastive focus hypothesis*, contrastive focus is used when speaker has reasons to suspect that hearer does not expect the assertion of the focus constituent as likely to be in-

¹Throughout the paper, we will indicate ungrammaticality with an asterisk (*) and infelicity with a hash (#).

cluded into the Common Ground (see definition, 2011:1167). Another antecedent for this idea is Krifka's (2008) distinction between "common-ground content" and "common-ground management." By "common-ground content", Krifka means the truth-conditional information which has been shared by interlocutors so far in the discourse. Common-ground management, on the other hand, "is concerned with the way how the CG content should develop"; for instance, raising a question has a common-ground management function, because it suggests what sort of truth-conditional information ought to be added to the CG content of the discourse.

The goal of this paper is to show that some of the variation occurring in English can also be accounted for by broadening our understanding of contrast. Rather than a single categorical constraint, we argue, the relevant notion of contrast should be a gradient one, and should comprise at least two related factors. Following Zimmermann's hypothesis, we propose that contrast, at least the sort of contrast which is relevant to clefting in English, should be understood in terms of *conflict with expectations*. Crucially, we claim that two types of expectations are relevant here, not just expectations about the state of the world, but also expectations about the shape and direction of discourse. Our "expectations about the world" correspond to Krifka's expectations about CG content that is likely to be added, and our "expectations about the discourse" are, in his terms, expectations about what sorts of CG management are likely to take place. Using data from a controlled rating task, we show that the intensity of this conflict matters: a cleft sounds more natural if the speaker is contradicting a firm assertion than if she is contradicting a tentative suggestion, and a cleft sounds more natural if the speaker is addressing content which had previously been marked as not-at-issue, thereby violating the expectation that such content will not need to be discussed.

In short, our claims are as follows:²

- (6) *Conflict with expectations*: Clefts are more felicitous the more they conflict with interlocutors' expressed expectations.
 - a. *Expectations about the world*: These expectations may involve beliefs about the world, expressed as assertions or presuppositions. More strongly expressed beliefs lead to stronger conflict.
 - b. *Expectations about the discourse*: These expectations may involve beliefs about the direction in which the discourse is going, expressed, among other ways, by marking content as at-issue or not-at-issue.

2 Background

2.1 What is Focus?

In the literature, the notion of *contrast* is often discussed in relation to two other primitives of information structure, topic and focus. Because this paper is mostly interested in contrast in focus-related contexts, it is in order to briefly introduce how we understand the notion of *focus*.

Traditional accounts of focus have defined focus as evoking a set of alternatives relevant for the interpretation of the sentence and which are taken to be salient by the speaker (Rooth 1985, 1992, Krifka 2008). One common way to diagnose focus is within question-answer pairs, like (7).

²Note that, in this paper, we frame expectations about the world as scalar, with stronger expectations leading to stronger conflict, but we have not adopted a scalar framing for expectations about the discourse. It is an interesting question whether there might also be degrees of at-issueness. But we leave this as a question for future work.

- (7) a. Question: Who cooked the beans?
 - b. Answer: $[John]_f$ cooked the beans.
 - c. Incongruent answer: *John cooked [the beans] $_f$.

In this example, the *wh*-element in the question instantiates a set of propositions of the form {x cooked the beans} (Hamblin 1973), from which an actual answer is selected – the focus element – here, *John*. Focus marking on the wrong element, as illustrated in (7c), leads to an incongruent Q-A pair.

2.2 Notions of Contrast and the Function of Clefts

Contrast, like focus, is assumed to operate on a set of alternatives relevant for its interpretation. However, contrast is different in the way it exploits these alternatives, leading to the commonly acknowledged distinction between two focus types: *informational* (or *presentational*) focus vs. *contrastive* (or *identificational*) focus (Rochemont 1986, Vallduví and Vilkuna 1998, Kiss 1998). It has been widely suggested that the function of clefting is to highlight instances of contrastive focus (Kiss 1998). We will assume here that this is the case.

But how should contrast be defined? The past literature has typically framed this distinction in purely semantic terms; there are several ways this can be done, and we will discuss two major ones. More recently, Zimmerman has argued that if clefts in Hausa and other Chadic languages are to be understood as marking contrastive focus, it will require a broader notion of contrast, one which takes discourse pragmatics as well as semantics into account.

One semantic account holds that contrastive focus requires the presence of an antecedent focus alternative, and more specifically imposes requirements on the size of the alternative set and the identifiability of its elements. To many scholars, notably Halliday (1967), Chafe (1976), Rooth (1992), and Kiss (1998), contrastive focus differs from informational focus in that it operates on a *closed* set of alternatives, that is a limited number of candidates. Chafe (1976:34) argues that "contrastive sentences are qualitatively different from those which simply supply new information from an unlimited set of possibilities." Additionally, contrastive focus is thought of as instances of focus where at least one of the individuals in the set of alternatives is identifiable, meaning that it has been explicitly mentioned in the preceding discourse. For instance, let's consider the sentence in (7b). This sentence can be uttered in a context where an open set of individuals – all the friends invited to the party Saturday night – were supposed to bring a dish and someone cooked beans, namely John. In this case, there is no need to know the exact number of friends who have been invited or who these friends are (the alternatives can remain implicit or contextually available), in which case the focus element is simply interpreted as introducing new information into the discourse, answering the wh-question in (7a). On the other hand, if the context explicitly mentions one or more other individual that did not cook beans, for example, in a question such as Who cooked the beans, John or his brother Fred?³ the focus constituent in (7b) receives a contrastive interpretation: the individual denoted in the answer contrasts with the individual(s) introduced in the discourse.

On the second semantic account, the distinguishing feature of contrastive focus is that it triggers an *exhaustive* inference. We can see this inference in action in (8). The use of a cleft here leads to the inference that the prejacent in (8a) is true, but also to the inference that the exhaustive statement in (8b) is true.

³See Krifka (2008) for the argument that this type of question is not contrastive.

- (8) It was $[John]_f$ that cooked the beans.
 - a. John cooked the beans.
 - b. Nobody other than John cooked the beans.

There is a substantial literature on the question of how this exhaustive inference arises, and how precisely its meaning should be characterized (see e.g. Horn 1981, Atlas and Levinson 1981, Kiss 1998, Velleman et al. 2012, Büring and Križ 2013). On the other hand, there is evidence that in certain languages, clefts or other intuitive contrastive focus constructions do not always trigger an exhaustive inference. This has been argued, for instance, for clefts in St'át'imcets (Salish; Thoma 2009), for focus movement structures in K'ichee' which are arguably clefts (Mayan; Yasavul 2013), and for non-cleft focus movement structures in Tangale (Chadic; Zimmermann 2011) which, Zimmerman argues, still show signs of being contrastive in an important sense. If we want to retain the idea that clefts and other focus movement constructions are inherently contrastive, then these data suggest it will not work to define contrastivity purely in terms of exhaustivity.

Zimmermann (2008) points out that both of the semantic approaches above do not fully predict when contrast-marking constructions such as clefts will be used. In diverse languages which are argued to use clefts to indicate exhaustivity or the presence of an antecedent, it is nevertheless sometimes possible to use canonical sentences when an exhaustive meaning is intended and an explicit antecedent is present — as in the following example from Hausa:

- (9) a. You will pay 20 naira.
 - b. A'a, zâ-n biyaa shâ bìyar nèe. no, FUT-1SG pay fifteen PRT 'No, I will pay [fifteen.] $_{f}$ '

Zimmermann has also pointed out that there are numerous languages where clearly nonsemantic factors influence the use of clefts. One fairly common pattern, especially in languages which strongly associate topicality with subject position, is for clefting to be *required* in cases of subject focus, and optional in other cases. Zimmermann (2008, 2011) suggests that this should be understood in terms of *hearer expectation*, following Steedman (2006)'s use of expectation in his model of information structure. Crucially, he suggests that speech acts as well as semantic content can count as unexpected in the relevant sense. In languages such as French and Hausa, because of the strong tendency for subjects not to be foci, any speech act involving subject focus can be said to be unexpected, and this, he argues, explains the requirement that subject foci be clefted in these languages.

2.3 At-Issueness and Metalinguistic Expectations

Following Zimmermann's arguments, we suggest that there are two different sorts of contrast which clefts can be used to mark, repeated from (6).

- (10) *Conflict with expectations*: Clefts are more felicitous the more they conflict with interlocutors' expressed expectations.
 - a. *Expectations about the world*: These expectations may involve beliefs about the world, expressed as assertions or presuppositions. More strongly expressed beliefs lead to stronger conflict.

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b. *Expectations about the discourse*: These expectations may involve beliefs about the direction in which the discourse is going, expressed, among other ways, by marking content as at-issue or not-at-issue.

In Zimmermann's work, the relevant expectations about the discourse are generated by the grammar of the languages he studies, which assign topic status to canonical subjects. Thus, in these languages, any move with subject focus is an unexpected move. We will be interested in a different source of expectations about the discourse: namely, the discourse status of certain propositions as at-issue or not-at-issue.

We assume that at any point in the discourse, participants are *expected* to address the propositions that are currently at-issue. Thus, in English (and presumably in other languages as well), a move which addresses a previously not-at-issue proposition is an unexpected discourse move.

We assume, further, that at-issueness is marked by certain *backgrounding* constructions, including appositives and nonrestrictive relatives (Potts 2012).

- (11) Mary, John's sister, is visiting this week.
- (12) a. At-issue: Mary is visiting this week.b. Not-at-issue: Mary is John's sister.

Indeed, there is such a strong convention that appositive and nonrestrictive relative clause content is not-at-issue that the use of these constructions can override a previously established current question (CQ). We can only make sense of the discourse in (13) if we understand B to be quite forcefully pushing A's question aside, and redirecting the discourse to address the question of when Mary is visiting. In other words, B's move effects a change in the CQ, by marking his answer to the previous CQ as not-at-issue.

(13)	A: Who is Mary related to?	(CQ: Who is Mary related to?)	
	B: Mary, John's sister, is visiting next week.		

(CQ: When is Mary visiting?)

3 New Experimental Data

As mentioned in the introduction, the intuition behind the experiments presented here is that even though *it*-clefts are assumed to indicate contrast, the mere presence of a focus antecedent in discourse and its subsequent exclusion does not seem to suffice for clefts to be felicitous. Although it may be a necessary condition, we do not think it is a sufficient one. Instead, we hypothesize that their use and felicity can be better explained by the notion of expectations, both about the world and about the discourse.

In this section, we present two pilot experiments designed to test this hypothesis by examining how strong the conflict of expectations has to be between interlocutors for the cleft to be selected as the preferred structure (rather than a canonical sentence with prosodic marking for example).

3.1 Experiment 1: Production Task

Given the observation that the *it*-cleft sounds very odd as a direct answer to a *wh*-question, and does not always sound natural when directly contradicting an incorrect assumption, a first step is to determine whether *it*-clefts are indeed produced at a significant rate by native speakers of

English. For that purpose, we conducted a semi-spontaneous production task.

3.1.1 Methods 15 English native speakers took part in this experiment. They were all recruited from an undergraduate class at the University of Texas at Austin. All were naive as to the purpose of the experiment.

Participants sat at a table in a quiet room and were given a paper survey (in the form of a six-page handout) that included the instructions on the first page and the task on the following pages. The instructions informed participants that they would read a series of written stimuli that each included three parts, as seen in (14):

- (14) a. A *Your friend says* part which constitutes the context and always ends with either a *wh*-question or a sentence containing a piece of information in bold,
 - b. An *Answer* or *Correction* part which provides participants with the information to use to formulate their answer in the third part. The information was labeled *Answer* in the condition where it is used to formulate an answer to a *wh*-question, and *Correction* in the condition where it must be used to offer a corrective statement to the false assumption made by the "friend" in the preceding context,
 - c. A *You say* part which included a blank line for participants to write out their response.

Participants were instructed to read each context and piece of information thoroughly, and then, depending on whether to offer an *Answer* or a *Correction*, use the information given in the second line to write down their response. The instructions emphasized the fact that participants must think about their response carefully before writing it down, formulating it as naturally as possible, as if they were to say it to the friend in a spoken dialogue. Moreover, participants were asked to use full sentences as much as possible.⁴ Finally, the instructions made clear that in cases where a correction must be offered, the bold element in the preceding context is the element to correct and replace using the information in the second part of the stimulus.

The current experiment consisted of a 2x2 within-subject design testing two types of contexts, INFORMATIONAL and COUNTER-PRESUPPOSITIONAL (which we take as the two opposite ends of the scale for degrees of contrast) and two grammatical functions, SUBJECT and OBJECT. In the informational context condition, the speaker has no overt beliefs or has chosen not to express them in any direct way. We take such a context to be one where the speaker simply seeks information without projecting expectations about what he believes the answer may be, which we encoded in the stimuli via a *wh*-question. In this condition, the information in the second line is always labeled *Answer* since it provides an instantiation to the open variable in the question. Furthermore, the *wh*-question is either a *who* or a *what*-question, triggering a subject or an object *Answer* piece of information, as illustrated in (15) and (16), respectively.

(15) Your friend says: This bean dip is fantastic. I really want to get the recipe. Who made it? Answer: Tim. You say: ______

(16) Your friend says: Ben and Lucy just bought a new house but had some landscaping work

⁴We are aware that full sentences often do not constitute natural sentences and that a partial sentence including the focus information seems in fact more natural. We leave open the discussion about whether or not we should enforce full sentences to be used in focus-related experimental tasks.

to do. There were a few trees way too close to the house. Which one did they cut down? *Answer*: the oak.

You say: _____

On the other hand, we created a counter-presuppositional condition under which the context only differed from the corresponding informational context in the form of the last sentence in the context. Whereas the last sentence in the informational condition was always a *wh*question, in the counter-presuppositional condition, the last sentence was always a statement in which the speaker presupposed *x* and expressed an opinion about it. For example, if we take (17) below (as opposed to (15)), the speaker presupposes that Shannon made the dip and expresses his belief about her ability to make a fantastic dip, making a value judgment about her cooking skills. The participant's task in that particular example is to rectify the presupposition that Shannon made the dip using the piece of information in the second line, and therefore offer the correction that the person who actually made the dip is Tim. The experimental item in (18) presents a counter-presuppositional context in the object condition (to oppose to (16) above).

- (17) Your friend says: This bean dip is fantastic. I really want to get the recipe. I can't believe that Shannon made it she's normally not a very good cook.
 Correction: Tim.
 You say: _________
- (18) Your friend says: Ben and Lucy just bought a new house but had some landscaping work to do. There were a few trees too close to the house. I don't understand why they cut down **the big pine**, though. *Correction*: the oak.

You say: _____

For the current study, we created five lexicalizations for each condition (for a total of twenty experimental stimuli). We then created two lists balanced so that each participant saw a total of ten experimental items – two items for each condition always presented in a different lexicalization – and five fillers. A complete list of the experimental stimuli is presented in Appendix A.

3.1.2 Results The results are given in raw count in Figure 1. As predicted, there is a significant effect of the type of context on the response form produced by participants. The difference between the distribution of responses (canonical versus cleft) across the two contexts is highly significant ($\chi 2(1)=36.24$, p<0.01), although most of the variation is attributable to differences within the informational context. Indeed, within the informational context, the canonical sentence is the form predominantly produced (z=7.27, p<0.01). This result confirms that at least in English, clefts make bad answers to explicit *wh*-questions. Under a definition of contrast à la Rooth, this result is expected since an antecedent focus alternative is not present in the context.

In the counter-presuppositional context, on the other hand, we observe that clefts are produced significantly more: the distribution of the cleft is significantly different across the two contexts (z=-6.02, p<0.01). Put slightly differently, the odds of using a cleft are 13.1 times higher when the speech act involves a correction than when it involves a simple answer. This result indicates that clefts are indeed produced by native speakers but are restricted to specific pragmatic uses of focus – to offer a correction to a presupposition. Again, this in line with what



veying a stronger interpretation of focus.

⁰ informational counter-presup is expected in previous research: the counter-presuppositional context provides the ground for linguistic contrast because of the presence of an explicit antecedent focus alternative and the exclusion of alternatives done via the ensuing response. These results are also expected under Gricean reasoning: simpler structures are assumed to appear in less marked contexts and, reversely, structurally more complex structures are selected by speakers when in need of con-

However, one aspect of our results represents a challenge for accounts that argue for a fundamental difference in the semantics of the two focus types, informational vs. contrastive (Kiss 1998, Molnar 2002): we find no categorical correspondence between focus interpretation and the grammatical realization of that focus, just a tendency for contrastive focus to be realized via a marked structure. Indeed, while purely semantic accounts predict that contrastive focus must be realized in a particular structure such as the *it*-cleft in English or in a specific syntactic position such as the preverbal position in Hungarian, our results demonstrate that clefting is not the only strategy available to speakers; canonical sentences are also produced to perform a correction (the difference in distribution between the two response forms does not reach statistical significance, z=-0.5, p=0.5).

Let's now turn to exploring the effect of the syntactic factor GRAMMATICAL FUNCTION on the sentence form produced. Figure 2 reports on raw counts for the condition subject focus (on the left) and the condition non-subject focus (on the right).

We first observe that this factor has no effect in an informational context: clefts are bad regardless of whether they encode a subject or a non-subject focus. The results are quite different for the counter-presuppositional context, revealing a structural asymmetry in the way subjects vs. non-subjects are realized when conveying contrast: the cleft is produced more frequently when the focus is a grammatical subject ($\chi 2(1) = 6.4$, p=0.01). We explain this asymmetry by arguing that non-subjects are less likely to be clefted due to further structural differences: extraction of lower constituents (non-subjects) is more complex than higher constituents (subjects).⁵

⁵We note that, as opposed to Skopeteas and Fanselow (2010), who find clefts only in the identificational context with subjects, we find a non-null number of clefts with non-subjects as well. We may wonder if it is due to the difference between their identificational context and our counter-presuppositional context: although both are intended to trigger contrast, Skopeteas and Fanselow set up their context as a *wh*-question including a wrong piece of information to be corrected by the participant, whereas we embed the wrong piece of information under an attitude predicate. We feel that if this context difference was indeed the culprit of the difference in non-subject cleft occurrence, this could constitute further evidence for our intuition that the stronger the contrast is, the more a cleft

Raw count of response forms by context and for focus subject and non-subject conditions



Of course, due to the design of the experiment being a written task, one can wonder if in a spoken task, participants would produce less clefts because of the possibility to rely more systematically on using a higher pitch accent to convey contrast. There are good reasons to believe that this could be the case, as there exists a large body of literature on English showing that the pitch accent signaling contrastive focus is consistently more marked than that used in informational cases (Truckenbrodt 1995, Kratzer and Selkirk 2007, Katz and Selkirk 2011, Féry and Samek-Lodovici 2006).⁶ But, to the best of our knowledge, we are not aware of any evidence that the availability of prosodic contrast-marking competes with or inhibits clefting in the spoken medium. This remains an open question and a point for further investigation.

For now, the results from the pilot study presented here can only tell us so much about the cleft's use. The question remains as to what makes the cleft a better alternative than marking contrastive focus in situ via a more prominent pitch accent, and what differences actually matter between informational and counter-presuppositional contexts. In our opinion, the answer lies in the fact that the cleft is doing more than just *semantic* contrast, as defined among others by Kiss (1998) – it is also marking a *metalinguistic* contrast, which we understand in terms of *expectations*. This hypothesis is explored in the rating experiment presented in the next subsection.

3.2 Experiment 2: Rating Task

In the rating task presented here, we investigate English native speakers' judgments on the naturalness of the *it*-cleft in different contexts. The working hypothesis is that the cleft is increasingly better when the speaker's expectations are expressed more strongly and the conflict with the hearer's expectations intensifies. If, as we claim, the cleft is not simply marking linguistic contrast but is also marking metalinguistic contrast – indicating a conflict between the interlocutors' beliefs about the world and expectations about the advancement of discourse – speakers should rate the cleft more highly when both types of expectations are strengthened. And we hypothesize that they should rate a canonical sentence more highly in conditions where the conflict between interlocutors' expectations is null or weak.

is likely to be used. See section 3.2 for further discussion.

⁶Although, the question "Is the difference between the pitch accent used to mark informational focus and the pitch accent used to mark contrastive focus only gradual or categorical in nature?" is still debated.

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Figure 2

3.2.1 Methods 12 English native speakers were recruited from an undergraduate class at St Edwards University in Austin. All were naive as to the purpose of the experiment.

Participants sat at a table in a quiet room and were given a paper survey (in the form of an eight-page handout) that included the instructions and the task. Participants were asked to carefully read a series of written stimuli that consisted of a dialogue between two speakers, A and B, and rate how natural B's response sounds on a 5 point scale, given A's preceding sentence. Participants indicated their choice by circling the number on the scale.

In the design of this study – a 4x2x2 between-subjects design – we controlled for (i) the context (speaker A's part), (ii) the form of the target sentence (speaker B's response), and (iii) the grammatical function of the focus element. Let's look at these three parameters in more detail.

The most straightforward one is the latter. The grammatical function of the focus was always either a SUBJECT or an OBJECT. Second, Speaker B's response was always presented in either of two forms: a CANONICAL or an *IT*-CLEFT. Participants were always presented with only one form to rate and never rated both forms for the same lexicalization. Finally, the context condition was designed to test the core proposal of this paper, that two types of expectations are relevant for the felicity of the *it*-cleft: STRENGTH OF BELIEF and AT-ISSUENESS. Strength of belief corresponds to expectations involving the speaker's beliefs about the world (common ground), which are expressed as assertions or presuppositions. We take this to be a gradient notion ranging from "no (overt) belief" to "strong belief." More strongly expressed beliefs lead to stronger conflict between interlocutors, in which case the *it*-cleft should be more natural. In addition, at-issueness corresponds to the expectations that speakers have with regards to the direction in which discourse is progressing, expressed by marking (part of) the proposition either as at-issue or non-at-issue. Thus, the context variable had four levels (four context types), as illustrated in (19).

(19) Context types:

- a. Informational
- b. At-issue, weak belief
- c. At-issue, strong belief
- d. Counter-presuppositional

Example (20) presents the four different contexts. Underneath each context, participants saw either a canonical sentence, as in (21-a), or the cleft, as in (21-b), and a 1–5 scale to provide the naturalness rating.

(20) Speaker A: This bean dip is fantastic. I really want to get the recipe ...

- a. Informational
 - ... Who made it?
- b. At-issue weak belief
 ... I think that maybe Shannon brought it.
- c. *At-issue strong belief* ... I'm sure that Shannon brought it.
- d. *Counter-presuppositional* ... I can't believe that Shannon brought it she's normally not a very good cook.⁷

⁷A reviewer brought to our attention the fact that this example is ambiguous: it can be interpreted either as





(21) Response to rate

- a. B: Tim made it.
- b. B': It was Tim who made it.
 - On a scale from 1 to 5, how natural does Speaker B's response sound to you? 1 2 3 4 5

The different contexts were designed to reflect the idea that speakers' beliefs are gradient; they can vary in strength depending on how the speaker chooses to express them. We take an informational context – where the speaker is simply requesting information via a *wh*-question – to constitute the starting point of the scale since no overt beliefs are expressed. At the next levels, the commitment of the speaker regarding the prejacent increases. In the current task, we used a variety of attitude verbs and adverbs to encode the different degrees: in the weakbelief and strong-belief conditions, the speaker respectively expresses a low or a high degree of commitment toward the asserted prejacent proposition (i.e. "Shannon made it" in (20b) and (20c)). In the counter-presuppositional context, on the contrary, the prejacent is not at-issue – it is presupposed. The speaker expresses a personal, subjective opinion about the truth of another asserted proposition in the sentence (i.e. "It's hard to believe that Shannon made the dip" in (20-d)).

The task included a total of 16 conditions for each of which we created five different lexicalizations. Participants were assigned to one of four lists created in which they saw a total of 16 experimental items randomized with 10 fillers. Three participants were assigned to each list. The exact same five lexicalizations of the informational and the counter-presuppositional context from the production study (described in section 3.1) were used in this rating study. We adapted these lexicalizations to create the two additional contexts "at-issue weak belief" and "at-issue strong belief."

3.2.2 Results Mean ratings for each context (collapsed for grammatical function of the focused element) are presented in Figure 3.

[&]quot;I doubt that Shannon brought it" or "Shannon brought it and I cannot believe she would do such a thing – the answer being counter-presuppositional only under the second reading. Our intuition is that the reading we wanted to trigger is still the easier one to get. In any case, we had four other lexicalizations that were not ambiguous, so we feel confident this ambiguity alone could not significantly affect the results.

Overall, mean ratings for CANONICAL were the highest in the informational context (4.84), decreased as the strength of belief intensified (mean ratings were 4.71 and 4.5 for weak belief and strong belief condition, respectively), with the lowest rating being in the counterpresuppositional context (3.33). On the contrary, mean ratings for CLEFT were the lowest in the informational context (2.41), increased as the strength of belief intensified (3.22 and 3.58 for weak belief and strong belief condition respectively), and received the highest rating in the counter-presuppositional context when the proposition to be corrected is non-at-issue and the speaker has expressed strong beliefs (3.77). These results are consistent with the results from the production study in indicating that the canonical sentence is clearly the favored way to respond to a simple wh-question (informational context), and the need for a more marked structure increases as focus is associated with a stronger pragmatic interpretation. But, here again, the results are gradient in that the canonical sentence, although decreasing in appropriateness across contexts, is never completely bad and is only slightly worse than a cleft in counter-presuppositional contexts.

A one-way between-subjects analysis of variance was first conducted to investigate the effect of context on the naturalness of the canonical form. The result showed that there was a significant effect (F=20.03, p<0.001). Post hoc comparisons using the Tukey HSD test indicated that the only significant difference is between the mean rating of the counter-presuppositional and that of the other three contexts, the informational context (M=4.9, SD=0.3, p<0.001), the low contrast context (M=4.7, SD=0.6, p<0.001), and the strong contrast context (M=4.6, SD=0.8, p<0.001). Put differently, canonicals are significantly worse in the counter-presuppositional context than in the other three. Taken together, these results indicate that the factor STRENGTH OF BELIEF has no significant effect on the naturalness of the canonical sentence (the difference between the weak-belief and the strong-belief context does not come out as statistically significant), but that AT-ISSUENESS does plays a role: canonicals are judged as more appropriate when the component addressed or contradicted is part of the at-issue (asserted) content of the sentence. We interpret this result as suggesting that the use-conditions of canonical sentences must make reference to the distinction at-issue/non-at-issue. The function of canonicals is to signal that "things are proceeding as normal" in the discourse; the update of the common ground is made without difficulties, that is without requiring a shift or an accommodation in the hearer's background assumptions.

To test the hypothesis that the naturalness of the cleft varies with STRENGTH OF BELIEFS and AT-ISSUENESS, we conducted a second one-way between-subjects ANOVA.⁸ There was a significant effect of context on rating (F= 9.03, p<0.001), but a post hoc comparison using Tukey HSD test indicates that most of this effect is attributable to the difference between the mean rating for the informational context and the other three: the low contrast context (M=3.2, SD=1.1, p=0.015), the strong contrast context (M=3.6, SD=0.7, p<0.001) and the counter-presuppositional context (M=3.7, SD=1.1, p<0.001). In sum, *it*-clefts are significantly worse in informational contexts than in the other three, and the factor STRENGTH OF BELIEF has – so far – only a slightly significant effect.

⁸In the full experimental version of the study which is underway, we have redesigned the experiment to be two separate within-subject tasks – with one task investigating STRENGTH OF BELIEF and the second controlling for AT-ISSUENESS. We plan on fitting a mixed-model effect to test the hypothesis that the cleft is increasingly better as both expectation types strengthen.

3.3 Discussion

What have we learned so far? Linguistic contrast, as defined in semantic terms by the previous literature, is undoubtedly a necessary condition: both the production and the rating tasks show that the cleft's occurrence and naturalness is worst in contexts that do not provide explicit alternatives in the discourse context. So it appears that all it takes for the clefts to be *felicitous* is linguistic contrast.

But what about the question "What does it take for clefts to be *preferred*"? We hypothesized that the level of conflict between interlocutors' expectations should have a direct effect on the naturalness of the cleft. More specifically, we pinpointed two factors that seemed important: strength of belief - the expectations that interlocutors have about the world when entering a conversation - and at-issueness - the expectations that interlocutors have about the direction in which the discourse is going to progress. When looking at the data simply descriptively, the results from the two preliminary studies presented here suggest that the cleft becomes a better option in response to a strongly expressed belief - although when turning to the statistical analysis, the effect only trends toward significance. But we think that we should also look at the results from another perspective: clefts and canonicals are in competition and this competition is key. Therefore, we should not only draw conclusions from the cleft's results and the direct effects the two factors may have on this specific structure, but also interpret the results from the canonical as indirectly affecting the cleft's results. Thus, we argue that what it actually takes for clefts to be *preferred* is for the canonical to be less natural or to not be available. As the naturalness of the canonical decreases due to metalinguistic contrast (i.e. the conflict about the direction of discourse intensifies), the naturalness of the cleft increases. More specifically, clefts are better than canonicals in the counter-presuppositional context due to a combination of two effects: clefts improve because there is an antecedent and canonicals degrade because the antecedent is non-at-issue.

Furthermore, the findings reported on in this paper have implications for theories of focus. Under purely semantic accounts of focus, proposed notably in Drubig (2003), the interpretational effects of clefts and other strong focus constructions are directly derived from the syntactic configuration, predicting that the felicity contexts for clefts are the same crosslinguistically. Put slightly differently, if it is the case that cleft constructions systematically encode contrast/exhaustivity, then the contexts in which they are felicitous should be identical across languages. But it seems that this assumption is challenged by many empirical observations. Indeed, it has been widely noted that languages differ in the way they use cleft constructions. For example, Skopeteas and Fanselow (2010) and Katz (2014) note a difference in the conditions under which clefts emerge in English and French. While the Hungarian preverbal position seems necessarily associated with a stronger interpretation (i.e. exhaustivity), English *it*-clefts are not unnatural when non-exhaustive (Washburn et al. 2013). This leads us to ask the question why all languages do not use clefts in the same contexts and where the interpretative differences between superficially identical constructions come from. Here, we consider a speculative answer, not in terms of use conditions on the cleft itself, but rather on the canonical form. The reason why this hypothesis is speculative is that it specifies use conditions for the unmarked form, which is not typical when looking at broader phenomena across languages. But we wish to point it out anyway. If what makes the cleft preferred in a certain context is the infelicity of the corresponding canonical sentence in that same context, the contexts that are available for clefting across languages could be predicted from the contexts that are *unavailable* for marking
focus in situ. Under this hypothesis, what varies across languages are the felicity conditions for the canonical form, the options being determined by the grammar of the language. To give a concrete example, English seems to penalize canonicals for addressing non-at-issue content (as shown by the experimental results in this paper), French for marking subject focus (Lambrecht 2001), K'iche' for marking transitive subject focus (Velleman to appear), and Hungarian for providing partial answers. Since we take canonical sentences to signal that "things are proceeding as normal" in the discourse, what is taken to vary across languages is what languages consider to be "normal."

4 Related Work and Conclusion

We are not the first to suggest that there may be languages in which metalinguistic expectations have an effect on the choice of focus-marking construction. Zimmermann (2008) discusses a number of Chadic languages with asymmetric patterns of focus-marking. Hausa is a representative example: ordinarily, Hausa foci may be realized in situ, but contrastive foci tend to be clefted, and foci which are syntactic subjects *must* be clefted.

Zimmermann's account of these patterns invokes the idea of metalinguistic expectation. He suggests that in these languages, there is a strong expectation that subjects will not be focused; and that clefting marks the violation of this expectation.

In light of his conclusions, our data suggests that there may be no important difference between Hausa and English in the semantics and pragmatics of clefts. In both languages, clefts indicate violation of expectations. What is different is the strength of the relevant expectation: for Hausa speakers, the expectation that subjects will not be focused is so strong that it swamps all other factors, *forcing* focused subjects to be clefted; in English, it is plausible that same expectation is present, but if so, it is weaker and its effects are correspondingly smaller.⁹

A Sample of Stimuli for Production Experiment

- (22) Informational context, subject:
 - a. I can't believe that Mark bought that ugly car. It looks like it's about to fall apart. Who convinced him to buy it?
 - b. This bean dip is fantastic. I really want to get the recipe. Who made it?
 - c. The schedule for the final exams is all wrong. The French exam is listed at 2 a.m. instead of 2 p.m. Who made it?
 - d. Amy was up all night cleaning the spare room, and now she's picking someone up at the airport. Who is visiting her?
- (23) Informational context, object:
 - a. Everyone who interviewed for that job sounded really good. I bet it was a hard decision to make. Who did they hire?
 - b. Oh look, there are pictures from the party last weekend. Mary sure seems to be having a good time. What was she drinking?
 - c. Look at John this evening. He's all dressed up and he's even wearing a tie. Who is

⁹On the other hand, an alternative account of the Hausa facts has been offered on which they are not due to metalinguistic expectations, but rather to prosodic constraints (Lovestrand 2009). And there is no independent evidence that speakers actually hold the relevant metalinguistic expectations. By contrast, the effects of at-issueness in English involve metalinguistic expectations for which there *is* independent evidence.

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he going out with?

- d. Darren sounded really excited about his vacation. He was already packing two weeks in advance. Where is he going?
- (24) Counter-presuppositional context, subject:
 - a. I can't believe Mark bought that ugly car. It looks like it's about to fall apart, too. I have no idea how **Leah** convinced him to buy it.
 - b. This bean dip is fantastic. I really want to get the recipe. I can't believe that **Shannon** brought it – she's normally not a very good cook.
 - c. The schedule for the final exams is wrong. The french exam is scheduled at 2am instead of 2pm. I don't understand why they have **the secretary** plan it.
 - d. Amy was up all night cleaning, and now she's on her way to the airport. I can't believe she's annoyed that **her mom** is visiting.
- (25) Counter-presuppositional context, object:
 - a. Everyone who interviewed for that job sounded really good. I bet it was a hard decision to make. I am wondering what convinced them to hire **Jim**.
 - b. Oh look, there are pictures from the party last weekend. Mary sure seems to be having a good time. I don't know why was she just drinking **soda**, though.
 - c. Look at John this evening. He's all dressed up and he's even wearing a tie. I don't know why he is going out with **Tammy**, though.
 - d. Darren sounded really excited about his vacation. He was already packing two weeks in advance. I don't understand why is he going to **Canada** at this time of year, though.

B Sample of Stimuli for Rating Experiment

Note: The informational context and the counter-presuppositional context used in this experiment are the exact same ones as the ones in the production experiment. In this appendix, the other two contexts are presented, at-issue weak belief and at-issue strong belief.

- (26) At-issue weak belief context, subject:
 - a. I can't believe Mark bought that ugly car. It looks like it's about to fall apart, too. I have a feeling that Leah must have convinced him to buy it.
 - b. This bean dip is fantastic. I really want to get the recipe. I think that maybe Shannon brought it.
 - c. The schedule for the final exams is wrong. The French exam is scheduled at 2 a.m. instead of 2 p.m. I wonder if the secretary made it.
 - d. Amy was up all night cleaning the spare room, and now she's on her way to the airport. I suspect her mom is visiting.
- (27) At-issue weak belief context, object:
 - a. Everyone who interviewed for that job sounded really good. I bet it was a hard decision to make. But I guess they probably ended up hiring Jim.
 - b. Oh look, there are pictures from the party last weekend. Mary sure seems to be having a good time. But I suspect she's just drinking soda.
 - c. Look at John this evening. He's all dressed up and he's even wearing a tie. I think maybe he is going out with Tammy.

- d. Darren sounded really excited about his vacation. I guess he is going to Canada.
- (28) At-issue strong belief context, subject:
 - a. I can't believe Mark bought that ugly car. It looks like it's about to fall apart, too. And it turns out that Leah convinced him to buy it.
 - b. This bean dip is fantastic. I really want to get the recipe. I'm sure that Shannon brought it.
 - c. The schedule for the final exams is wrong. The French exam is scheduled at 2 a.m. instead of 2 p.m. I am sure the secretary made it.
 - d. Amy was up all night cleaning the spare room, and now she's on her way to the airport. It turns out that her mom is visiting.
- (29) At-issue strong belief context, object:
 - a. Everyone who interviewed for that job sounded really good. I bet it was a hard decision to make. It turns out they finally hired Jim.
 - b. Oh look, there are pictures from the party last weekend. Mary sure seems to be having a good time. I know she was just drinking soda, though.
 - c. Look at John this evening. He's all dressed up and he's even wearing a tie. I know he is going out with Tammy.
 - d. Darren sounded really excited about his vacation. I'm sure he's going to Canada.

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Constituent Ordering in Persian and the Weight Factor

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Studies on constituent ordering have pointed out the tendency to postpose heavy constituents. However, head-final languages seem to display the mirror-image tendency. In this paper, we present corpus data on the relative order between the direct object (DO) and the indirect object (IO) in Persian, an SOV language. Our study shows a similar effect in Persian; however, relative length plays a secondary role, since the position of the DO mainly depends on its degree of determination.

Keywords: word order, heaviness, differential object marking (DOM), givenness, Persian

1 Introduction

The "end-weight" principle in constituent-ordering preferences was first proposed by Behaghel (1909) based on observations of German. More recently, several studies, mainly on English, have highlighted the tendency to postpone heavy constituents (e.g. Wasow 1997, Stallings et al. 1998, Arnold et al. 2000). This weight effect is either accounted for in terms of processing or in terms of planning and production. Incremental models of sentence production (e.g. Bock and Levelt 1994, Garrett 1980, Kempen and Harbusch 2003) claim that the ordering of constituents depends on their required processing time. Short simple constituents can be processed and formulated faster and thus become available for production sooner than long and/or complex ones. Since this explanation is grounded in general principles of cognition, it has sometimes been suggested that the "short-before-long" principle is universal. However, investigations on some (strictly) head-final languages have undermined the (inferred) universality of this preference. The opposite tendency has been reported for Japanese (Hawkins 1994, Yamashita and Chang 2001) and Korean (Choi 2007).

Based on extensive data from typologically different languages, Hawkins (1994, 2004) highlights an asymmetry between VO and OV languages. The latter display the mirror-image tendency, placing long constituents before shorter ones. Hawkins proposes a theory of word-order preferences in terms of processing constraints which is sensitive to the direction of the head and consequently correctly predicates the asymmetry between strictly head-initial and head-final languages. Yamashita and Chang (2001, 2006), on the other hand, provide a production-oriented account for the "long-before-short" preference in Japanese. They revisit the availability-based account of ordering preferences in sentence production highlighting the necessity to consider language-specific features.

In this study we investigate the relative order between the direct object (DO) and the indi-

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rect object (IO) in the preverbal domain in Persian. Data from Persian is of special interest for the issue at stake, since Persian is an SOV language, but, contrary to Japanese, it is not strictly head-final. It is largely assumed that in Persian, the position of the direct object depends on its markedness and relative length or heaviness have never been mentioned to be relevant. Meanwhile, no systematic data-driven study on the subject has ever been conducted to support this hypothesis.

The remainder of this paper is organized as follows. In the next section, we present an overview of Persian focusing on properties relevant for this study, and in section 3, the existing hypothesis on the position of direct object. Our corpus study is presented in section 4. We present available accounts of "long-before-short" in OV languages in section 5, and in section 6 our account of the data.

2 An Overview of Persian

2.1 Word Order

Persian exhibits mixed behavior with regards to head-direction. The unmarked (neutral or canonical) word order is uncontroversially SOV. Meanwhile, all phrasal categories (other than the VP), namely, NP, PP, and CP are head-initial, as illustrated by (1). Even the verbal domain is not strictly head-final. Clausal complements are strictly postverbal, as in (2), and goal arguments are systematically postverbal in colloquial speech, as in (3).

- (1) dar in ketāb=e jāleb ke diruz xānd-am in this book=EZ^{1,2} interesting that yesterday read-1sG 'In this interesting book that I read yesterday.'
- (2) (man) goft-am (ke) in ketāb jāleb ast
 (I) said-1sg (that) this book interesting is
 'I said that this book is interesting.'
- (3) (mā) diruz raft-im sinema.
 (we) yesterday went-1PL movies
 'Yesterday, we went to the movies.'

While SOV is the canonical order, all other variations are possible. Although the written language is conservative with regards to the canonical SOV order, the colloquial register exhibits a fair amount of variation. It should be noted, however, that these variations are not all equally frequent and some imply a special prosody. In this study, we only focus on verb-final constructions.

2.2 Persian NPs

As mentioned previously, the relative order of objects in Persian has generally been linked to the differential object marking (DOM) (see section 2.3 below), which in turn is related to definiteness and/or specificity. This section provides an overview of Persian NPs in this respect.

¹Glosses follow the Leipzig Glossing Rules (www.eva.mpg.de/lingua/resources/glossing-rules. php). The following non-standard abbreviations are used for clarity: DOM = differential object marking; EZ = Ezafe; RESTR = Restrictive.

 2 The *Ezafe*, realized as an enclitic, links the head noun to its modifiers and to the possessor NP (see Samvelian 2007).

In formal Persian there is no overt marker for definiteness; only indefiniteness is marked.³ Furthermore, Persian has what Corbett (2000) calls a *general number*, expressed by the singular form. This means that in Persian the number is not specified for a bare singular noun. These properties have some bearings on the readings of NPs. In the remainder of this section, we will discuss the following NP types: bare nouns, bare-modified, indefinite/quantified and definite NPs.

It should be noted that since definiteness is not overtly marked, bare singular nouns, that is, nouns occurring alone in their bare singular form with no (overt) determiner or quantifier, may correspond to two different types of NPs, either a definite and/or an anaphoric NP, as in (4) and (5), or a bare noun, that is, a noun without any determination or quantification. By "bare noun" we only refer to the latter. As we will see in section 2.3, this possibility is excluded in the DO position, where only the bare noun reading is licensed for bare singular nouns.

- (4) xoršid dar āsemān mi-deraxš-ad sun in sky IPFV-shine-3sG 'The sun shines in the sky.'
- (5) gorg zuze mi-kešid wolf howl IPFV-pulled 'The wolf was howling.'

2.2.1 Bare Nouns Bare nouns are non-specified for number and have a nonspecific reading, which can be generic, as in (6), as well as existential (contra Karimi 2003), as in (7).

- (6) gorg yek heyvān=e vahši va darande ast wolf a animal=Ez wild and predator is 'The wolf is a wild and predator animal.'
- Maryam ketāb xarid
 Maryam book bought
 'Maryam bought a book/some books.'

Note that, contrary to Karimi's (2003:96–97) claim, bare nouns can introduce a discourse referent in Persian, which uncontroversially implies that they can receive an existential reading (Karttunen 1976), as illustrated by (8) (see Samvelian 2001 for a detailed discussion).

(8) (man) māšin dār-am vali tormoz=aš xarāb ast
(I) car have-1sg but brake=3sg broken is
'I have a car but its brake is broken.'

2.2.2 Bare-modified Nouns These nouns only differ from bare nouns by the presence of a (re-strictive) modifier, as in (9) and (10), and have the same readings as the latter.

 (9) ketāb=e qadimi nāyāb ast book=ez old rare is 'Old books are rare.'

³There is a suffix in the colloquial register which marks a noun as being discourse-given, which we present briefly when discussing definite NPs, see section 2.2.4.

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 (10) Maryam ketāb=e še'r xarid Maryam book=EZ poetry bought 'Maryam bought a poetry book/some poetry books.'

2.2.3 Indefinite NPs These NPs can have either a specific or a nonspecific existential reading. In the DO position the two readings will be differentiated by DOM (see section 2.3). Contrary to bare nouns, indefinite NPs are always specified for number.

Indefiniteness is overtly marked in Persian. It can be realized by the enclitic =i, as in (11a), by the cardinal $ye(k)^4$ 'one', as in (11b), or by the combination of these two determiners, as in (11c).⁵ It should be noted that these markers are not always interchangeable (see Ghomeshi 2003).

Indefinite NPs are also formed by numerals or other indefinite quantifiers, as in (12). In this case, the noun remains in the singular form, even when the NP denotes more than one entity, and it cannot take =i.

- (11) a. gorg=i zuze mi-kešid wolf=indf howl ipfv-pulled
 - b. yek gorg zuze mi-kešid a wolf howl IPFV-pulled
 - c. yek gorg=i zuze mi-kešid a wolf=INDF howl IPFV-pulled 'A (certain) wolf was howling.'
- (12) čand(=tā)/se(=tā) gorg zuze mi-kešid-and few(=CLF)/three(=CLF) wolf howl IPFV-pulled-3PL 'A few/three wolves were howling.'

2.2.4 Definite NPs Definite NPs can either be formed by different definite determiners, like demonstratives, or by no overt determiner, as in (13). Furthermore, bare plural nouns⁶ generally trigger a definite reading,⁷ as in (14). Note, however, that the plural marking is not incompatible with the indefinite determination =i or *yek*, as in (15) (for a discussion of plural marking and definiteness, see Ghomeshi 2003).

- (i) se=tā ketāb-hā gom šod-and three=clf book-pl lost became-3pl 'The three books were lost.'
- (ii) čand=tā/se=tā az ketāb-hā gom šod-and few=clf/three=clf of book-pl lost became-3pl 'A few/three of the books were lost.'

⁴Pronounced *ye* in colloquial speech. We will use the formal form throughout this article.

⁵The use of the enclitic alone is restricted to the formal language.

⁶Persian disposes of several nominal plural suffixes, among them the suffix $-(h)\bar{a}$ is universal and can systematically be added to any noun to form a plural (for a review of the nominal plural marking see Lazard et al. 2006 and Faghiri 2010, among others).

⁷Note that the combination of a numeral/quantifier and the plural form triggers a definite or a partitive reading, as in (i) and (ii), respectively.

- (13) (in) šiše emruz šekast
 (this) glass today broke
 'This/the glass broke today.'
- (14) šiše-hā emruz šekast-and glass-PL today broke-3PL
 'The (*Some) glasses broke today.'
- (15) yek ketāb-hā=i heyn=e asbābkeši gom šod-and a book-pl=indf during=ez move lost became-3pl 'Some (of the) books get lost during the move.'

It should be noted that colloquial speech displays a definite suffix, realized as -(h)e, which marks a noun as being discourse-given or anaphoric, for example, *gorbe-he* 'the cat'. Since the data used in this study are limited to the written language, where this suffix is not likely to appear, we will not discuss it any further.

2.3 Differential Object Marking

Persian displays differential object marking (DOM),⁸ realized by the enclitic $=r\bar{a}$. Definite and/or specific direct objects are necessarily $r\bar{a}$ -marked.⁹ Consequently, non- $r\bar{a}$ -marked direct objects receive an indefinite nonspecific reading, as in (16). DOM is not incompatible with the indefinite determination, as in (17). An indefinite NP like $ket\bar{a}b=i$ when $r\bar{a}$ -marked will receive a specific reading.

(16)	Maryam ketāb=rā xarid vs. Maryam ketāb xarid
	Maryam book=DOM bought Maryam book bought
	'Maryam bought the book.' vs. 'Maryam bought a book/some books.'
(17)	Maryam ketāb=i=rā xarid
	Maryam book=INDEF=DOM bought

'Maryam bought a (specific) book.'

It should be noted that the use of the enclitic $=r\bar{a}$ is not limited to DOM. $R\bar{a}$ is also used as a topicalizer for other non-subject functions, as illustrated by as in (18). Meanwhile, a more detailed discussion is beyond the scope of the present study (for further discussions see Lazard 1982, Meunier and Samvelian 1997, Dabir-Moghaddam 1992, among others).

 (18) emruz=rā dars mi-xān-am today=DOM lesson IPFV-read-1sG 'As for today, I (will) study.'

Note that $=r\bar{a}$ is a phrasal affix and is placed on the right edge of the NP, as in (19). Meanwhile, when the head noun is modified by a relative clause, $=r\bar{a}$ is either placed on the head noun, as in (20a), or on the right edge of the clause, as in (20b). The norm, however, states that it should be

⁸This designation coined by Bossong (1985) denotes the property of some languages with overt case-marking of direct objects to mark some objects, but not others, depending on semantic and pragmatic features of the object; see also Aissen (2003).

⁹In colloquial speech $= r\bar{a}$ is realized as =(r)o. We use the formal form throughout this paper for the ease of reading and also in coherence with our data, which are extracted from a written corpus.

placed as close to the head as possible. Due to the availability of two positions, double marking marginally happens, as in (20c).

- (19)[ketāb=e dastur=e zabān=e fārsi=ye čāp=e jadid]=**r**ā xarid-am book=ez grammar=ez language=ez Persian=ez edition=ez new=dom bought-1sg 'I bought the last edition of (the book of) the Persian Grammar.'
- [ketāb=i¹⁰=**r**ā (20)ke ru=ye miz bud] xānd-am a. book=RESTR=DOM that on=EZ table was read-1sg
 - b. [ketāb=i ke ru=ye miz bud]=rā xānd-am book=RESTR that on=EZ table was=DOM read-1sg
 - ke ru=ye miz bud]=rā xānd-am [ketāb=i=**r**ā c. book=RESTR=DOM that on=EZ table was=DOM read-1sg 'I read the book that was on the table.'

2.4 Complex Predicates

Persian has a limited number of simplex verbs, around 250, half of which are currently used by the speech community. The verbal lexicon mainly consists of syntactic combinations, called "complex predicates", also known as Compound Verbs or Light Verb Constructions, including a verb and a non-verbal element, for example, a noun, as in bāzi kardan 'to play' (lit. 'play do'), an adjective, as in derāz kešidan 'to lay down' (lit. 'long pull'), a particle, as in bar dāštan 'to take' (lit. 'PARTICLE have'), or a prepositional phrase, as in az dast dādan 'to loose' (lit. 'of hand give'). New "verbal concepts" are regularly coined as complex predicates rather than simplex verbs (see Samvelian 2012, Samvelian and Faghiri 2013, Samvelian and Faghiri 2014, among many others).

Although, Persian complex predicates are multiword expressions and thus display some lexical properties such as lexicalization, they display all properties of syntactic combinations, including some degree of semantic compositionality. Hence, as Samvelian (2001, 2012) extensively argues, it is impossible to establish a clearcut distinction between (prep-)noun-verb complex predicates and "ordinary" object-verb combinations. In other words, the differentiation is better reflected by a continuum from highly lexicalized complex predicates to ordinary complementverb combinations rather than a categorical distinction.

3 The Position of the Direct Object

Several theoretical studies, mainly in the generative framework, have established a link between the position of the direct object and its specificity (e.g. Karimi 2003, Rasekhmahand 2004). Following Karimi's (2003) work in the minimalist framework, two different syntactic positions have generally been assumed for the DO depending on its specificity.¹¹

¹⁰Persian grammars generally establish two distinct determiners =i in Persian. One is the indefinite determiner discussed in section 2.2.3. The other one, which occurs exclusively with restrictive relatives, is analyzed as a 'demonstrative' or 'definite' article (Lazard et al. 2006).

 $^{11}\mathrm{The}$ two positions assumed by Karimi (2003:105) are:

(i) a.

 $\begin{bmatrix} VP & DP_{[+Specific]} [V' & PP & V] \end{bmatrix} \\ \begin{bmatrix} VP & [V' & PP & [V' & DP_{[-Specific]} & V] \end{bmatrix} \end{bmatrix}$ b.

- (21) a. Kimea aqlab barā mā še'r mi-xun-e (Karimi 2003:91-92)
 Kimea often for us poem IPFV-read-3sg
 'It is often the case that Kimea reads poetry for us.'
 - b. Kimea aqlab barā mā ye še'r az Hafez mi-xun-e
 Kimea often for us a poem from Hafez IPFV-read-3sG
 'It is often the case that Kimea reads a poem by Hafez for us.'
 - c. Kimea aqlab hame=ye še'r-ā=ye tāza=š=**ro** barā mā mi-xun-e Kimea often all=Ez poem-PL=Ez new=3sG=DOM for us IPFV-read-3sG 'It is often the case that Kimea reads all her new poems for us.'
 - d. Kimea aqlab ye še'r az Hafez=ro barā mā mi-xun-e
 Kimea often a poem from Hafez=DOM for us IPFV-read-3sg
 'It is often the case that Kimea reads a (particular) poem by Hafez for us.'

In a neutral word order, nonspecific DOs are adjacent to the verb, as in (21a) and (21b), while specific DOs precede the indirect object, as in (21c) and (21d). Since specificity triggers $r\bar{a}$ -marking, this means that unmarked DOs occur adjacent to the verb while marked DOs do not. Hereafter, we refer to this hypothesis as the *DOM criterion*.

(22) The DOM Criterion

In a neutral word order, $r\bar{a}$ -marked DOs occur separated from the verb while unmarked DOs occur adjacent to the verb.

Furthermore, it is assumed that a nonspecific DO can be separated from the verb, that is, can undergo scrambling, only if it has a contrastive focus. The scrambling of specific objects, on the other hand, is less constrained, since they can additionally be topicalized.¹²

Grammarians have also formulated generalizations about the canonical position of the DO, which are mostly in accordance with the DOM criterion. However, some additionally establish a distinction between unmarked DOs, depending upon the presence of the indefinite determiner *-i*. Givi Ahmadi and Anvari (1995:305), for instance, state that $r\bar{a}$ -marked DOs should precede the IO, unmarked DOs should follow the IO, and *i*-marked (non $r\bar{a}$ -marked) DOs can either follow or precede the IO, as in (23).

(23)	a.	Yusef ketāb=rā be ketābxāne dād
		Yusef book=dom to library gave
		'Yusef gave the book to the library.'
	b.	Yusef az ketābxāne ketāb gereft
		Yusef from library book took
		'Yusef took a book/some books from the library.'
	c.	Yusef ketāb=i az ketābxāne gereft <i>or</i> Yusef az ketābxāne ketāb=i gereft
		Yusef book=INDEF from library took
		'Yusef took a book from the library.'

It should be noted that these hypotheses remain theoretical and, to our knowledge, no systematic empirical verifications have ever been conducted. We have conducted a corpus-based study to investigate their validity and to study the factors that determine the preferential word

¹²Karimi (2003:106–111) assumes that discourse functions trigger movement in Persian and the landing site of a scrambled object is the specifier of a functional head, such as Topic or Focus.

order in ditransitive constructions in line with Arnold et al. 2000, Wasow 2002, Bresnan et al. 2007.

The focus of our study is the relative order between the DO and the IO in the preverbal domain. The data we use are extracted from a corpus compiled out of daily newspaper articles and thus are essentially of a formal register, where the word order variations are expected to be limited and the canonical SOV order to be dominant. ¹³

4 Corpus Data

Our study is conducted on the Bijankhan corpus, a corpus collected from daily news and common texts, in particular, the newspaper *Hamshahri*, of about 2.6 million tokens, manually tagged for part-of-speech information. The corpus was created in 2005 by the DataBase Research Group at the University of Tehran and can be freely downloaded from their website.¹⁴

4.1 Constitution of the Dataset

The Bijankhan corpus does not contain any syntactic annotation, nor is it lemmatized or delimited for sentences. Our first step was to lemmatize the corpus¹⁵ and to delimit finite clauses on the basis of the conjugated verbs.¹⁶ In total, 185,015 finite verbs were lemmatized, representing 322 verb types, since we considered *Particle-Verb* complex predicates as *bar-dāštan* 'to take' (see section 2.4) as a distinct verb type from the simplex verb. The number of simplex lemmas is 228.

We selected the potentially ditransitive verbs in order to isolate the potentially ditransitive sentences: 122 verb types, corresponding to 42,550 tokens out of which we extracted a random sample of 2000 tokens. We then manually identified the relevant sentences, that is, sentences matching either of the following patterns: NP PP V or PP NP V. We did not take into consideration the preceding constituents of the sentence. This dataset, *Dataset1*, contains 541 sentences formed with 82 verb types. Following Samvelian's (2012) argumentation against a clearcut distinction between complex predicates and ordinary complement-verb combinations, we did not aim to exclude complex predicates from our dataset. Consequently, our dataset contains a number of lexicalized complex predicates, e.g. *qarār gereftan* 'to be installed' (lit. 'installation take').

First, we annotated the DO for two properties, markedness and bareness: a) Markedness, to test the DOM criterion; b) Bareness, since bare objects correspond to the opposite extremity on the scale of specificity and/or definiteness compared to marked objects. Furthermore, they tend to form a semantic predicate with the verb. The distribution of the relative order with respect to these two variables is given in Table 1.

We observe that the data are globally consistent with the DOM criterion, as seen in Table 2. Marked DOs tend to be separated from the verb: 248 over 258 tokens are in DO-IO order. Unmarked DOs, that is, BARE and OTHER, tend to be adjacent to the verb: 74 over 283 tokens are in IO-DO order. However, marked DOs have a very consistent behavior compared to unmarked

¹⁴http://ece.ut.ac.ir/dbrg/bijankhan/

¹⁵Given the limited number of Persian simplex verbs, we developed a dictionary-based lemmatizer. It should be noted that some finite verbs of the corpus remained unrecognized due mainly to tagging errors and orthographic anomalies. We ignored these verbs.

¹⁶Periphrastic verbal forms, that is, conjugations involving auxiliaries, were considered as single finite verbs.

 $^{^{13}}$ The postverbal realization of the IO, an ordering possibility prevailing in colloquial speech but expected to be limited in the written language (see section 2.1), is thus excluded by this methodological choice. To give an estimation, among all occurrences of the verbs *rixtan* 'to pour' and *ferestādan* 'to send' in the corpus, 254 and 219 respectively, there are only 8 cases where the IO is realized postverbally.

		DO		
	Marked	Bare	Other	Total
DO-IO-V	248	27	47	322
IO-DO-V	10	183	26	219
Total	258	210	73	541

 Table 1

 Distribution of word order by markedness and bareness in Dataset1

Table 2

Contingency table for DOM and word order

	DO			
	Marked		Un	marked
DO-IO-V	248	(96.12%)	74	(26.15%)
IO-DO-V	10 (3.88%)		209	(73.85%)

DOs, which show more versatility. 96% of marked DOs precede the IO, while 74% of unmarked DOs follow the IO.

A closer look at unmarked DOs reveals an inconsistency between bare nouns and unmarked non-bare DOs (labeled OTHER in Table 1). 87% of the former follow the IO while 64% of the latter precede the IO. To summarize, on the one hand, marked and bare objects not only verify the DOM criterion but also show only a slight variation. On the other hand, unmarked non-bare objects present a more significant amount of variation and more importantly, their preferred position goes against the DOM criterion.

With this observation, we felt the necessity for a more fine-tuned classification of unmarked non-bare DOs. We defined two classes on the basis of the degree of determination of the NP (see section 2.2). We separated determined NPs, that is, quantified or indefinite NPs, from non-determined NPs, that is, bare-modified NPs. Recall that the latter only differ from bare nouns by the presence of a modifier. Consequently, we end up with four DO types: BARE, BARE-MODIFIED, INDEFINITE (unmarked indefinite to be more precise), and MARKED.

The distribution of the relative order with regards to DO type is given in Table 3. The new classification provides some insights into the unbalanced variation observed with DOM. Indeed, the three types of unmarked DOs do not behave similarly. Interestingly, indefinite DOs seem to group with marked DOs, contrary to what is expected from the DOM criterion. Meanwhile, the preferred position of bare-modified DOs remains unclear and our dataset appears to be inconclusive. Nevertheless, it is clear that the DO type and relative order are strongly related (χ^2 =348.7374, df = 3, p-value < 2.2e-16). Hence, the DO type is a relevant variable and probably a better predictor than the DOM criterion, since it captures more variation.

To remedy to this insufficiency, we enlarged our dataset. Given our first experience of token

		DO-type		
	Bare	Bare-modified	Indefinite	Marked
DO-IO-V	27	11	36	248
IO-DO-V	183	11	15	10
Total	210	22	51	258

Table 3Distribution of word order by DO-type in Dataset1

				DC)-type				
		Bare	Bar	e-modified	Ir	ndefinite	1	Marked	Total
DO-IO-V	43	(0.158 ***)	22	(0.333 **)	111	(0.770 ***)	403	(0.950 ***)	579
IO-DO-V	228		44		33		21		326
Total	271		66		144		424		905
Significance codes for p-values obtained by the χ^2 test: 0 '***' 0.001 '**'									

Table 4
Distribution of word order by DO-type in Dataset2

identification (rate of 541/2000), we decided to modify our sampling method. We considered all occurrences of two typically ditransitive low frequency verbs of the corpus, *rixtan* 'to pour' and *ferestādan* 'to send' (219 and 254 tokens, respectively), and a random sample out of all occurrences of two high frequency typically ditransitive verbs, *gereftan* 'to give' and $d\bar{a}dan$ 'to take' (10494 and 6849 tokens, respectively). This dataset (*Dataset2* hereafter) contains 905 tokens. The distribution of the relative order and the DO type is given in Table 4.

The new dataset confirms our observations concerning marked, bare, and indefinite DOs. Moreover, we can track down a preferential position for bare-modified DOs, which group with bare DOs, in conformity with the DOM criterion. Our data are particularly interesting for indefinite DOs, since their preferential position goes against the received hypothesis, the DOM criterion, according to which these DOs should group with bare nouns and bare-modified DOs, rather than *rā*-marked DOs. In *Dataset2* the DO type provides an accuracy of 86.8%, as against 78% for the DOM criterion.

4.2 Multifactorial Analysis

Our data reveal two different preferential orders for the IO and the DO in the preverbal domain, depending on the degree of determination of the DO. The DO type is indeed a very efficient predictor for the relative order between the DO and the IO; however, it leaves some variation unexplained. Given that studies on word order preferences on other languages have singled out factors such as heaviness, collocationality and lexical bias, we annotated *Dataset2* for these variables and performed mixed-effect logistic regression modeling (Agresti 2007) in order to study the effect of these variables independently and in interaction with each other.¹⁷ Moreover, likelihood ratio tests were used to assess main effects and interactions and their contribution to the fit. In the remainder of this section, we will focus on the effect of the above-mentioned factors, heaviness in particular, without discussing the technical details of the modeling more than necessary.

 $^{^{17}}$ Logistic regression allows for the modeling of a categorical variable – in our case the binomial variable OR-DER{DO-IO,IO-DO} - with a combination of categorical and continuous variables without any assumption about the distribution of the data. The *logit* transformation returns a value in the range of 0 and 1, which models the probability of the success scenario, in our case ORDER=DO-IO. It predicts ORDER=DO-IO, if the return value is bigger than 0.5, and ORDER=IO-DO otherwise. When the model returns 0, the return value of the *logit* transformation, that is, the probability of the success scenario, would be 0.5, which means no prediction is possible; likewise, negative return values correspond to failure and positive ones to success. In other words, positive coefficients vote for ORDER=DO-IO and negative ones for the inverse. The bigger the absolute value, the stronger the probability for either one. Wald tests are used to obtain p-values for individual coefficients.

4.2.1 Lexical Bias It has been shown that in preferential constituent ordering, the verb may exhibit a bias towards one order rather than the other (Wasow 1997, Stallings et al. 1998). Thus, verbal lemmas can be a source of variation in the preferential order and this is the case in our data as well. This variation is commonly dealt with using mixed models (e.g. Bresnan et al. 2007), which have the advantage of capturing the variation due to non-predicting variables, that is, random effects, in order to allow better estimates for the predictors, that is, fixed effects. Accordingly, we have included verbal lemmas as a random intercept. ¹⁸

4.2.2 Collocationality Studies on word-order variations have pointed out that semantic connectedness can influence the ordering of constituents (e.g. Wasow 1997, Hawkins 2001). Constituents semantically connected to the verb, that is, constituents whose interpretation depends on the verb, tend to occur adjacent to it. In particular, Wasow (2002, 1997) provides corpus evidence on heavy-NP shift in English, showing that constituent ordering and semantic connectedness are correlated. The more the V-PP combination is semantically connected the more it is likely to appear adjacent and trigger the NP shift.¹⁹ For Persian, semantic connectedness seems even more relevant, given the productivity of complex predicates, that is, syntactic combinations displaying a high degree of collocationality.

Both the IO and the DO can have a collocational relation with the verb and while this collocational relation does not necessarily imply adjacency, the prototypical pattern for a lexicalized complex predicate is either N-V, as in *qarār gereftan* 'to be installed' (lit. 'establishment take'), or P-N-V, as in *be kār bordan* 'to use' (lit. 'to work take'). As mentioned earlier, there are no formal criteria to systematically differentiate complex predicates from ordinary complementverb combinations. Furthermore, there is no exhaustive list of (lexicalized) complex predicates available (Samvelian and Faghiri 2013, 2014). Hence, annotating the data for collocationality is not straightforward. A manual annotation based on native speakers' intuition would not only be subjective but also hardly independent of the word order. Consequently, we opted for an automatically annotated measure based on the frequency of the sequence N-V or P-N-V in the whole corpus (185k verbs). We operationalized this measure by a categorical variable, COLL-MES, with three levels depending on the frequency, NP-COLL, PP-COLL and NONE.²⁰ This variable has the advantage of being independent of annotators' judgments, but it has the disadvantage of being "blind", hence approximate and corpus-dependent.

COLL-MES turned out to be significant (p-value < 0.001 for COLL-MES=NP-COLL) with the expected effect, that is, favoring the IO-DO order when the sequence N-V is coded as collocational. However, COLL-MES and DO-TYPE are highly related (χ^2 = 397.8262, df = 6, p-value < 2.2e-16) in

¹⁸An anonymous reviewer suggested that we group these verbs semantically and examine whether these classes correlate with the word order. Even though we did not classify verbal lemmas, we annotated the data for the preposition lemma, which reflects a semantic classification to some extent, and did not find a significant correlation. Note that this is indeed an important clue for the study of ordering preferences in the postverbal domain, which we will undertake in future studies.

¹⁹Wasow classifies V-PP combinations on the basis of their degree of collocationality and idiomaticity into the three following classes: non-collocations, semantically transparent collocations and semantically opaque collocations, that is, idioms, and observes that the rate of the NP shift, 26 %, 47%, and 60% respectively, increases with the degree of semantic connectedness.

²⁰It should be noted that we tried different ways to operationalize this measure. The frequency as a continuous variable, a categorical variable with six levels (NPH, NPL, PPH, PPL and NONE), a categorical variable with three levels (NPH, NPL and NONE) and another one with (PPH, PPL and NONE). We opted for COLL-MES because it had a better performance on the data compared to the others.





our data and when we consider their interaction in the model, the significant effect of COLL-MES disappears. Moreover, this variable does not help to capture the variation in the data beyond the DO type. In other words, non-canonical orders, that is, where the order does not conform to the preferred order predicted by the DO type, cannot be explained by COLL-MES. More precisely, in the case of BARE and BARE-MODIFIED types, where 65 (out of 337) tokens do not follow the predicted IO-DO order, only 6, that is, less than 10%, are coded as PP-COLL. Likewise, in the case of MARKED and INDEFINITE types, where 54 (out of 514) tokens do not follow the predicted DO-IO order, only 3, that is, 5.5%, are coded as NP-COLL. Consequently, the significant effect of this variable in our data seems to be an illustration of the fact that bare objects tend strongly to participate in the formation of complex predicates rather than that of providing an explanation for the relative order.

4.2.3 Heaviness Heaviness is one of the most frequently evoked factors in studies on constituentordering preferences in other languages. Yet, to our knowledge, it has not been investigated for Persian. As mentioned earlier, in head-initial languages, e.g. English (Wasow 2002) and French (Thuilier 2012), heaviness is shown to have an effect corresponding to the "short-before-long" tendency. In head-final languages, e.g. Japanese (Hawkins 1994, Yamashita and Chang 2001) and Korean (Choi 2007), the mirror-image effect is observed. Like Japanese and Korean, Persian is an SOV language, hence the "long-before-short" tendency would be expected.

In line with Wasow (1997, 2002), we operationalized the weight factor in terms of the relative length between the DO and the IO in number of words. First of all, we observe that the relative length is not relevant for all DO types and its influence on word order varies from one type to another. Relative length is irrelevant for bare DOs, given that it is by definition negative in this case.²¹ As for the marked DOs, more than 95% of them are in the DO-IO order and, as illustrated by Figure 1, the data show no significant bias with respect to the relative length.

Focusing on indefinite and bare-modified DOs, however, it appears that the order is influenced by relative length. As illustrated by Figure 2, longer IOs are more likely to precede the

²¹Given that the NP in the IO can have an enclitic realization, the IO can consist of only one (phonological) word. Hence, 0 is also a possible value for this variable. We only had two such cases in the whole dataset; and they followed the IO-DO order.



Figure 2 Distribution of word order and relative length for indefinite and bare-modified DOs

DO. More precisely, in the case of indefinite DOs the shift from the (preferred) DO-IO order is reinforced when the IO is longer than the DO. In the case of bare-modified DOs, the general preference for the IO-DO order is reinforced when the IO is longer than the DO.

Given these observations, we built a model with only a subset of the data, that is, excluding bare nouns and marked DOs, with DO-TYPE and REL-LEN²² as main effects²³ and VERB as a random intercept. The model is summarized in Table 5, where success corresponds to OR-DER=DO-IO.

As expected, DO-TYPE has a significant effect: BARE-MODIFIED favors the IO-DO order and INDEFINITE the inverse. Interestingly, REL-LEN turned out also to have a significant effect with a positive coefficient, favoring the DO-IO order, when the DO is longer than the IO and the inverse, when the IO is longer than the DO. Thus, the effect of the relative length corresponds to the "long-before-short" tendency.

5 Long-before-short Tendency in OV Languages

Availability-based production accounts of word-order preferences suggest the universality of the "short-before-long" principle. According to these accounts, which are almost exclusively underpinned by studies on Germanic languages, short simple constituents can be processed and formulated faster than long ones and thus become available for production sooner. Hence, the "long-before-short" tendency observed in OV languages challenges this widely accepted view of sentence production.²⁴

Building on extensive corpus studies from typologically different languages, Hawkins (1994, 2004) proposes a theory of word-order preferences based on the human parsing mechanism, which predicts opposite tendencies for VO and OV languages. Specifically, he postulates a

 $^{^{22}}We$ used the logarithmic transformation to minimize the effect of outliers. The exact value of Rel-len is $log(DO_{Nb-of-words})-log(IO_{Nb-of-words}).$

²³The maximal model also included coll-меs which was eliminated because it did not have a significant effect (p-values > 0.99).

²⁴See Jaeger and Norcliffe (2009) for a discussion.

Summary of results	Summary of results of mixed-effect model for Order					
Random effects:						
	Groups	Name	Variance	Std. Dev.		
	VERB	(Intercept)	0.2245	0.4738		
	Number o	f obs: 210, gro	oups: verb,	31		
Fixed effects:						
	Estimate	Std. Error	z value	Pr(> z)		
(Intercept)	1.5933	0.2947	5.406	6.45e-08	**:	
DO=BARE-MOD	-2.0397	0.3485	-5.852	4.85e-09	**:	
REL-LEN	0.8435	0.2609	3.233	0.00122	**	

Table 5	
Summary of results of mixed-effect model for ORI	DER

distance-minimizing dependency-based principle, the *Early Immediate Constituent* (EIC), according to which, other things being equal, the parser prefers a word order that allows the listener to recognize the phrase and its immediate constituents in the quickest possible manner. This principle is sensitive to the direction of the head. In a head-initial language like English, shifting a heavy NP to follow the PP allows the two constituents of the VP to be recognized more quickly, as illustrated by (24). All the words in the NP need to be processed before the PP is identified. Hence, in the case of a heavy NP, that is, when the NP is longer than the PP, reversing the order allows the identification of the two constituents by processing a smaller number of words. Likewise, in a head-final language like Japanese, the mirror-image shift minimizes the distance between the heads of the two constituents of the VP and allows them to be recognized more quickly than in the reverse ordering. However, in the case of a mixed headdirection language like Persian, EIC does not provide an adequate prediction. For instance, EIC does not provide any predictions for the preferred ordering of the IO and the DO when the DO is an indefinite NP, since in both orderings, as illustrated by (25b) and (25c), the same number of words must be processed in order to recognize the VP.

a.	I [$_{\rm VP}$ introduced [$_{\rm NP}$ some friends that John had brought] [$_{\rm PP}$ to Mary]]
	1 2 3 4 5 6 7 8
b.	I [$_{\rm VP}$ introduced [$_{\rm PP}$ to Mary] [$_{\rm NP}$ some friends that John had brought]]
	1 2 3 4
a.	Yusef yek ketāb=e āmuzeš=e akkāsi az ketābxāne gereft
	Yusef a book=Ez teaching=Ez photography from library took
	'Yusef borrowed a photography tutorial book from the library.'
b.	Yusef [_{VP} [_{NP} yek ketāb=e āmuzeš=e akkāsi] [_{PP} az ketābxāne] gereft]
	1 2 3 4 5 6 7
c.	Yusef [_{VP} [_{PP} az ketābxāne] [_{NP} yek ketāb=e āmuzeš=e akkāsi] gereft]
	1 2 3 4 5 6 7
	a. b. a. b. c.

Despite the fact that the EIC principle correctly predicts the "long-before-short" preference in Japanese, Yamashita and Chang (2001, 2006) feel the need for a production-oriented account in the framework of the theory of grammatical coding (Bock and Levelt 1994, Garrett 1980) that could explain these seemingly contradictory tendencies. For these authors, acknowledging language-specific differences in sentence production is the key to a uniform account of wordorder preferences. Since word-order preferences can be influenced by both conceptual and form-

related factors (Bock 1982), the sensitivity of a production system to these factors can be viewed as language-specific.

According to Yamashita and Chang (2001, 2006) the production system of Japanese, contrary to English, is more sensitive to conceptual factors than to form-related ones. This is because Japanese (and Persian for that matter) is a far less "rigid" language than English.²⁵ Moreover, in English Heavy-NP shift happens in the postverbal domain, where it is shown that the verb exerts strong influence, contrary to the preverbal domain (Stallings et al. 1998). These syntactic constraints presumably increase the effect of form-related factors over more conceptual ones. Longer constituents have competing properties. On the one hand, from a formal point of view, they are slower to process, therefore less accessible. On the other hand, they contain more lexical items, which makes them richer in meaning and more salient and hence more accessible from a conceptual point of view. Consequently, in Japanese, more sensitive to conceptual factors, placing long constituents before shorter ones is favored, while in English, more sensitive to form-related factors, placing short constituents before longer ones is favored.

6 Discussion

6.1 The DOM Criterion Revisited

According to our data, the preferential position of the DO is adjacent to the verb for bare nouns and bare-modified DOs and separated from the verb for marked and indefinite DOs. The degree of variation that each DO-type presents varies. Marked and bare nouns DOs behave in a very consistent manner and present a small (arbitrary or stylistic) variation, while indefinite and bare-modified DOs present a considerable amount of variation. In the light of these observations, it seems appropriate to revisit the DOM criterion. Indeed, it appears that subordinating the position of the DO to its degree of determination provides an account closer to reality than an account based on markedness only. Note that variation in the strength of these preferences can also be explained.

The more a DO is determined, that is, the more (discourse) accessible a DO, the more it is likely to be placed leftward in the sentence and separated from the verb. And the less a DO is determined, that is, the less (discourse) accessible a DO, the more likely it is to be placed adjacent to the verb. Put this way, it is plausible for DOs located in the middle of the hierarchy to show more variability than the ones located in the two extremities.

6.2 Relative Length

The data examined in this study show that despite its significant effect in the relative order of the DO and IO, relative length is of secondary importance in Persian, since relative order mainly depends on the type of the DO:

- 1. The position of $r\bar{a}$ -marked and bare DOs is totally independent of relative length;
- 2. Relative length has a significant effect on the ordering of indefinite and bare-modified DOs, conforming to the "long-before-short" tendency observed in OV languages.

Persian is very similar to Japanese with respect to the properties singled out by Yamashita and Chang (2001, 2006). Like Japanese and contrary to English, it displays a relatively free word

²⁵Japanese has a fairly free word order and allows null pronouns. English, in contrast, has a fairly strict word order that requires all arguments to be overtly present (Yamashita and Chang 2001:54).

order and does not require all arguments to be overtly realized. Moreover, the ordering preferences under study take place in the preverbal domain. Following Yamashita and Chang (2001, 2006), we attribute the "long-before-short" tendency to the sensitivity of the preverbal domain in Persian to conceptual factors rather than to form-related ones. We assume that longer constituents are lexically richer and hence more salient.

We note that the "long-before-short" tendency can be integrated in the continuum established previously on the basis of the degree of determination of the DO, given that relative length plays a significant role for the DOs located in the middle of the hierarchy. In the case of these DOs, lexical richness contributes to the accessibility of the DO and hence a relatively more salient DO would be located higher in the continuum and therefore is more likely to be separated from the verb, whereas at the two extremities of the continuum, that is, marked and bare DOs, the nature of the DO determines its preferred position regardless of relative length.

6.3 Information Structure

Another highly discussed factor, influencing ordering preferences, alongside heaviness, is givenness (or newness) in discourse, that is, the information status (see Gundel 1988, Arnold et al. 2000, Bresnan et al. 2007). Although the study of the information structure suffers from some inconsistencies in terminology and analysis (see Gundel 1988, Lambrecht 1996, Ward and Prince 1991), the effect of givenness corresponding to the "given-before-new" principle seems uncontroversial, especially since it is consistent with accessibility-based production models.

At this stage of the study, we have not annotated the data for the information status of the DO or the IO and consequently have not been able to study the effect of the relative givenness on the word order. Nevertheless, we can discuss this factor to some extent on the basis of the referential givenness²⁶ of the DO. We observe that the continuum established based on the degree of determination of the DO conforms to the *Givenness Hierarchy* (Gundel et al. 1993).²⁷ Indeed, for NPs in the DO position in Persian, we can assume that *ra*-markedness corresponds to the highest degree of (referential) givenness, and bareness to the lowest degree of givenness. Consequently, given the continuum from the very strong preference of marked DOs to be separated from the verb to the very strong preference of bare DOs for adjacency, we observe that the preferred position of the DO is consistent with the "given-before-new" principle.

7 Conclusion

In this paper, we have presented corpus data on the relative order between the DO and the IO in Persian, which support the "long-before-short" tendency observed in other OV languages like Japanese and Korean. Yet, given that Persian, contrary to the latter, has a mixed head-direction behavior, Hawkins's (1994) EIC principle does not provide the expected prediction. On the contrary, Yamashita and Chang's (2001) production-oriented account is grounded in properties shared by Japanese and Persian. Consequently, in line with Yamashita and Chang (2001), we attribute this to the fact that the extra lexical material in longer constituents makes

²⁶Gundel (1988) proposes two distinct and logically independent senses of givenness-newness: referential givenness and relational givenness. Relational givenness is about the partition of the semantic/pragmatic representation of the sentence into topic and focus. Referential givenness describes the relationship between a linguistic expression and a corresponding non-linguistic entity in the speaker's/hearer's mind.

²⁷Gundel et al. (1993) define the (referential) *Givenness Hierarchy* with six cognitive statuses in the following increasing order: Type identifiable, Referential, Uniquely identifiable, Familiar, Activated and In focus.

them conceptually more accessible and that ordering preferences in Persian, like in Japanese, are more sensitive to conceptual factors than to form-related ones.

Furthermore, in Persian, relative length is only of secondary importance, since the position of the DO mainly depends on its degree of determination. The more a DO is determined the more it is likely to be separated from the verb. We can trace a continuum from the $r\bar{a}$ -marked DOs to bare DOs which conforms to the Givenness Hierarchy and supports the "given-before-new" principle.

We are currently undertaking a series of controlled experiments to verify the results of our corpus study with respect to relative length and to further investigate the role of the information structure.

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The Chameleon-like Nature of Evaluative Adjectives

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This is is an experimental study of the semantics of the construction *NP* was (not) *Adj* to *VP* where *Adj* is an evaluative adjective such as *stupid*. We show that in the simple past tense this construction is predominantly FACTIVE for most people but IMPLICATIVE for some. We also demonstrate that the interpretations are sensitive to preconceptions about how suitable the adjective is as a characterization of the event described by the infinitival clause. This CONSO-NANCE/DISSONANCE effect gives the construction its chameleon-like characteristics.

Keywords: evaluative adjectives, presupposition, entailment, factive, implicative, variation, Amazon Mechanical Turk, crowdsourcing

1 Introduction

What an expression of a language implies is intimately related to what it means and also to what information speakers use it to convey. This paper studies implications communicated by uses of certain expressions, to investigate what these expressions mean. Concretely, we concentrate on implications of certain predicative adjectives, focusing on implications about the infinitival clauses in sentences such as (1).

(1) The Raiders were stupid to draft Russell.

The semantics and the syntax of this construction have been studied in some detail by Norrick (1978), Stowell (1991), Barker (2002), Hacquard (2005), Oshima (2009), Kertz (2010), Landau (2010), and Fábregas et al. (2012). These studies all treat evaluative adjectives as factive in this construction, presupposing (and hence implying) in sentence (1) that the Raiders drafted Russell. Although the corresponding negative constructions are rarely mentioned, implicitly these studies hold that (2) also presupposes that the Raiders drafted Russell.

(2) The Raiders weren't stupid to draft Russell.

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Empirical Issues in Syntax and Semantics 10, ed. Christopher Piñón, 233–250 http://www.cssp.cnrs.fr/eiss10/ © 2014 Lauri Karttunen, Stanley Peters, Annie Zaenen, and Cleo Condoravdi 233 These two sentences are each taken to have a further implication: (1) implying (3a), and (2) implying (3b).

- (3) a. The Raiders drafting Russell was stupid.
 - b. The Raiders drafting Russell was not stupid.

The intuitions backing this traditional analysis can be summarized as in Table 1.

Table 1	
Sentence	Factive
NP was Adj to VP	NP VPed
	NP VPing was Adj
NP wasn't Adj to VP	NP VPed
	NP VPing wasn't Adj

T.1.1. 4

The implication that *NP VPed*, being shared by the affirmative and the negative sentence, is the obvious candidate for what the two sentences presuppose on this analysis. Moreover, what differs between the affirmative and the negative sentences' implications is whether *NP VPing* was or wasn't *Adj*. This makes the proposition that *NP VPing was*

Adj the obvious candidate for what the affirmative sentence asserts and the negative sentence denies. Indeed, that sums up the traditional analysis of what these sentences mean.

When one looks at the WWW to examine this construction's usage, however, the picture appears to be more complicated. Affirmative examples do seem to uniformly imply that the event mentioned in the infinitival clause happened. But cases with a negated matrix clause present a distinctly mixed picture. On the one hand, numerous negative examples like those in (4) follow the factive pattern just described.

- (4) a. Mandela was not fortunate to meet all of these people but rather they were fortunate to meet Mandela.
 - b. Piers Morgan was not brave to take on Brett Lee: he was idiotic and he was lucky that he did not get seriously hurt, says Peter Miller on Cricket Stats.
 - c. On July 1, 1776, Jefferson presented his Declaration of Independence while Dickinson continued to rally that it wasn't quite time. And when you think about it, he wasn't stupid to think so. Great Britain had the largest, strongest Navy in the world and, at the time, were squatting right outside the Island of Manhattan, poised to attack.

On the other hand, there are many examples that conflict with the factive pattern, such as those in (5).

- (5) a. I wasn't fortunate to live extremely close to my Mom and Dad for most of my adult life. The closest was when I was in Denver and they were in Garden City, KS.
 - b. This is my first trip to Italy, so I was not brave to venture out alone.
 - c. Now I knew someone was in the junkyard and the cold wind was carrying the cries. I wasn't stupid to go stumbling through the junkyard in the dark and get hurt.

In these examples, the text surrounding the adjective's clause makes it clear that the writer means to imply that the event mentioned in the VP did *not* take place. The negated adjective characterizes a possible event that did not happen: not stumbling through the junkyard was not stupid. Such examples are hardly rare; these three come from the first two pages of a web search on *wasn't Adj to*. We have found, though, that some readers feel such examples are not fully acceptable—that their authors must have intended the adjective to be followed by *enough*. We

take up this reaction in due course. The pattern of implications from this usage is summarized in Table 2.

None of the tabulated implications of this usage are common to affirmative and negative sentences. Nevertheless, this use of the construction does seem to have a presupposition: that the affirmative sentence is true if and only if *NP VPed*, and the negative sentence is true if and only if *NP didn't VP*. This biconditional presupposition could also be formulated along the lines of (6).

Table 2	
Sentence	Implicative
NP was Adj to VP	NP VPed NP VPing was Adj
NP wasn't Adj to VP	NP didn't VP NP not VPing wasn't Adj

(6) For NP to VP would be Adj and for NP not to VP would not be Adj.

All examples we have found attesting to this pattern contain an evaluative adjective, like *stupid*, *brave*, and *fortunate*, as opposed to emotive adjectives such as *glad*, *sad*, or *annoyed*.¹

Our discussion of implicative interpretations here and for the remainder of this paper pertains specifically to the *NP was (not) Adj to VP* construction with evaluative adjectives. For conciseness we sometimes refer in what follows to interpretations such as those in (4) as **F** interpretations and those in (5) as **I** interpretations. The ENTENTEN-2.0 corpus (Lexical Computing Ltd 2012) contains a similar mix of examples of *NP was not Adj to VP*, some, such as (7), having the **F** interpretation and others, such as (8), the **I** interpretation.

- (7) a. I am not saying that I was not stupid to have trusted someone because they were family but it doesn't mean that they should get away with it.
 - b. But what would have happened if she was not fortunate to be married to Joe?
- (8) a. Srinivasan has said that his telephone was hacked into and that he was not stupid to send such derogatory messages.
 - b. I was not fortunate to be born with long and beautiful eyelashes like many women.

The **F** and the **I** interpretation of a negative sentence both imply that something happened. Both also imply that what happened was not *Adj*. The pivotal difference between the interpretations is *what* they imply happened: **F** that *NP VPed* and **I** that *NP did not VP*. Of the first 60 examples of *NP be not stupid to VP* in the ENTEN-2.0 corpus, approximately two fifths are type **F** uses, another two fifths are type **I**, and one fifth could be taken either way.

¹To avert potential misunderstandings, we note that the construction exemplified by

(i) It was stupid of John to wash the car.

seems to differ in its range of usage from the similar seeming construction of (ii), which this paper focuses on.(ii) John was stupid to wash the car.

Although Stower (1991) suggests that (i) is syntactically derived from (ii), we have not found on the WWW any negative contained of the form It use not A di of NR to IR taking the second implicative time of intermetation that

negative sentences of the form *It was not Adj of NP to VP* taking the second, implicative type of interpretation that the negative *NP was not Adj to VP* sometimes has. In every clear case we have found, the construction with *of NP* is intended to have the factive interpretation. For example:

- (iii) a. It was not stupid of you to love someone. It was stupid of that person not to receive your love.
 - b. It was not brave of me to start this blog.

2 Interpreting Apparently Conflicting Data

How ought conflicting observations as are found in this construction to be treated? Possible responses include the following:

- 1. Treat examples like those in (4) and (7) as the only normative uses of the language in question, and regard apparent counterexamples, like those in (5) and (8), as aberrant.
- 2. Offer an explanation of the communicative success of cases like those in (5) and (8), while treating only the examples in (4) and (7) as normative uses of the language in question.
- 3. Treat cases like those in (4) and (7) as exemplifying one normative use of the language, and cases like those in (5) and (8) as exemplifying another normative use of the language.

Put differently, how can one determine what the scientifically appropriate response to a particular conflict is? Are apparent counterexamples to a linguistic generalization misuses of the language, comprehensible errors on the part of their producers, evidence of an alternative linguistically legitimated use, or possibly something else? The first response does not seem to meet the standard of scientific responsibility in this instance, although simple errors of usage do sometimes occur through ignorance or inadvertence.

The second response, on the other hand, is prima facie plausible. Some English speakers do feel the sentences in (5) and (8) deviate from their language's norms but not so far that the author's intent gets obscured by his sloppiness in usage. Distinguishing between an intelligible abuse of a language and a different speaker's fully normative use can be a complex problem. This paper deals with it by means we now begin to describe.

Our approach employs experimental methods to decide between the three approaches above for the case of evaluative adjectives in the construction under study here. In section 3 we formulate three hypotheses regarding the normative status in English of **F** and **I** uses and spell out a way to test them in section 4. In sections 5, 6, and 7, we present our analysis of the results and argue that, while response 2 above may at times be the correct one, evidence strongly favors response 3 regarding observed uses of the construction under study having the **I** pattern of implications.

Closer examination of the **I** type examples in (5) and (8) reveals that for many, the writer seems predisposed to believe that *for NP to VP* would be *Adj*. Sincere assertion of a negative first-person statement to express its **I** interpretation commits the writer to this belief. For example, (5c) could only be claimed by a writer who believed that for him to go stumbling through the junkyard in the dark and get hurt would be stupid.

Similarly, the writer of (5a) must believe that for him to live extremely close to his mom and dad for most of his adult life would be fortunate. Indeed, even to a reader who thinks living so close would not be fortunate, the writer's next sentence makes clear that he thinks it would. And for non-first-person sentences like (8a), the writer presents Srinivasan as assuming that for him to send such derogatory messages would be stupid. A related observation is that many type I sentences on the WWW and in corpora with an *Adj* that is undesirable have an "of course" flavor, as though the author regards the possible event not occurring as perfectly natural because its occurrence would have been *Adj* rather than *not Adj*, as in (5c) and (8a). And many type I sentences in which *Adj* is desirable have a "regrettably" flavor, as though the author regards the possible event not occurring as sad because its occurrence would have been *Adj* rather than *not Adj*, as in (5a) and (8b). In many cases, moreover, it seems probable that not only the writer but also the audience of readers is predisposed to grant that *for NP to VP* would be *Adj*, as in (5c), for example. When would it not be stupid for a person to go stumbling through the junkyard in the dark and get hurt? And even readers who do not themselves subscribe to assumptions such as that it requires bravery to venture out alone during one's first time in a foreign country, or for a woman to be born with long and beautiful eyelashes would be fortunate, readily recognize the cultural influence of such beliefs. Might culturally entrenched assumptions such as these nudge readers toward the **I** interpretation of sentences (5) and (8)?

We term a statement that *NP* was (not) Adj to VP, where Adj is evaluative, CONSONANT in a context where there is a predisposition to assume or grant that for NP to VP would be Adj. This property, which we have just seen in action, has an opposite. Statements of the form under study are DISSONANT in contexts where a predisposition exists to assume or grant that for NP to VP would not be Adj.² Consonance exists along a spectrum, from cases where there is a widespread assumption that for NP to VP would be Adj, through ones where readers widely believe that many people assume this even though they themselves do not, to cases in which the reader grants the proposition solely because the writer makes clear that he or she believes it. Dissonance has a similar spectrum. Just as we may see a tendency toward **I** interpretations of consonant negative sentences, there might be a tendency toward **F** interpretations of dissonant negative sentences, as illustrated in (9).

(9) They were not foolish to question what was so blatantly a discrimination against British citizens who have paid into the NHS all their life but were denied care.

The CONSONANCE/DISSONANCE spectrum is of course relevant only in situations where the truth of the infinitival clause is not part of the 'common ground' in the discourse. In our judgement (9) could be used in a situation where the addressee is not supposed to know whether the protagonists have questioned some decision, leaving her the choice of an **F** or **I** interpretation. That is not the case with examples such as (4a), where the interlocutors evidently are in agreement that Mandela and some group of people had met. The point of (4a) appears to be to contradict a previous suggestion that Mandela was fortunate to meet these people. It is an example of what Horn (1985) calls METALINGUISTIC NEGATION, a disagreement about words.

If these tendencies are strong enough, they might constitute a useful probe for testing whether use of the *NP was (not) Adj to VP* construction to express the **I** interpretation is a deviation from correct usage whose communicative intent can nevertheless often be understood, or instead is a normatively correct usage, albeit a different one from the construction's use to express the **F** interpretation. A pilot experiment to assess their strength was run with sentences like *Robin was not clever to choose the best/worst piece* and *Kim was not stupid to save/waste money*.³ Subjects were asked whether Robin chose the named piece or whether Kim saved/wasted money, and were also given the option of responding that they could not decide. The results are shown in Table 3 on the next page.

Encouragingly, the consonant sentences, which appear first and last in the table, are more likely to receive the **I** interpretation, while the dissonant sentences in the middle are even more

²Wason and Reich (1979) describe a related type of mismatch between context and a sentence's semantic content, which they term "non-pragmatic."

³This experiment was run with filler items from a study about *lucky*. Overall it involved 100 "Turkers" and 20 questions per subject.

Table 3

NP was not clever/stupid to VP

STIMULUS	ADJECTIVE-COMPLEMENT	ANSWERS	CHOICE	%
	RELATION			
R. was not clever	to choose the best	R. chose the best piece	F	25
to choose	piece is clever	R. did not choose the best piece	Ι	64.2
the best piece	CONSONANT	undecided		10.7
R. was not clever	to choose the worst	R. chose the worst piece	F	80
to choose	piece is not clever	R. did not choose the worst piece	Ι	10
the worst piece	DISSONANT	undecided		10
K. was not stupid	to save money	K. saved money	F	78.6
to save money	is not stupid	K. did not save money	Ι	14.2
	DISSONANT	undecided		7.1
K. was not stupid to waste money	to waste money is stupid	K. wasted money	F	28.6
		K. did not waste money	Ι	66.7
	CONSONANT	undecided		4.8

likely to receive the **F** interpretation. A small minority of respondents were unable to decide which interpretation was intended, usually smaller than committed to either the **I** or the **F** interpretation. These initial results do not settle whether respondents choosing the **I** interpretation for consonant sentences were making allowance for the writer's misuse of English, and attributing a plausible meaning to what was written even though that meaning is contrary to the norms of English. Note that a significant minority of respondents chose the **F** interpretation even for consonant sentences. Nor do the results settle whether respondents choosing the **F** interpretation were always following their own language norms, rather than some of them attributing a less surprising interpretation to a writer's dissonant sentence than they themselves would use the sentence to express. Again note that a non-negligible minority of respondents chose the **I** interpretation of the dissonant sentences. However, the results do demonstrate the existence of strong effects, indicating that CONSONANCE/DISSONANCE can be useful in a larger, more carefully controlled experiment to decide between possible explanations of the data.

An additional useful fact is that sentences can be neither consonant nor dissonant. As we have seen, consonance is a stronger or weaker predisposition to assume that *for NP to VP* would be *Adj*. Dissonance is a stronger or weaker predisposition to assume that *for NP to VP* would not be *Adj*. These opposites are both absent from neutral sentences, for which neither disposition is present in any significant degree. Examples include *Robin was not clever/stupid to take the middle piece* and *Kim was not clever/stupid to count money*. Neutral examples play an important role along with consonant and dissonant sentences in experiments to test the hypotheses we now lay out.

3 Predictions of Three Hypotheses

In order to choose between reactions 2 and 3 (see the beginning of section 2) to unexpected uses observed on the WWW and in corpora, we consider three hypotheses regarding the norms of English.

Hypothesis A: Evaluative adjectives can only be used factively in this construction.

This is the received view among linguists and, if correct, calls for a satisfactory explanation of the robustness of communicatively successful **I** uses.

Hypothesis B: Evaluative adjectives can only be used implicatively in this construction. We introduce this for formal completeness although we are not aware of any linguist who holds this view. It nevertheless merits testing along with Hypothesis A.

Hypothesis C: Two norms exist for interpreting evaluative adjectives in this construction; one permits only factive use, the other only implicative use.

It bears remembering that norms are not inviolable laws. People who follow them still violate them from time to time—accidentally, unwittingly (when something gets in the way of seeing what the norm requires), and even deliberately (for effect). So one would not expect language use to conform exceptionlessly to the norm(s) on any of these hypotheses.

The most direct way to test Hypotheses A, B, and C would be to determine, when one of these adjectives is used in the construction, which interpretation the speaker or writer meant to convey. One might, for example, ask which implications in Table 1 and Table 2 the person intended. But this is not feasible as we do not have access to the authors; so we resort to other methods for testing the hypotheses. In an ideal world, one might be able to induce speakers to use evaluative adjectives in the construction without biasing speakers toward communicating any particular one of the interpretations under study. Such an experiment, though it faces obvious difficulties, is worth trying to design and carry out. At least for now, however, we have pursued an easier if more circuitous path that begins with testing readers' interpretations of sentences whose writers' intentions are unknown apart from clues in the sentences themselves. This provides useful information about the ways in which English speakers understand the construction under study, and opens the door to relatively unperturbed investigation of whether a reader would use the construction in the same way as the writer did in the circumstances at hand.

To determine how results of our experiment bear on the Hypotheses, some understanding is needed of the mechanism underlying the CONSONANCE/DISSONANCE effect in sentence interpretation. Could the linguistic norm for evaluative adjectives permit or even require consonant sentences to be used to communicate the implications in Table 2, and dissonant sentences to communicate those in Table 1? Does the norm instead require these adjectives to be used to communicate the implications in Table 1; but readers interpret apparent violations of this norm as if the writer meant to communicate the **I** implications in Table 2 when those are 'more sensible' (i.e. in consonant contexts)?⁴

We call the former possibility the SEMANTIC explanation, and the latter the PRACTICAL explanation. These alternatives amount to auxiliary hypotheses, necessary to link Hypotheses A, B, and C to actual language usage as sampled by our experiment. As such, they are evaluated in the experiment along with the primary hypotheses: A, B, and C. We note that the SEMANTIC and the PRACTICAL explanations are not mutually exclusive. It could be, and perhaps is, the case that evaluative adjectives' meanings favor the type I interpretation to some extent in consonant contexts and the type F interpretation to a similar extent in dissonant contexts, and at the same time true that readers tend to interpret writers' failures at following the language's norm 'charitably', giving sentences a more rather than less 'sensible' reading. We return to these questions after describing our experiment and its results.

We chose 19 adjectives that were classified as evaluative factives by Norrick (1978), and coupled them, affirmative and negated, with an appropriate infinitival phrase, so as to get one

 $^{^{4}}$ If Hypothesis B is correct, uses of evaluatives in dissonant contexts to communicate the **F** implications in Table 1 successfully would need a similar explanation.

consonant, one neutral, and one dissonant sentence, as exemplified in (10).

- (10) a. CONSONANT: Tom was not foolish to wear a clown costume to the interview.
 - b. NEUTRAL: Harry was not foolish to wear this outfit to the interview.
 - c. DISSONANT: Tom was not foolish to wear a suit to the interview.

If all evaluative adjectives were factive for all speakers we would expect that, in the case of negative statements, judgments of nearly all subjects in Dissonant and Neutral contexts would be that the event did happen. But in a Consonant context there could well be fewer **F** interpretations and an increased number of **I** interpretations. If Hypothesis A is correct, the experiment should have an outcome similar to what is depicted in Figure 1.

Figure 2

Hypothesis B: All the adjectives are implicative



Dissonant Neutral Consonant

And if there are actually two groups of speakers, one group for whom the normative use of evaluative adjectives is factive in the *NP was Adj to VP* construction and another group for whom the normative use is implicative, both CONSONANCE and DISSONANCE effects could be seen. The distribution of responses to negative stimuli in the Neutral case would give us an estimate of the relative size of the two groups. If Hypothesis C is cor-

Figure 1

Hypothesis A: All the adjectives are factive



Dissonant Neutral Consonant

If all evaluative adjectives were implicative for all speakers, we would expect that, in the case of negative statements, the judgments of nearly all subjects in Consonant and Neutral contexts would be that the event did not happen. But in a Dissonant context there could well be more **F** interpretations and fewer **I** interpretations. If Hypothesis B is correct, the experiment should yield a result similar to Figure 2.

Figure 3

Hypothesis C: There are two norms



Dissonant Neutral Consonant

rect, the experiment should have an outcome similar to what is depicted in Figure 3 in case there were as many factive subjects as implicative ones.

Because of the CONSONANCE/DISSONANCE effect, a number of implicative speakers would tend to give a factive interpretation in the dissonant context and, similarly, a number of factive speakers would tend to give an implicative interpretation in the consonant case. These tendencies would be produced by the effect regardless of which explanation of it is actually at work, the SEMANTIC or the PRACTICAL explanation.⁵

⁵In our experiment each reader saw only 20 out of 114 evaluative sentences so as to avoid undesired priming or set effects.

4 Experiments

We ran this study on Amazon Mechanical Turk in March of 2013 with a larger group of subjects. We had 206 participants ranging in age from 18 years (1) to more than 60 years (3), about half of them (108) between ages 19 and 30. All participants identified themselves as native speakers of English. 100 were women.

Each subject was asked to respond to 30 test sentences randomly chosen from blocks of six sentences such as shown in Table 4.

Table 4

Stimuli for the adjective smart

Paul was smart to take the best piece.	Consonant
Paul wasn't smart to take the best piece.	Consonant
Jessica was smart to take the middle piece.	Neutral
Sally wasn't smart to take the middle piece.	Neutral
Audrey was smart to take the worst piece.	Dissonant
The man wasn't smart to take the worst piece.	Dissonant

Each subject saw at most one sentence from a single block. There were 19 adjective blocks, each comprising six sentences. The adjectives were: *arrogant, brave, careless, cruel, evil, foolish, fortunate, heroic, humble, lucky, mean, nice, polite, rude, sensible, smart, stupid, sweet, and wise.* We tried to make four of the six sentences in each block clearly biased, with two CONSONANT and two DISSONANT; the remaining pair were supposed to be NEUTRAL. Each pair comprised the affirmative and the negative version of a sentence. The examples were all in simple past tense; the idiomatic "probably not" sense that two of the adjectives, *fortunate* and *lucky*, sometimes have in the future tense, see Karttunen (2013), was not part of this experiment.

In the experiment, subjects were presented with 30 web pages consisting of a sentence and two possible interpretations of what the author might have thought. Did the author believe that the infinitival clause was true or the opposite? Figure 4 is an example of one such page. To move on, the subject had to click one of the three radio buttons: **A**, **B**, or **Cannot decide**.⁶ The order of the **A** and **B** buttons on the page and their association with a positive or a negative answer were randomly assigned for each page.⁷

Instructions for the experiment showed subjects the three examples in (11), where it is clear for each sentence which answer is right, along with an explanation of why the answer is correct.

- (11) a. John managed to stop the car.
 - b. Linda forgot to call her mother.
 - c. Fred was determined to retire at the end of the year.

The author of (11a) clearly believes that John stopped the car in spite of some difficulty. The author of (11b) must think that Linda did not call her mother although she had intended to do so. In the case of (11c) the correct answer is *Cannot decide* because (11c) does not indicate

⁶In section 5 we call the **Cannot decide** responses **Either**.

⁷Random assignment and ordering may have been a mistake. Some participants complained in their postexperiment comments that the lack of consistency was confusing and had caused them to make errors, selecting **A** when in hindsight they should have selected **B**, or vice versa. We suspect that the two types of errors resulting from unintended clicks most likely canceled each other out and did not significantly bias the outcome.

Figure 4

Sample stimulus page

Statement: Paul wasn't smart to take th	e best piece.
Question: Does the author believe A or	r B?
A: Paul did take the best piece.	
B: Paul didn't take the best piece.	
Choose one answer based only on the giv	en sentence.
• A	
• B	
◦ Cannot decide	

whether the author has any belief about whether Fred in fact retired or didn't retire at the end of the year.

In the experiment, we tried to conceal as best we could what the experiment was about. Of the 30 sentences each participant was presented with, one third were randomly selected distractors containing an adjective we were not studying such as *afraid*, *eager*, *hesitant*, *outraged* and *surprised*, or sentences with no adjective at all like those in (11). We maintained a 50/50 balance of affirmative and negative sentences to obscure the fact that responses to negative stimuli were of principal interest to us.

We selected half-a-dozen control sentences similar to (11a) and (11b), prepared to exclude any participant who got more than two of the "gold standard" answers wrong because it would indicate the subject either didn't know English well or was not paying enough attention to the task. Only three subjects were excluded from analysis for failing this test.⁸

The experiment can be run from a browser at the following URL: http://web.stanford.edu/group/csli lnr/eiss-10-AMT/Website/Experiment.html ⁹

5 Results

Figure 5 presents an overview, aggregating the results for negative sentences containing all nineteen evaluative adjectives in the study. Overall, we see that:

- 1. There are more **F** interpretations than **I** ones in all three contexts.
- 2. There is a strong, clear CONSONANCE/DISSONANCE effect. The decrease in **F** and matching increase in **I** interpretations from DISSONANT through NEUTRAL to CONSONANT contexts

⁸We nevertheless paid them the same fee as the others: \$1 for the completed task, more than the prevailing rate at the time, to maintain a good reputation as an employer in the *Turker Nation* community (http://www.turkernation. com/). As a result, data collection for the experiment was completed very quickly. All tasks were completed in less than two hours.

⁹This page operates in 'debug' mode; everything proceeds like the actual experiment until the very end. At that point, the trial user's data are displayed on the screen for her to verify that everything worked correctly. In the actual experiment on AMT, a subject's data would be sent to the experimenter and would not be seen by the subject. In debug mode nothing is saved or sent anywhere.

is nearly linear. (Adjusted $R^2 = 0.99$ for the slope of the I interpretations.)¹⁰

- 3. There are 23.0% I interpretations and 68.7% F interpretations in the neutral condition.
- 4. Even in the DISSONANT condition, there are 11% I interpretations. A t-test, comparing these to the Either responses (subjects selecting the *Cannot decide* button) showed that these two responses cannot be assimilated.



Results: Percentage of Factive, Implicative, and Either choices for NP was not Adj to VP.



A useful baseline for interpreting this pattern of choices is subjects' responses to "gold standard" sentences with negation, like *Linda was not surprised to find a key in the lock*, *Bill was not able to respond to the question*, and *Linda was not eager to go to the party*. Readers interpreted such sentences as predicted all but 4.9% of the time.¹¹ For negated evaluative adjectives, no response received close to 95% of responses.

Responses to affirmative evaluative adjectives were comparatively uniform (see Figure 6). Readers interpreted affirmative evaluatives 97% of the time as the event happening, except in dissonant contexts, where 5% or 6% of respondents couldn't tell whether the event happened or thought it did not.¹²

These experimental results are clearly consistent with hypothesis C. Using interpretations in neutral contexts as an estimate of the relative sizes of the group of **F** speakers and the group of **I** speakers yields a ratio of

Figure 6

Results: Percentage of Positive, Negative, and Either choices for *NP was Adj to VP*.



¹⁰When constructing examples, we aimed at making affirmative DISSONANT ones clearly unexpected and affirmative CONSONANT ones clearly expected. The linearity of this shift measures how well we succeeded, together with how successful we were in constructing examples that were indeed judged to be neutral. Quite a bit of variation from adjective to adjective can be expected (see section 6.1 for discussion).

¹¹Predicted responses to the listed sentences were: Linda found a key in the lock, Bill did not respond to the question, and Linda either might or might not have gone to the party.

¹²Affirmative examples with the adjectives *fortunate* and *lucky* were not presented in this study, so are not included in Table 6. In previous studies, affirmative past tense sentences with these adjectives were consistently found to imply that *NP VPed*.

about three **F** speakers for each **I** speaker.¹³ But were the sentences that we constructed and classified as neutral understood as neutral by the subjects? Subjects' responses to them lie nearly on a straight line between their responses to dissonant sentences and responses to consonant ones, which suggests that the sentences we constructed to be neutral probably are on the whole neither significantly consonant nor dissonant.¹⁴ Readers can judge for themselves how genuinely neutral the sentences we tested are by examining these sentences at the following URL: http://web.stanford.edu/group/csli lnr/eiss-10-AMT/Website/input sets.js¹⁵

To the extent that the sentences are in fact neutral, the results of the experiment suggest that Hypothesis A and Hypothesis B should both be rejected. Neither hypothesis provides a basis for predicting that neutral sentences will deviate from the base response that it predicts: **F** for Hypothesis A and **I** for Hypothesis B.

In sum, a large enough group of readers provided enough responses to a wide enough range of adjectives for the experiment to yield reliable information about how readers interpret sentences written by unknown people. We conclude that (a) affirmative evaluative adjectives are consistently interpreted with the implications shared by factive and implicative interpretations. All negated sentences were more likely to receive an Either response than the corresponding affirmative sentences were, negated evaluative adjectives as much as twice as likely. Nevertheless, (b) interpretations of negated evaluative adjectives pattern like a mixture of factive readings and implicative readings, in roughly a three-to-one proportion.

6 Discussion

We discuss some of the variation in data from the experiment before turning to the question of whether readers who responded with the implicative interpretation of a negated evaluative might be placing a plausible interpretation on a sentence they would not use in the way that the writer did.

6.1 Variation

An obvious question is how consistent individual readers were in their judgments of negative evaluative adjectives. The design precludes direct measurement since no subject saw the same adjective twice and each subject saw only three negated adjectives in any given type of context. We would like to measure individual consistency in a future experiment.

Turning to the adjectives, do all evaluative ones have the same likelihood of being interpreted implicatively? The same degree of susceptibility to the CONSONANCE/DISSONANCE effect? Although we have much less data for any one adjective than for them all considered together, the evaluative adjectives do not all appear to be the same.¹⁶

 13 It is hard to know which group a person who responded *Cannot decide* belongs to or, indeed, whether such people find the sentences ambiguous. The number of *Cannot decide* responses is consistently quite low across all conditions. Although the initial instructions included a case where *Cannot decide* was the only correct response, it is possible that some Turkers felt selecting *Cannot decide* responses too often would have negative consequences for payment. It might be better to phrase this option in positive terms, for example *The author could believe either A or B*.

¹⁴Responses to them were if anything marginally closer to their responses to dissonant sentences than to consonant ones.

¹⁵This page contains the blocks of actual test sentences in the file factiveImplicativeAdjInputs.txt and the distractors in filler.txt in the same directory.

¹⁶For each adjective separately, we have on the average 34 judgments, \geq 25, \leq 45, in any one type of context.

Some adjectives, including *stupid*, *fortunate*, and *lucky*, receive a significant proportion of **I** readings in neutral contexts and show a strong CONSONANCE/DISSONANCE effect in the limited available evidence. **I** readings of these adjective are also frequently found in corpora. For *fortunate* the number of **I** interpretations in the NEUTRAL context was just over 56%, for *stupid* and *lucky* it was around 40% and the CONSONANCE/DISSONANCE effects were close to linear (adjusted R² over 0.80) for all three. For *stupid*, moreover, we find over 25% of **I** interpretations in the DISSONANT context, further reinforcing the impression that it is regarded as implicative by a substantial number of English speakers.

Figure 7 shows results for a representative adjective with a high percentage of **I** interpretations in neutral contexts. Such adjectives seem to be clear evidence for Hypothesis C. It is worth noting that the strength of the **I** interpretation may not always correlate with frequency of use on that meaning. Another adjective for which our results show a high percentage of **I** readings in the neutral case is *foolish* Nevertheless, the ENTENTEN-2.0 corpus has few examples containing this adjective and the examples on the WWW do





Dissonant Neutral Consonant

adjective, and the examples on the WWW do not suggest a substantial proportion of I use.¹⁷
Some other adjectives show near linear CONSONANCE/DISSONANCE effects on the I reading but a considerably lower percentage of neutral I interpretations, e.g. *cruel, smart* and *polite* (20%), *evil* and *mean* (just above 10%). This suggests that having a normative I interpretation may not be the only cause of an adjective manifesting the CONSONANCE/DISSONANCE effect.

At the opposite end of the spectrum are adjectives like *arrogant*, *heroic*, *humble*, and *sensible*. For the first three, the pattern of responses is not inconsistent with Hypothesis A. There are relatively few I interpretations in both the DISSONANT and the NEUTRAL context and the number goes up only in the CON-SONANT context; however, the F interpretations go down in the neutral case, where the Either responses go up. Figure 8 shows the pattern of responses for a typical one these

Figure 8

NP was not heroic to VP (98 subjects)



adjectives. The case of *sensible* is more difficult to understand, with nearly as many I inter-

- (12) a. Sally wasn't brave to flee the dragon. DISSONANT
 - b. Jane wasn't brave to mention the dragon. NEUTRAL
 - c. Tom was't brave to fight the dragon. CONSONANT

Perhaps all three contexts are too fantastic to be reliably classified along the CONSONANCE/DISSONANCE scale.

¹⁷As to *brave*, results from the experiment are consistent with the hypothesis that it is implicative for a substantial minority: 28% of the neutral contexts get an **I** reading. However, we suspect our test sentences for this adjective were not well constructed as we also obtain 31% **I** responses in the DISSONANT context (and 33% in the CONSONANT context). The test sentences were:

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pretations in the DISSONANT context as the NEUTRAL and reasonably high percentages in both cases (21% vs. 22%). Use of these adjectives in the *NP was not Adj to VP* construction on the WWW is very limited, which does not help clarify the extent to which they can be used with the I interpretation.

It is premature to draw firm conclusions about differences between evaluative adjectives, given the limited data currently available. We would like to determine which of the trends just noted, if any, stand up in future experiments.

6.2 CONSONANCE/DISSONANCE Context

In the experiment described in section 4, the CONSONANCE/DISSONANCE context is always introduced in the VP of the target sentence. However, nothing about the effect requires this. One could set up a preceding context producing the same effect. As an example:

(13) a. That outfit looks very unprofessional. Jane wasn't foolish to wear it to the interview.b. That outfit looks very professional. Jane wasn't foolish to wear it to the interview.

We followed up the experiment already described with a smaller experiment that showed comparable results to the ones obtained when the context was in the VP. In fact, we conjecture that the context creating the CONSONANCE/DISSONANCE effect does not have to be verbal at all, which will complicate any attempt to predict the **I** or **F** readings automatically.

6.3 Active versus Passive Language Use

The judgments discussed so far are about how our subjects understood evaluative adjectives. As mentioned in section 3, there are differences between understanding and using a particular linguistic construct. Both the WWW and the ENTENTEN-2.0 corpus provide evidence that some evaluative adjectives are sometimes used implicatively in the *NP* was (not) Adj to VP construction. (This evidence is clearest for *stupid*, *fortunate*, *lucky*, and *brave*.) We piloted an experimental approach to obtaining information about subjects' active language use in the follow-up experiment we ran with the CONSONANCE/DISSONANCE context provided by a preceding sentence. Fifty subjects who gave a stimulus an **F** or an **I** interpretation were then asked whether they themselves would use the target sentence to express the reading they had given to it.¹⁸ Table 5 gives the results for this follow-up question regarding **F** and **I** interpretations in Dissonant, Neutral, and Consonant VPs.

Table 5

Factive answers with dissonant examples	84%
Implicative answers with dissonant examples	79%
Factive answers with neutral examples	87%
Implicative answers with neutral examples	82%
Factive answers with consonant examples	83%
Implicative answers with consonant examples	79%

Positive responses to 'Would you say this yourself?'

The percentage of Yes answers is consistently higher for the factive readings, but the dif-

¹⁸Subjects who responded Either were asked a different follow-up question.
ference (around 5%) is not overwhelming. So more than 18% out of the total 23% of speakers that we estimated earlier are implicative users in the neutral context responded that they themselves *would* use the negative sentence with the I meaning.¹⁹ These pilot results suggest that a quite substantial minority of English speakers think upon reflection that the *NP was not Adj to VP* construction can properly be used with the implicative meaning. We want to follow up with a larger experiment using the technique that was successfully piloted for investigating subjects' active use of this construction. If the preliminary results hold up, this will show that a sizable population of English speakers has a norm allowing some evaluative adjectives to be used implicatively rather than factively.

Even now there is very strong evidence, we believe, that the evaluative adjectives classified in the linguistics literature as factive are not uniformly viewed this way by competent speakers of English. Some are both understood and actively used as genuine implicatives by some speakers, whereas other speakers view all evaluative adjectives as lexical factives. For all these adjectives there is, in any event, a CONSONANCE/DISSONANCE context effect.

6.4 Possible Causes of the Consonance/Dissonance Effect

As mentioned earlier, the CONSONANCE/DISSONANCE effect could result from either, or both, of two causes. (SEMANTIC) The context dependency might in some way and to some extent be built into the factive and implicative lexical meanings of evaluative adjectives themselves. (PRACTICAL) As a comprehension effect, CONSONANCE/DISSONANCE might in some measure result from communication pressures to treat other people's statements as saying something 'sensible'. It is beyond the scope of this paper to delve more deeply into the potential SEMANTIC cause. However, we do say more here about communication pressures on readers, both because they are undoubtedly at work in language comprehension and because they might be urged in defense of Hypothesis A—as providing a fully satisfactory explanation of how apparent type I uses of evaluative adjectives are successfully understood the way the producer intended them to be despite being contrary to what the sentences actually mean in English.

People do, after all, make mistakes in using language. A not uncommon one is to say the opposite of what one means to say. Successful communication often occurs despite these mistakes. Hearers and readers sometimes detect apparent incongruity between a sentence actually produced and what they would expect its producer to avow, in view of other available indicators. Interpreters then sometimes adjust their interpretation to be more in line with what they think the producer likely intended.²⁰ The factive reading of a negated evaluative adjective in a consonant context might be perceived as an incongruous statement; an interpreter could find the proposition that *NP VPing* was not *Adj* hard to reconcile with a predisposition toward assuming that *for NP to VP* would be *Adj*. A cooperative reader might accordingly resolve the apparent conflict by viewing the producer as having meant that *NP did not VP* and it was *NP not VPing* that was not *Adj*. Indeed, many members of English's determinedly factive majority of speakers profess that sentences like (5) and (8) are mistakes; the producer must have inadvertently omitted *enough* before the *Adj*. These interpreters clearly recognize the producer's intent to express the implicative reading; and they are so convinced that the sentence produced

 $^{^{19}}$ And possibly some of the more than 13% of speakers who gave the F reading but then said they would not themselves use the negative sentence with this reading might also be implicative speakers.

²⁰For steps toward such a theory see Gibson et al. (2013). The cases discussed there are all syntactic and of a very different nature than the one we are studying here.

should not be used this way that they 'mentally revise' it to another sentence whose meaning is close to what they think the producer must have meant.

This may be part of a full story about why implicative readings of negated evaluatives are more likely in consonant contexts than in neutral ones. However, it is by no means an adequate defense of Hypothesis A in relation to the data presented in this paper. For one thing, it applies to interpretation but not to production; yet in all contexts the majority of our subjects who interpreted sentences implicatively stated they would themselves use the sentences with that meaning. Secondly, it does not in fact explain how an interpreter perceives a producers' intended meaning. If the writer made an error, why think it was, say, omitting enough rather than, for example, inadvertently inserting not? The latter revision leads to a positive factive interpretation that is compatible with consonance, but it does not yield an implicative interpretation of the given sentence! Thirdly, communicative pressures influencing the interpretation of language uses apply to all expressions, not just a select few; so any serious attempt to explain away as errors data supporting implicative uses of negated evaluative adjectives in consonant contexts must be consistent with how evaluatives are used in their full range of contexts. And dissonant affirmative sentences containing evaluative adjectives could appear just as incongruous as consonant negative ones: How can the proposition that NP VPing was Adj be reconciled with a predisposition to assume that for NP to VP would not be Adj? Yet one sees hardly any tendency for people to interpret dissonant affirmative evaluatives like Audrey was smart to take the worst piece (from Table 4) as meaning either what (14a) does or the factive reading of (14b).

(14) a. Audrey was too smart to take the worst piece.

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b. Audrey was not smart to take the worst piece.

7 Presuppositions and Assertions of Factive and Implicative Evaluatives

As discussed in section 1, the traditional factive analysis of evaluative adjectives in the construction *NP* was (not) *Adj to VP*—the norm for speakers whose intuitions are represented by Table 1—is that both sentences presuppose *NP VPed*, and the affirmative one asserts *NP VPing* was *Adj*, while the negative one denies this. We propose, however, that it is better to analyze the proposition that, for example, (1) asserts and (2) denies as (15).

(15) For the Raiders to draft Russell would have been stupid.

In general, we take an affirmative factive sentence of this form to assert that *for NP to VP* would have been *Adj*, and a negative sentence to assert the negation of this proposition. We think the major difference between a statement like (1) and one like (15) lies in what they presuppose, not what they assert. This is evident from the fact that the questions (16a) and (16b) request the same information, differing mainly in that asking the latter question presupposes that the Raiders drafted Russell while asking the former does not.

- (16) a. Would it have been stupid for the Raiders to draft Russell then?
 - b. Was it stupid for the Raiders to draft Russell?

The propositions *NP VPed* and *for NP to VP* would have been *Adj* jointly imply that *NP VPing* was *Adj*. So this analysis explains why factive users of this construction feel that (3a) follows from (1), even though it is not what sentence (1) asserts. Similarly, the propositions *NP VPed* and *for NP to VP* would not have been *Adj* jointly imply that *NP VPing* was not *Adj*, explaining

why these language users feel that (3b) follows from (2) despite not being what (2) asserts. Thus we adopt this friendly amendment to the traditional factive analysis of the construction.

As for the implicative interpretation, we pointed out it presupposes a biconditional (6) according to the analysis of two-way implicatives in Karttunen (1971). This presupposition could equivalently be thought of as (17).

(17) If NP were to have VPed, that would have been Adj; and if NP were not to have VPed, that would not have been Adj.

The affirmative sentence *NP was Adj to VP* asserts that what *NP* did with regard to *VPing* or *not VPing* was *Adj*. The affirmative sentence's implications shown in Table 2 follow from interaction between its presupposition and its assertion. The presupposition (6), or equivalently (17), plus the asserted proposition *what NP did re VPing was Adj* together imply *NP VPed* because they are not jointly consistent with *NP did not VP*. That consequence plus the asserted proposition jointly imply *NP VPing was Adj*. In a similar way the proposition *what NP did re VPing was not Adj* asserted by the negative sentence *NP was not Adj to VP* combines with the presupposition to yield the negative sentence's implications in Table 2.

Setting aside for now potential SEMANTIC variation of lexical meaning with context, the semantic contributions of factive and implicative evaluative adjectives in sentences of the form *NP was (not) Adj to VP* are as summarized in Table 6.

NP was Adj to VP	Factive	Implicative
Presupposition	NP VPed	For NP to VP would be Adj & for NP not to VP would not be Adj
Assertion	For ND to VD would be Adi	What ND did about WDing mag Adi
Assertion	For NP to VP would be Adj	what NP did about vPing was Adj
NP was not Adj to VP		
Presupposition	NP VPed	For NP to VP would be Adj &
		for NP not to VP would not be Adj
Assertion	For NP to VP would not be Adj	What NP did about VPing was not Adj

Table 6

8 Conclusion

In this paper we first showed that, contrary to what the, admittedly scant, linguistic literature leads us to expect, the *NP not be ADJ to VP* construction with evaluative adjectives is not always interpreted as factive but can also have an implicative reading. We then isolated contextual factors that lead to a preference for the factive (**F**) or implicative (**I**) interpretation. We called these contexts DISSONANT and CONSONANT. In the consonant interpretation the speaker/writer seems to believe that for NP to VP would be Adj and that the readers too would be predisposed to this view. In a consonant context, a negative statement that NP was not Adj to VP pushes the hearers towards the **I** interpretation, that is, that the NP did not VP. In the **F** interpretation, there is a predisposition to assume or to grant that for NP to VP would not be Adj. A dissonant context favors the **F** interpretation. We conducted an experiment that showed that, indeed,

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these contexts influence the interpretation of the evaluative *NP be ADJ to VP* construction. We also introduced test sentences where the *VP* refers to a situation that we did not consider to be either consonant or dissonant. The **I** interpretations that were given in that context argue for the view that all the **I** interpretations cannot be due to some accommodation to the context but that there are, in fact, speakers for whom the evaluative construction is a normative language use.

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Strict and Sloppy Reflexives in VP Ellipsis

Matthew Ong Adrian Brasoveanu

This paper reports a series of three experimental studies (described in detail in Ong 2013) with three related goals/results. The first goal is to empirically evaluate two competing – syntax vs. discourse driven – accounts of strict vs. sloppy readings of reflexives in VP ellipsis, building on the experimental investigation in Kim and Runner (2009). The results strongly suggest that discourse-based accounts are empirically more adequate. The second goal is to argue that a heretofore ignored lexical factor, namely the meaning of the ellided verb, is in fact a strong predictor of strict vs. sloppy readings. We found that 'implicit-causality' verbs that are object-oriented are much more likely to have strict readings than subject-oriented implicit-causality verbs. Finally, we observe that the position of sentential negation is also an important biasing factor with respect to strict vs. sloppy readings, which we attribute to its 'reversal' function in discourse.

Keywords: reflexives, ellipsis, implicit causality, discourse relations, negation

1 Introduction

Consider the examples of VP ellipsis in (1a) and (1b) below. These sentences involve two clauses where the first one (the *source clause*) provides the antecedent for the elided VP in the second one (the *target clause*).

- (1) a. John blamed himself, and Bill did too.
 - b. John blamed himself because Bill did too.

The VP ellipsis *did too* in the target clause is resolved to the VP *blamed himself* in the source clause, and the anaphor *himself* at the ellipsis site is ambiguous between a *strict* reading 'Bill blamed John' and a *sloppy* reading 'Bill blamed Bill, i.e. himself'.

The availability of strict vs. sloppy readings is affected by the choice of sentence coordinator/subordinator: it is more difficult to get a strict reading for (1a), while (1b) allows it more readily. This difference crucially involves VP ellipsis since when the target clause has a full overt VP (*Bill blamed himself*), Principle A of Binding Theory rules out strict readings quite strongly irrespective of what sentence coordinator/subordinator we use. Similar asymmetries between the availability of strict vs. sloppy readings can be found with a number of other subordinating conjunctions, for example, *even though, when*, and *before*.

We are grateful to Christina Kim who generously provided the original materials for her and Jeff Runner's experiments, as well as helpful email discussion of various issues. We are similarly indebted to Hannah Rhode for discussion and experimental data. Finally, we are grateful to Pranav Anand, Donka Farkas, Matt Wagers, and an anonymous *Empirical Issues in Syntax and Semantics 10* reviewer for extensive and very helpful discussions and/or comments that sharpened our interpretation of the experimental results and our theoretical hypotheses. The usual disclaimers apply.



The present paper investigates this interpretation asymmetry between (1b) and (1a), hereafter called the Causality Effect. Specifically, we compare two competing explanations. One comes from Hestvik (1995) and is syntactic in nature, while the other is based on the theory of discourse relations in Kehler (2002). The paper also asks whether the asymmetry can be influenced by the semantics of the verb in addition to the syntactic and/or discourse relation between the two clauses. Since subordinating clauses (exemplified by *because*) often involve causality relations, it is worth asking whether *implicit causality* in the verb's meaning itself can trigger the same strict/sloppy bias. Finally, we investigate the perhaps unexpected role of sentential negation in biasing towards strict vs. sloppy readings.

We investigate these issues in a series of three binary-choice experiments that look at multiple aspects of the Causality Effect. These experiments are an extension of previous work by Kim and Runner (2009), which centered around the effect of discourse connectives on strict vs. sloppy readings of reflexives. In their work, the focus was on *parallelism* vs. *cause-effect* discourse relations in sentences such as *Mary voted for herself, and/so Jane did too*. The experiments reported in the present paper (described in detail in Ong 2013) expand on this idea in three ways: (i) we expand the range of discourse connectives while controlling for syntactic configuration; (ii) we specifically address the role of the verb's semantics in facilitating the Causality Effect; finally, (iii) we examine the role of negation in affecting the strict vs. sloppy bias.

The main results are as follows. Experiments 1 and 3 strongly suggest that Kehler's (primarily) discourse-driven theory is a better model of the Causality Effect: the discourse relation between source and target clauses, and not their syntactic configuration, seems to be the major factor in determining how likely strict/sloppy readings are. Experiments 1 and 2 show that lexically-contributed causality plays a role in the availability of strict readings even when such causality is not specifically marked in the discourse relation. Finally, Experiment 3 also shows that sentential negation influences how likely strict vs. sloppy readings are; we conjecture that this is due to its 'reversal' function in discourse.

The paper is structured as follows. Sections 2 and 3 present the background and specific proposals for the syntactic and discourse-theory explanations of the Causality Effect, and Section 4 discusses the notion of *implicit causality*. Section 5 presents the three experimental studies. The first study was designed to test which theory, Hestvik's or Kehler's, makes better empirical predictions. The second study is a follow-up that focuses specifically on the role implicit causality plays in biasing toward strict or sloppy readings. Finally, the third study expands on the first by investigating additional connectives and their interaction with sentential negation. Finally, section 6 concludes.

2 A Syntactic Account: Hestvik (1995)

To explain why subordinate structures license strict readings but parallel/coordination structures do not, Hestvik proposes a copy-based account of VP ellipsis (cf. the deletion account in Sag 1976). The account is couched in a DRT framework (see Kamp 1981 and Kamp and Reyle 1993, and also Heim 1982 for a very closely related framework), and takes reflexives to receive their interpretation by undergoing LF movement out of the VP in order to establish the equational condition needed to resolve their anaphoric requirement (see Lebeaux 1983 and Chomsky 1986 among others for similar movement-based accounts). Movement essentially creates a λ abstraction configuration that leads to a bound variable interpretation – see Figure 1.



The DRT account of reflexives in Hestvik (1995): \Rightarrow indicates that a DRS is derived from another by applying various syntactic and/or construction rules; \Rightarrow indicates semantic equivalence.



The derivation of strict vs. sloppy readings comes from competing orders between (i) the LF copying of the VP material to the ellipsis site and (ii) the raising of the reflexive out of the source VP. If raising happens before copying, both the trace in the source VP and the trace in the elided VP are governed by a single reflexive, giving the strict reading. If raising happens after copying, the trace at the ellipsis site is governed locally within its own clause, giving the sloppy reading. For example, the derivation of the sloppy reading for *John blamed himself because Bill did* proceeds as follows:

(2)	John [_{VP} blamed himself] because	Bill e
	John [VP blamed himself] because	Bill [VP blamed himself]
	John [α himself _i [VP blamed t _i]] because	Bill [$_{\alpha}$ himself _i [VP blamed t _i]]

Recall that under this account, reflexives can be successfully interpreted only if they are able to move 'under' a suitable NP at LF. No movement, hence no binding, takes place before the VP is copied in (2) above. Since movement and variable binding happen only after copying, *Bill* ends up serving as the antecedent of the reflexive in the elided VP.

We derive the strict reading if we reverse the order of the two covert LF operations: we first raise the reflexive out of the VP, and copy the VP only after that.

(3)	John [[_{VP} blamed himself] because	Bill e]
	John [$_{\alpha}$ himself _i [[_{VP} blamed t _i] because	Bill e]]
	John [α himself _i [[_{VP} blamed t _i] because	Bill [VP blamed t_i]]]

Crucially, the structure in the last line of (3) is licit because both traces t_i are bound by the reflexive *himself_i*, which is possible under the assumption that the *because* clause is adjoined below the subject of the source clause. When we try to follow the same derivation for the strict reading in the parallel configuration, the subject of the source clause does not c-command the target clause and the second trace t_i in in (4) below ends up being unbound and incurring an ECP violation:

(4)	John [$_{VP}$ blamed himself] and	Bill e
	John [$_{\alpha}$ himself _i [VP blamed t _i]] and	Bill e
	John [$_{\alpha}$ himself _i [VP blamed t _i]] and	Bill [VP blamed t_i]

One interesting issue Hestvik mentions in passing concerns the effect of negation on strict vs. sloppy readings, which will be the focus of our Experiment 3. He observes that when the source clause is negated, strict readings are available:

(5) John didn't blame himself, but Bill did. (strict reading possible)

This observation is unaccounted for under (the simple version of) the syntactic account: the presence of negation in the source clause does not affect the overall, coordination-based syntactic structure. So if syntactic structure was the primary determiner of strict vs. sloppy bias, sentences like (5) should behave like the sentence without negation in (4).

3 A (Primarily) Discourse-Relation Based Account: Kehler (2000, 2002)

Kehler (2000, 2002) proposes an alternative, discourse-relation based explanation for the Causality Effect. Under this account, there are three basic discourse relations, **Resemblance**, **Cause-Effect**, and **Occasion**, each with different 'subtypes', for example:

(6)	a.	Bill likes to play golf. Al likes surfing the net.		(Resemblance: Parallelism)
	b.	John supports Clinton, but Mary opposes him.		(Resemblance: Contrast)
	c.	Bill was about to be impeached. He called his	lawyer.	(Cause-Effect: Result)
	d.	Bill called his lawyer,		(Cause-Effect: Explanation)
		because he was about to be impeached.		
	e.	Bill was about to be impeached,	(Cause-E	ffect: Violated Expectation)
		but he didn't call his lawyer.		

Generally, a Resemblance relationship between S_1 and S_2 requires a one-to-one correspondence between the set of entities mentioned in S_1 and the set of entities in S_2 , as well as some salient property (or more generally, relation) P that holds of both sets.

For Cause-Effect relationships, however, one need only have an implicational relationship between sentences at the propositional level. Here 'implicational' is defined in terms of plausibility and not in the logical sense of material or strict implication. Thus, if *P* is inferred from S_1 and *Q* from S_2 , the Result relation is obtained if *P* plausibly 'implies' *Q*. Similarly, if *Q* plausibly 'implies' *P*, we have Explanation, and if *P* plausibly 'implies' $\neg Q$, we have Violated Expectation.

What is crucial in Kehler's theory is that for VP ellipsis, Resemblance relations require syntactic identity while Cause-Effect relations require identity only at the 'propositional level'. This distinction is meant to capture a wide range of observations about the acceptability of various perturbations of the prototypical examples of VP ellipsis, such as voice-mismatch (7),

and Condition C effects (8).

- In March, four fireworks manufacturers asked that the decision be reversed, and on Monday the ICC did. (from Dalrymple 1991, p. 35)
- (8) Sue defended John_i because he_i couldn't. (based on examples from Kehler 2000, p. 550)

Kehler makes the same sort of observation about Condition A effects, where Cause-Effect relations license strict readings much better than Resemblance relations. For example:

(9)	a.	John _i defended himself _i even though Bill didn't.	(Denial of Preventer)
	b.	John _i defended himself _i and so Bill did too.	(Result)
	c.	John _i defended himself _i but Bill nevertheless didn't.	(Violated Expectation)

4 Implicit Causality (IC)

In addition to the contribution of syntactic and discourse structure to the Causality Effect, the third important aspect considered in this paper is the lexical contribution of the verb. In particular, different verbs have different *implicit causality* (IC) biases (Garvey and Caramazza 1974, McKoon et al. 1993, Rohde 2008, Solstad and Bott 2013 and references therein). For example, the verbs *disappoint* and *scold* strongly bias pronoun resolution in distinct ways because of the cause-effect structures they are prototypically associated with. To see this, consider the minimal pairs below:

- (10) John disappointed Bill because he (=John) stole the book.
- (11) John scolded Bill because he (=Bill) stole the book.

Readers of (10) strongly prefer to resolve the pronoun *he* to the subject of *disappoint* rather than the object, whereas in (11) the opposite is true. The strength of the preference is so strong that Garvey and Caramazza (1974) think it is due to the fact that verbs like *disappoint* and *scold* imply as part of their root meaning an underlying causal event involving either the subject or object. For example, in *John disappointed Bill*, John must have done something to make Bill disappointed in him, while in *John scolded Bill*, Bill must have done something to make John scold him. Verbs in the class of *disappoint*, such as *amaze*, *infuriate*, and *frighten* have been dubbed IC1 verbs, and those in the class of *scold*, such as *thank*, *fear*, and *hate*, are known as IC2 verbs.

- (12) List of IC verbs (from McKoon et al. 1993):
 - a. IC1: aggravate, amaze, amuse, annoy, apologize, bore, charm, cheat, confess, deceive, disappoint, exasperate, fascinate, frighten, humiliate
 - b. IC2: assist, blame, comfort, congratulate, correct, detest, envy, hate, jeer, notice, pacify, praise, reproach

What is significant about IC verbs is the possibility that they may trigger the Causality Effect in a way akin to discourse connectives like *because* or *even though*. That is, they induce a weakening of the requirement for structural parallelism that Kehler's model predicts for Resemblance relations. With such weakening, the elided VP can function like a deep anaphor (in the sense of Hankamer and Sag 1976), bypassing the 'structural identity' requirement associated with

Resemblance.

Since the choice of verb is (largely) independent of the type of discourse connective used, we predict that the Causality Effect induced by IC verbs should appear with both *and*-type and *because*-type connectives. Thus, even *and*-type sentences should exhibit a higher percentage of strict readings when IC verbs are present. This prediction is investigated in our Experiment 2, the results of which are reported in subsection 5.2.

5 The Three Experimental Studies

5.1 Experiment 1

5.1.1 Reflexives and if-clauses As a first step towards deciding whether Hestvik's syntactic account or Kehler's discourse account better explains the Causality Effect, we designed an experiment that varied the relative c-command relation between *the subject of the source clause* and *the elided VP in the target clause* while preserving the discourse relation between the two clauses. The two configurations we used were conditional sentences in which the antecedent appeared either before or after the consequent:

(13)	If Ann voted for herself, Mary did too.	('if-then' conditional)
(14)	Mary voted for herself if Ann did too.	('then-if' conditional)

The reason for using conditional structures (a novel contribution to the experimental literature on this topic, as far as we can tell) is that their syntactic structure is fairly well understood, and the literature seems to be in agreement that the syntactic structures of 'if-then' and 'then-if' conditionals differ in exactly the respect we want (see e.g. Chierchia 1995 among others). In particular, 'if-then' conditionals have roughly the structure depicted in Figure 2 on the left, where the *if*-clause is adjoined higher than the main-clause subject, while the *if*-clause is adjoined at the VP level in 'then-if' conditionals, as shown on the right.

Figure 2

Syntactic structures for 'if-then' (left panel) and 'then-if' (right panel) conditionals.



A number of tests indicate that a sentence-final *if* -clause is adjoined below the subject of the matrix clause:

- (15) *Condition C effects*:
 - a. *She_{*i*} yells if Mary_{*i*} is hungry.
 - b. Bill visits her_i if Mary_i is sick.

(*coreferential matrix-subject pronoun) (✓ coreferential matrix-object pronoun)

(16) *VP ellipsis*: I will leave if you do, and John will [leave if you do] too.

(17) VP topicalization: I told Peter to take the dog out if it rains, and [take the dog out if it rains] he will.(from Iatridou 1991, p. 9)

Hestvik's account predicts that 'if-then' conditionals should have only sloppy readings since the derivation of strict readings would require the subject of the source clause to c-command the elided VP. In contrast, both strict and sloppy readings are predicted to be possible for 'then-if' conditionals. Kehler's coherence account predicts that both strict and sloppy readings should be possible for either type of conditionals since the cause-effect relationship between the *if*-clause and the matrix clause is preserved regardless of linear order. These predictions are summarized in (18).

(18) Predicted readings:

	Structural account	Coherence account
<i>If P, Q</i> ('if-then' conditional)	sloppy (only)	strict & sloppy
Q if P ('then-if' conditional)	strict & sloppy	strict & sloppy

5.1.2 Method The experiment had a 2×3 factorial design, crossing 3 connectives (AND, IF, and so) and the relative order of the source and target clause. An example item passed through all the conditions is provided in (19) below:

(19) Experiment 1 – example		nent 1 – example item:	
		EARLY (generalizes 'if-then')	LATE (generalizes 'then-if')
	AND	Ann voted for herself, and Mary did	Mary voted for herself, and Ann did
		too.	too.
	IF	If Ann voted for herself, Mary did too.	Mary voted for herself if Ann did too.
	so	Ann voted for herself, so Mary did	Mary voted for herself, so Ann did
		too.	too.

The so-conditions were included so that the results could be directly compared to the results reported in Kim and Runner (2009). Their Experiment 3 had a 2×2 factorial design crossing the Resemblance/Cause-Effect discourse relations and intra-/inter-sentential configurations, as exemplified in (20):

(20) Kim and Runner (2009), Experiment 3 – example item:

	RESEMBLANCE	CAUSE-EFFECT
INTRA-SENT.	Ann voted for herself and Mary	Mary voted for herself so Ann did
	did too.	too.
INTER-SENT	Ann voted for herself. Mary did	Mary voted for herself. So Ann
	too.	did too.

Although the main goal of Kim and Runner (2009) was to see if inter- vs. intra-sentential relations affected strict and sloppy readings for reflexives, we included the so-conditions in our experiment to compare our results against their Resemblance vs. Cause-Effect manipulation. Many of the same verbs were used in both experiments.

In addition to the EARLY VS. LATE and CONNECTIVE TYPE manipulations, we paid particular attention to verb type. The verbs were chosen to be a mixture of implicit causality and noncausality verbs in order to see whether implicit causality (in either direction) had any effect on strict vs. sloppy readings in any one of the conditions. In particular, 9 IC1, 18 IC2, and 21 NON-IC verbs were chosen.

The participants were given a binary choice task in which they were asked to (implicitly) choose between a strict and a sloppy reading in the context of a 'detective story'. The participants assumed the role of a police chief that was the boss of a 'concise detective', and were instructed to select the most likely interpretation of a report made by the detective about some on-going investigation. An example stimulus is provided below:

(21) The Detective reported to you: 'If Becky voted for herself in the election, Samantha did too.'

You understand this to mean that: If Becky voted for herself in the election, Samantha voted for

- a. Becky
- b. Samantha

The choice that the participants were required to make effectively disambiguated between the strict and sloppy interpretation of the detective's report.

This particular setup was chosen so that both conditional and AND/SO stimuli could be accommodated. That is, we could have followed Kim and Runner (2009) and simply ask the question: *Who did Samantha vote for?* (*A*) *Becky or* (*B*) *Samantha*. This would have been natural for AND/SO stimuli (*Becky voted for herself in the election, and/so Samantha did too.*), but this type of question would have been less natural for IF stimuli like the one exemplified in (21) above. This is because the question *Who did Samantha vote for?* ostensibly presupposes that Samantha actually voted, while the detective's report explicitly marks the *conditional*, uncertain status of this proposition.

31 UC Santa Cruz undergraduate students participated in the experiment for course (extra) credit. All participants were native speakers of English. The experiment was conducted using an installation of Alex Drummond's Ibex platform¹ locally hosted on the UCSC servers.

There were 48 experimental items and 60 fillers, 6 of which were control fillers used to assess whether participants were paying attention to the experimental task and did not select answers arbitrarily. Every participant saw each item exactly once; the items were rotated through the 6 conditions (Latin square design). The order of the 108 stimuli (48 experimental items + 60 fillers) was randomized for each participant, and the order of the two choices associated with each stimulus was randomized for every stimulus and every participant.

5.1.3 Results and discussion The percentages of strict/sloppy readings for the 6 conditions, followed by the raw counts in parentheses, are provided in Figure 3. Three generalizations can be extracted from these results. First, the percentage/probability of strict readings is roughly constant across all conditions. This is confirmed by the main-effects pnly and the interaction mixed-effect logistic regression models for this data (both models included crossed subject and item random intercepts and random slopes for connectives²): none of the effects were significant in either the main-effects or the interaction model, and the interaction model did not significantly reduce deviance compared to the main-effects model. This across-the-board null result

¹See http://code.google.com/p/webspr/.

²This was the maximal random effect structure that converged; see Barr et al. (2013) for more discussion of (maximal) random effect structures for mixed-effects regression models.

is particularly significant for the IF-conditions: the order of the *if*-clause relative to the main clause does not appear to make any difference. This is compatible with the coherence account but not with the syntactic one – the latter predicts that there should be a significant difference between these two conditions.

Figure 3

Experiment 1: Percentages and raw counts of strict/sloppy for **connective**×**position**; the areas of the 6 boxes and of the strict/sloppy subregions inside each of them is proportional to the relative number of observations in that cell.



Second, contrary to what one might expect from isolated intuitive judgments, participants chose the strict reading fairly frequently for all connective types, even AND. This undermines both the account in Hestvik (1995) and the one in Kehler (2002) since both of them argue that under certain conditions, the reflexive in VPE should behave just as it would in the overt counterpart.³ But Kehler's account, with its explicit acknowledgment of the multiple factors contributing to VPE licensing and interpretation, seems to be more easily generalizable to accommodate this result.

Third, our Experiment 1 and Experiment 3 in Kim and Runner (2009) suggest different conclusions about the impact of Cause-Effect relations on strict vs. sloppy readings in VPE. In Kim and Runner (2009), Cause-Effect showed a markedly higher tendency (>70%) toward strict readings, while Resemblance showed a probability of strict readings similar to ours.

³We are grateful to an anonymous reviewer for emphasizing this point.

A much less uniform picture of the facts emerges if we examine the data by verb, that is, by IC type. As Figure 4 shows, verb/IC type makes a clear contribution to the Causality Effect. This contribution is statistically significant: adding verb type as a third fixed effect to the mixed-effects models estimated above improves data fit ($\chi^2 = 5.25$, df = 2, p = 0.07), with a significant difference between IC1 and IC2 (p = 0.02) and a close-to-significant difference between IC1 and NON-IC (p = 0.09).

Figure 4

Experiment 1: Percentages and raw counts of strict/sloppy for **connective**×**verb type**; the areas of the 9 boxes and of the strict/sloppy subregions inside each of them is proportional to the relative number of observations in that cell.



Figure 4 shows that the proportion of strict readings for IC1 is lower than for IC2, with NON-IC somewhere in between (but close to IC2). This holds for all connective types, suggesting that the phenomenon is at least partially independent of discourse relation.⁴

If as Kehler (2002) suggests, VP ellipsis is anaphora to properties (see also Hardt 1999 and Stone and Hardt 1999), the resolution of which is guided by a variety of factors (discourse structure, syntactic structure, etc.), then it is reasonable to expect that one of the factors biasing the resolution of this anaphoric requirement is the IC content contributed by the main verb. We already know that this IC content can strongly bias the resolution of regular pronouns (Rohde 2008 and references therein, among others), so it is plausible that it could have an impact on

⁴Since the effect of verb/IC type was very similar for the two clause orders (EARLY vs. LATE), we aggregated over them in Figure 4 for the sake of readability.

the resolution of higher-order anaphora.

One way to flesh this idea out would be to say that reflexives like *himself* can receive two distinct (but closely related) interpretations: (i) the default/preferred one is the 'de-transitivizer' interpretation – they are simply functions from transitives/binary relations to intransitives/unary relations, and (ii) their other, less salient interpretation is a pronominal one, with a suitably constrained resolution. See Büring (2005, 2011), Schlenker (2005), Jacobson (2007), Roelofsen (2008), and references therein, among many others, for more discussion of this and of the related preference for binding rather than coreference exhibited by pronouns.

The conjecture, then, is that IC1 vs. IC2 verbs interact with these two interpretations of reflexives in different ways. The subject-oriented IC1 verbs are compatible with the preferred de-transitivizer interpretation, and maybe even reinforce it. We therefore expect a conditional like *If John disgraced himself, Bill did too* to exhibit a strong preference for sloppy readings. If the overt reflexive *himself* in the antecedent is interpreted as a de-transitivizer – because it is the preferred interpretation of reflexives and because IC1 verbs highlight their subject and consequently, the remainder of the sentence is 'understood' as a predication about the subject – the covert reflexive in the elided VP will likely receive the same de-transitivizer interpretation, which will yield the sloppy reading.

In contrast, the object-oriented IC2 verbs highlight the object and its causal efficacy (see e.g. Kasoff and Lee 1993), and indicate that the sentence should be 'understood' as predicating a relation between the subject and the object. This would make the second, pronoun-like interpretation of the reflexive more salient since the de-transitivizer interpretation is explicitly not relational in nature. Now suppose the overt reflexive *himself* receives a pronominal interpretation in a conditional like *If John criticized himself, Bill did too*. Then this gives the subject *John* in the antecedent clause an extra salience boost and in addition, makes it more likely that the covert reflexive in the elided VP will receive the same pronominal interpretation. Since pronoun-like elements (whether overt or covert) prefer to retrieve the most salient entity, the likelihood of retrieving *John* in the consequent, that is, the likelihood of a strict reading, is higher.

5.2 Experiment 2

5.2.1 Motivation In order to directly investigate the effects of IC type (rather than indirectly by treating IC as a covariate, which is what we did in Experiment 1), we conducted a follow-up experiment that expanded the number of IC1 and IC2 verbs under investigation while eliminating NON-IC verbs. In this experiment, IC type was an explicit experimental manipulation. The synonym classes of both IC types were expanded, and since Experiment 1 already established that Kehler's discourse-based account of the Causality Effect is the more plausible one, the number of connective types was pared down to just AND and so, and there was no manipulation of syntactic structure.

5.2.2 Methods and materials The experiment had a 2×2 design that crossed IC type (IC1 vs. IC2) and connective type (AND vs. so). The IC verbs from Experiment 1 were reused along with a number of new verbs, which added up to 24 IC1 verbs and 24 IC2 verbs:

- (22) List of verbs tested in Experiment 2:
 - a. IC1: amuse, disappoint, scare, humiliate, disgrace, encourage, motivate, reassure, fool, calm, inspire, embarrass, confuse, please, shock, startle, let down, flatter, amaze,

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discourage, disgust, astonish, cheat, surprise

b. IC2: hate, pity, like, dislike, thank, help, condemn, congratulate, apologize, comfort, value, criticize, blame, berate, disparage, laugh at, correct, be disappointed with, be hard on, have confidence in, praise, defend, doubt, respect

There were 48 items and 60 fillers, and the procedure was identical to the one used in Experiment 1. There were 21 participants in this experiment, all of them UC Santa Cruz undergraduate students completing the experiment for course (extra) credit. An example IC1 item is provided in (23) (in the AND-condition), and an example IC2 item is provided in (24) (in the so-condition).

- (23) The Detective reported to you: 'Kevin amused himself by telling funny stories and Mike did too.'
 You understand this to mean that: Kevin amused himself by telling funny stories and Mike amused
 a. Kevin b. Mike
- (24) The Detective reported to you: 'Cathy blamed herself for the disaster so Sally did too.' You understand this to mean that: Cathy blamed herself for the disaster so Sally blamed a. Cathy b. Sally

5.2.3 Results and discussion The results of Experiment 2 are summarized in Figure 5. The results confirm the observation that IC1 verbs have a depressing effect on the probability of strict readings, while IC2 verbs raise that probability.

This effect is highly significant. We compared two mixed-effects logistic regression models, one with main effects only for connective and verb type, and one with the interaction of connective and verb type in addition to the main effects. Both models had the maximal random effect structure possible for both subjects and items, that is, random intercepts and random slopes for the main effects of connective and verb type, and for their interaction.

The interaction model did not significantly improve fit relative to the main-effects only model. But in the main-effects model, both the effect of connective and the effect of verb type were highly significant (effects reported in logits; AND is the reference level for the connective fixed effect, and IC1 is the reference level for the verb-type fixed effect): $\beta_{so} = 0.67$, SE = 0.24, p = 0.005 and $\beta_{IC2} = 0.82$, SE = 0.27, p = 0.003. Thus, we see that IC2 verbs have a strong positive effect on the probability of strict readings, independently of the enhancing effect of the connective so – and stronger than this connective effect.

These results confirm and solidify our tentative results from Experiment 1. However, the same question from Experiment 1 persists regarding the relatively low proportion of strict readings for the so conditions. We would expect higher proportions – along the lines of what Kim and Runner (2009) report – if so really signaled a Cause-Effect relation. One possibility is that the particular experimental task we selected (because we wanted to investigate conditionals in Experiment 1) had a depressive influence on the probability of strict readings. One of the goals of our third study, to which we turn in the next section, was to investigate if this depressive effect can be observed with other Cause-Effect connectives in addition to so.

Figure 5

Experiment 2: Percentages and raw counts of strict/sloppy for **connective**×**verb type**; just as before, the areas of the 4 boxes and of the strict/sloppy subregions inside each of them is proportional to the relative number of observations in that cell.



5.3 Experiment 3

5.3.1 Motivation The third, and final, study had two main goals. One of them, mentioned above, was to investigate if the particular experimental task we used had an overall depressive effect on the probability of strict readings for Cause-Effect connectives other than so. The second goal was to investigate the interaction between this broader range of discourse connectives and negation, following up on the observation in Hestvik (1995) that coordinating structures involving *but* and negation preferrably have a strict reading:

(25) John didn't blame himself, but Bill did.

Hestvik accounts for this phenomenon within his syntactic framework by arguing that *but* structures can sometimes involve subordination. However, the argument against this analysis is parallel to the argument against analyzing *and*-clauses as subordinated: neither can be fronted in the same way as other, clearer cases of subordinating conjunctions:

- (26) a. Because Bill blamed himself, John blamed himself.
 - b. *but Bill blamed himself, John didn't blame himself.

c. *and Bill blamed himself, John didn't blame himself.

Given that discourse relations seem to be the main factor in influencing strict vs. sloppy readings, it is worth asking instead what impact the discourse structure associated with *but* + negation has on them. Is it primarily the negation that makes strict readings more likely? Or is it the contrast relation contributed by *but*? Or maybe both?

One way of (partially) distinguishing between these possibilities is to manipulate the position of negation: if we see an effect when the negation is in the first clause (and *but* follows it), rather than when the negation is in the second clause, we can more confidently say that negation has an important role (maybe in conjunction with *but*).

Similarly, if we see a systematic effect of the position of negation (first vs. second clause) across a variety of connective types in addition to *but*, we can more confidently attribute the effect to negation and its contribution to discourse structure, rather than attributing it to the contribution made by sentence connectives (or IC type, for that matter).

5.3.2 Method To test this, we used a 2×4 factorial design (plus 1 control condition that was identical to one of the conditions in Experiments 1 and 2) that crossed 4 discourse connectives – AND, BUT, (AND) THEREFORE, and (BUT) NEVERTHELESS – and the presence of negation in either the first or the second clause. The extra control condition was AND with no negation. An example item is provided below:

	[Control – AND C NO NEGATION. John Dianed minisch and Din did too.]			
_		EARLY NEGATION	LATE NEGATION	
-	AND	John didn't blame himself and Bill	John blamed himself and Bill didn't.	
		did.		
	BUT	John didn't blame himself but Bill	John blamed himself but Bill didn't.	
		did.		
-	NTL	John didn't blame himself but nev-	John blamed himself but neverthe-	
		ertheless Bill did.	less Bill didn't.	
-	TF	John didn't blame himself and	John blamed himself and therefore	
		therefore Bill did.	Bill didn't.	

(27) Experiment 3 – example item (NTL=nevertheless, TF=therefore): [Control – AND & NO NEGATION: John blamed himself and Bill did too.]

Experiment 3 used the same items and fillers as Experiment 1, and the experimental procedure also remained the same. 31 UC Santa Cruz undergraduate students participated in this experiment for course (extra) credit.

5.3.3 Results and discussion Figure 6 provides the descriptive summary of the Experiment 3 data. We see that the percentage of strict readings (38%) we obtained for the control condition (AND & NO NEGATION is comparable with the percentages we obtained for the same condition in Experiment 1 (36% for EARLY and 33% for LATE, with a non-significant difference between EARLY and LATE). This indicates that the overall nature of the task was very similar across the two experiments, so we can draw conclusions about the experimental task in general based on the results of our Experiment 3.

The results show that the experimental task does not have an across-the-board depressive effect on the probability of strict readings: the percentages of strict readings for THEREFORE and NEVERTHELESS are high, and very close to the ones observed in Kim and Runner (2009) for

so. Thus, while our specific task might depress the probability of strict readings, the depressive effect is not as strong as to swamp all effects of connective type. It is therefore possible that the lack of difference between AND and so in Experiment 1 and the fairly small difference between them in Experiment 2 are due to the particle so, which might not be an unambiguously Cause-Effect expressing particle. Instead, so might express a more general, semantically bleached discourse relation that subsumes Cause-Effect, for example, some type of weak notion of plausible entailment or 'relatedness'.

Figure 6

Experiment 3: Percentages and raw counts of strict/sloppy for **connective×negation position**; just as before, the areas of the boxes and of the strict/sloppy subregions inside each of them is proportional to the relative number of observations in that cell; the six NAs in the figure mark unavailable cells, that is, the combinations of conditions that were not tested: NO NEGATION & BUT, NO NEGATION & NEVERTHELESS, and NO NEGATION & THEREFORE.



To analyze the data, we compared two mixed-effects logistic regression models, one with main effects only for connective type and negation position, and one with interaction terms between connective type and negation position in addition to the main effects. Both models had the maximal random effect structure that converged for both subjects and items (and within those non-nested maximal models, the smallest deviance), namely: random intercepts and random slopes for connectives.

The interaction model did not significantly improve fit relative to the main-effects only model. But in the main-effects model, the effect of connective for NEVERTHELESS and THEREFORE (but not for BUT), and the effect of negation were highly significant (effects reported in logits): $\beta_{\text{NEVERTHELESS}} = 0.81$, SE = 0.25, p = 0.001, $\beta_{\text{THEREFORE}} = 1.63$, SE = 0.28, $p = 3 \times 10^{-9}$, and $\beta_{\text{LATE-NEGATION}} = -0.32$, SE = 0.12, p = 0.01.

We see that both THEREFORE and NEVERTHELESS have a significantly higher probability of strict readings than AND (the reference level for the connective fixed effect) or BUT. This provides further support for the coherence account since it is not at all clear that clauses headed by *therefore* or *nevertheless* are syntactically subordinated.

Importantly, we also see that LATE NEGATION has a significantly lower probability of strict readings than EARLY NEGATION (the latter being the reference level for the negation-position fixed effect). Although this happened to some extent across all connectives, it manifested itself most strongly for BUT and NEVERTHELESS.

One way to explain the enhancing effect of early negation on the probability of strict readings is to follow Krifka (2013) (and references therein; see also Horn 1989) and take negative sentences to be verum-focused, or more precisely, to always contribute (or retrieve) a propositional discourse referent for their positive counterparts. That is, a negative sentence is not simply an assertion that happens to be negative, but crucially involves rejecting its positive counterpart. Negation has a reversal discourse function.

Since early negation makes its positive counterpart salient, the subject of the first clause receives a 'double boost' in salience, since it is part of both the asserted negative sentence and its positive alternative. The extra salience boost increases the likelihood of strict readings by a reasoning similar to the one we used to explain the Causality Effect observed in Experiments 1 and 2. As an anonymous reviewer points out, this seems to be closely related to the fact that examples like *John blamed himself but nobody else did* and *John blamed himself and everybody else did too* seem to strongly facilitate strict reflexives in a way that is hard for Hestik's or Kehler's accounts to capture; see Fiengo and May (1994), p. 105, fn. 10, and Kennedy (2003), p. 32 et seqq. for related discussion.

The contrastive function of BUT and NEVERTHELESS might work off of and reinforce the reversal effect associated with early negation. When these two connectives are used, the second clause (i.e. the clause immediately following BUT and NEVERTHELESS) is more likely to have a strict reading because it is expected to contrast with the first, negative clause, and therefore elaborate on the positive alternative evoked by that clause. See, for example, Vicente (2010), for more discussion of the 'corrective' use of *but* that involves a denial of the proposition expressed by the first conjunct (e.g. *John didn't go to the park, but (rather) he went to the library*).

6 Conclusion

The overall theme of this paper has been that discourse structure plays a significant biasing / disambiguating role with respect to strict vs. sloppy readings of reflexives in VP ellipsis. And this discourse structure is determined by a variety of sources, including the specific discourse connective that is used, the early vs. late position of sentential negation, and the semantics of the verb itself.

While we initially framed the theoretical contribution of the paper in terms of distinguish-

ing between two competing theories that were grounded in syntax vs. discourse structure, the results indicate that the empirical landscape is more fine-grained and complex than an antithesis of two simple sources of bias. The preponderance of the evidence seems to favor a (primarily) discourse-structure account, but not all of the data can be easily explained by examining discourse connectives and their meanings. For one thing, it is still unclear what the status and contribution of so is. But more importantly, much of the explanatory burden was ultimately shifted to the meaning contributions made by other items: the implicit causality bias contributed by different verb types, the various analyses of reflexives proposed in the previous literature, and finally, the reversal (*verum*-focus related) contribution made by sentential negation. These effects and their interactions were merely outlined here, but they deserve a much more in-depth empirical and theoretical investigation.

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What Can Visual World Eye-tracking Tell Us about the Binding Theory?

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This paper presents the results of a visual world eye-tracking experiment that tests two claims in the literature: that the Binding Theory (BT) is a set of "linked" constraints as in the classic BT (Chomsky 1981) and HPSG's BT (Sag, Wasow, and Bender 2003); and that the BT applies as an initial filter on processing (Nicol and Swinney 1989, Sturt 2003). Our results instead support two different claims: that the constraint on pronouns and the constraint on reflexives are separate constraints that apply differently and with different timelines, in line with "primitives of binding" theory, Reuland (2001, 2011); and that neither constraint applies as an initial filter on processing, as proposed in Badecker and Straub (2002).

Keywords: visual world eye-tracking, Binding Theory, initial filter, defeasible filter, multiple constraints

1 Introduction

A question of central importance at the interface of the grammar and the language processing system is how grammatical constraints are deployed during sentence processing. This paper focuses on how the grammatical constraints of the syntactic Binding Theory (BT)-the structural constraints on reflexives and pronouns-apply during online processing. Our study is presented against a background literature proposing a variety of models for the application of the BT during processing. The Initial Filter approach (Nicol and Swinney 1989) suggests that the BT constraints constrain from the very beginning of processing which potential antecedents people consider during processing; the Defeasible Filter approach (Sturt 2003) posits that initially people consider only potential antecedents consistent with the BT, but may at a later stage of processing consider antecedents not sanctioned by the BT; and the Multiple Constraints approach (Badecker and Straub 2002) claims, instead, that the constraints of the BT apply alongside other processing constraints throughout processing. Using a novel visual world eye-tracking method which manipulates the gender of potential antecedents visually, we find clear evidence that listeners consider gender-matching potential antecedent NPs for reflexives and pronouns that match in gender regardless of whether they are licensed structurally by the BT, consistent with the Multiple Constraints view. We also consider how our results also bear on the formulations of the BT, favoring an approach that recognizes that the constraints of the BT apply differently for reflexives and pronouns, in particular appearing to be less robust for the latter.

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1.1 Syntactic Constraints on Binding

Different types of NPs display different biases with regard to sentence-internal antecedence, which are arguably based on syntactic structure. Reflexives must find an antecedent NP in a higher position in the same clause, as in (1a), whereas pronouns resist antecedent NPs in a higher position in the same clause, as in (1b):

- $(1) \quad \ \ a. \quad Charles_{j} \ said \ [that \ Jim_{i} \ saw \ himself_{i/^{*}j/^{*}k}]$
 - b. Charles_j said [that Jim_i saw $him_{i/j/k}$]

The classic BT (e.g. Chomsky 1981) accounted for these facts with the two constraints and the definition in (2).

(2) Principle A. A reflexive is bound in a local domain.Principle B. A pronoun is free in a local domain.Bound (not free) = coindexed with a c-commanding noun phrase

Principle A requires a reflexive to be bound (coindexed with a c-commanding phrase) in a local domain (roughly, a clause); and Principle B requires a pronoun to be free (not bound) in that same local domain. Thus, in (1a), *himself* must be bound by *Jim*, and not by *Charles* (by Principle A); and in (1b), *him* cannot be bound by *Jim*, but may be bound by *Charles* (by Principle B). Note that the ultimate antecedent of *him* in (1b) (be it *Charles* or some other sentence-external referent) is usually thought to be determined by other, non-syntactic, considerations. In what follows we will refer to potential antecedent NPs sanctioned by the BT (e.g. *Jim* in (1a) and *Charles* in (1b)) as "BT-compatible" or "BT-accessible," and those not sanctioned by the BT (*Charles* in (1a) and *Jim* in (1b)) as "BT-incompatible" or "BT-inaccessible."

Most syntactic frameworks assume something like the BT, though they differ on what the relevant structural relations are (e.g. phrase structure trees, argument structures, functional structures, etc.), what count as reflexives and pronouns for the BT, and whether the principles constraining reflexives and pronouns are linked or (partially) independent.

For example, in the lexicalist framework Head-driven Phrase Structure Grammar, binding is defined on argument structures. An argument structure is an ordered list of the arguments of a head, such that an item outranks every item to its right; "outrank" corresponds to syntactic prominence and thus is similar to c-command in the classic BT. On the assumption that a verb like *see* has an argument structure that includes at least the information in (3), that it has two arguments, one more structurally prominent (NP1) than the other (NP2), the HPSG BT in (4) (based on Sag, Wasow, and Bender 2003) also predicts the binding in (1).

- (3) ARG-ST of see: $\langle NP1, NP2 \rangle$
- (4) Principle A: An outranked reflexive must be outranked by a coindexed element. Principle B: A pronoun must not be outranked by a coindexed element.

In (1a) NP2 (*himself*) is an outranked reflexive (there is an argument to its left in the argument structure of *see*), so it must be coindexed with one of its outranking elements, here NP1 (*Jim*); and in (1b), *him* is a pronoun and must not be outranked by any coindexed element (i.e. it cannot be coindexed with NP1, *Jim*). HPSG's BT also makes no claims about the ultimate antecedent of *him* (as in (1b), it could be *Charles* or some sentence-external NP).

The "reflexivity" approach of Reinhart and Reuland (1993), which is also employed in Reuland's more recent (2001, 2011) "primitives of binding" approach, builds on the intuition that the BT is about licensing reflexive predicates. Essentially if the intent is for two arguments to be coindexed, that needs to be marked. The relevant conditions are in (5):

- (5) A. A reflexive-marked predicate (a predicate containing a "self" word) is reflexive (it has coindexed arguments).
 - B. A reflexive predicate (a predicate with coindexed arguments) is reflexive-marked (by a "self" word).

In (1a), the predicate *see* is reflexive because its two arguments are coindexed; and it is reflexive-marked (by *himself*), satisfying A and B. In (1b), however, the assumption is that a pronoun like *him* cannot reflexive-mark the predicate, so *see* cannot be reflexive (i.e. cannot have two coindexed arguments). Coindexing *him* with *Jim* would violate B since the predicate is not reflexive-marked.

While Reflexivity rules out binding (as coindexation) in a sentence like 'Jim adores him,' it does not rule out coreference; that is 'Jim' and 'him' could end up referring to the same individual. It turns out that under certain circumstances a pronominal object can be coreferential with the subject, as indicated by this classic example from Reinhart (1983) (cited in Reuland 2001, p. 448):

(6) I know what Mary and Jim have in common. Mary adores him and Jim adores him too.

To account for this possibility the Reflexivity approach is supplemented by Rule I (from Reuland 2001, p. 448):

(7) Rule I: NP A cannot corefer with NP B if replacing A with C, C a variable A-bound by B, yields an indistinguishable interpretation.

The intuition is that in (6), *Jim adores him* does not have the same interpretation as *Jim adores himself*, and thus, by Rule I, is allowed. Unlike for reflexives, besides the Reflexivity conditions, Rule I has to be computed to properly constrain pronoun reference. The Reflexivity approach, unlike the other two approaches, allows discourse-level considerations to play a role in the ultimate fate of the interpretation of object pronouns.

Summarizing, then, the classic BT of Chomsky (1981) and the HPSG BT (Sag, Wasow, and Bender 2003) treat the intrasentential coreference possibilities of pronouns and reflexives on a par: both are determined by the binding principles. However, the Reflexivity (and Reuland's 2001, 2011 primitives of binding) theory distinguishes the licensing of reflexive interpretations from pronoun interpretations. In particular, Rule I must apply to determine whether coreference with a pronoun is licensed. It may be worth noting that Rule I is logically independent of the choice of BT. In principle, it could be paired with the classic Chomskyan BT or the HPSG one as well. It is simply a condition stating under what conditions coference (as opposed to binding) is (dis-)allowed.

As mentioned above at some point in coming to an interpretation for pronouns, information beyond the local syntactic context must be examined. It is clear from both psycholinguistic and computational studies of pronoun interpretation that a variety of sentence-external features (beyond the restrictions placed on it by the BT) influence the interpretation of pronouns.

1.2 The BT during Processing

In a series of cross-modal lexical priming studies, Nicol and Swinney (1989) showed that only BT-compatible antecedents were primed immediately after the proform. For the reflexive in (8), only *doctor* was primed, whereas for the pronoun, only *skiier* and *boxer* were primed. The

BT-incompatible antecedents (*boxer* and *skiier* for the reflexive, *team* for the pronoun) were not primed.

(8) The boxer told the skiier that the doctor for the team would blame him/himself for the recent injury.

As Nicol and Swinney summarize, "... It appears that *initial perceptual processing activates all viable candidates (here, those that conform to grammatical constraints)* and the choice among the candidates is relegated to later, perhaps nonmodular (see Fodor 1983) language processing" (p. 19) [my emphasis]. This has become known as the "Initial Filter" view of how the BT applies during processing. The BT acts like goggles on the parser, only allowing it to "see" those NPs sanctioned by the BT principles.

Based on the results of several self-paced reading experiments, Badecker and Straub (2002) showed that gender-matching BT-incompatible antecedents affected processing. In an example like (9a), participants showed a latency increase when the BT-inaccessible but gender-matching reflexive antecedent *John* was present compared to *Jane*; and in (9b), the presence of the gender-matching local subject also triggered an increase in reading latency. These effects occurred after the reflexive or pronoun.

(9) a. John/Jane thought that Bill owed himself another opportunity to solve the problem.b. John thought that Bill/Jane owed him another opportunity to solve the problem.

Badecker and Straub suggest that their results "indicate that the binding-theory principles do not function as initial filters on the input to all stages of coreference processing. Instead, the data presented here *support the interactive-parallel-constraint model*. The *initial candidate set is composed of the focused discourse entities* (or sentence constituents) that are compatible with the lexical properties of the referentially dependent expression" (pp. 764–765) [my emphasis]. This has come to be known as the "Multiple Constraints" view that BT constraints apply simultaneously with other constraints on processing.

Sturt (2003) argued that these previous studies (Nicol and Swinney; Badecker and Straub) used methods not sensitive enough to tap into earliest moments of processing. This argument, and his subsequent eye-tracking during reading demonstration of the early effects of BT on reflexives, have been very influential. A number of subsequent studies have built on Sturt's study, regularly finding no evidence for the effect of BT-incompatible antecedents for reflexives. We now turn to reviewing this line of studies.

Sturt (2003) used gender-stereotyped nouns like *surgeon* to examine the online application of BT principle A. In that study and all of the follow-up studies, the BT-compatible antecedent was the gender-stereotyped NP, and the BT-incompatible antecedent was either a name or a pronoun; the reflexive matched or mismatched the stereotyped gender, and matched or mismatched the gender of the inaccessible antecedent. In his experiment 1, the BT-accessible antecedent was linearly closer to the reflexive than the BT-inaccessible antecedent, as (10) illustrates. *The surgeon* is the only BT-accessible antecedent for the reflexive; the main clause sentence subject (he/she) is BT-inaccessible for the reflexive.

(10) Jonathan/Jennifer was pretty worried at the City Hospital.

He/she remembered that the surgeon had pricked himself/herself with a used syringe needle.

The basic result was that first-fixation durations at the reflexive were longer if the reflexive mismatched the stereotyped gender of the accessible antecedent; that is, *surgeon...herself* >

surgeon...himself. First-fixation durations showed no effect of the gender of the inaccessible antecedent (*he/she*). However, second pass reading times, which are the sum of fixations made on a region after that region has already been exited for the first time, did show an effect of the BT-inaccessible antecedent.

Sturt suggested his results, "show that processing can indeed be *affected both by a bind-ing-accessible antecedent, and by a (binding-inaccessible) discourse focused antecedent,*" but that "the relevant constraints become operative at temporally distinct stages, and are not both simultaneously available at the earliest point in processing, in other words, the results support a model in which *Principle A acts as an early but defeasible filter*" (p. 558) [my emphasis]. Sturt called this the Defeasible Filter view.

In Sturt's experiment 2, which otherwise was similar to his experiment 1, the inaccessible antecedent was placed as the object of a subject relative clause; here the inaccessible antecedent was linearly closer to the reflexive than the BT-accessible one, as in (11). Here the BT-accessible antecedent (*the surgeon*) is linearly more distant from the reflexive than the BT-inaccessible antecedent (*Jonathan/Jennifer*).

(11) Jonathan/Jennifer was pretty worried at the City Hospital. The surgeon [who treated Jonathan/Jennifer] had pricked himself/herself with a used syringe needle.

As in his experiment 1, first-fixation durations were again longer when the gender-stereotyped accessible antecedent mismatched that of the reflexive. However, unlike experiment 1, there was no early or late effect of the BT-inaccessible antecedent.

Subsequent studies using gender-stereotyped nouns in a variety of constructions all find early effects of BT condition A, but variable effects of the inaccessible antecedent. Factors that varied across experiments included whether the inaccessible antecedent was a subject and pronoun (as in Sturt's experiment 1), was the object of a subject relative clause (as in Sturt's experiment 2), or was the subject of an object relative clause. Several studies have placed the inaccessible NP as subject of an object relative clause, with varying degrees of BTinaccessible antecedent effects.

Xiang, Dillon, and Phillips (2009) used ERP methods to test sentences similar to Sturt's experiment 2, but with object relative clauses, as in (12). Here the accessible antecedent is the subject of the main clause and the inaccessible is the subject of an object relative clause.

(12) The tough soldier [that Fred/Katie treated in the military hospital] introduced himself/herself to all the nurses.

They found a significant P600 when the reflexive mismatched the stereotyped gender of the accessible antecedent, replicating the effect of the BT; they also found some marginal effects of the "intrusive" antecedent (*Katie*), as an early (250–350) central anterior negativity, and a later (800–1000) posterior negativity. They argue that these marginal effects do not actually suggest that readers were considering the intrusive antecedent, but we mention this here for completeness.

Cunnings and Felser (2012) used sentences similar to Xiang et al.'s but with a pronominal subject of an object relative clause as the resuming inaccessible antecedent, as in (13):

(13) James/Helen has worked at the army hospital for years.

The soldier [that he/she treated on the ward] wounded himself/herself while on duty in the Far East.

They divided their participants into two groups based on working memory capacity. In addition to early stereotyped gender mismatch effect, they find a robust effect of inaccessible antecedent in lower working memory participants. Though the different effects in the different working memory groups raise almost as many questions as they answer, it is worth noting that the effect of the inaccessible antecedent was strongest when it was the pronominal subject of an object relative clause, as in (13).

Summarizing, all studies employing the gender-stereotype manipulation show early effects of the BT, as the main effect of the gender-stereotype mismatch. However, studies vary on whether they find any effect of the inaccessible antecedent. Table 1 summarizes the structural differences across studies and the variable effect of the inaccessible antecedent.

Tab	le	1
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Effects of B1-accessible and -inaccessible across studies					
Study	Pronoun	Subj (of RC)	Obj (of RC)	Effect of Acc	Effect of Inacc
Sturt 1	\checkmark		Х		
Sturt 2	x	х	\checkmark	\checkmark	Х
Xiang et al.	x	\checkmark	Х	\checkmark	$\sqrt{?}$
C&F (low mem.)	\checkmark	\checkmark	x	\checkmark	\checkmark

1.3 Some Considerations for Our Study

Examining the variations in Table 1, a generalization begins to emerge. It appears that more "topical" inaccessible antecedents exert more of an influence on binding resolution. When the inaccessible antecedent is the subject of the sentence (Sturt exp 1), or is resumed by a pronoun (Sturt exp 1, Cunnings and Felser), or is the subject of an object relative clause (Xiang et al., Cunnings and Felser), it is more likely to have an effect on the processing of reflexive binding. Sentence subjects and pronouns have long been associated with topicality; and Roland, Mauner, O'Meara, and Yun (2012) show that the subjects of object relative clauses are more likely to be "discourse old" than the objects of subject relative clauses; that is, they are likely to pick up reference to something already topical in the discourse, potentially continuing it as a topic. Our study will manipulate the "topicality" of the inaccessible antecedent by relative clause type: it will either be the subject of a relative clause (= more topical) or the object of a relative clause (= less topical).

Sturt's (2003) study, and subsequent ones examining the processing of reflexives are typically described as providing evidence for when the BT applies. However, since they only examine reflexives, they can only reveal how Principle A applies during processing. It follows that evidence for how Principle A applies may serve as evidence for how Principle B applies if the BT actually applies as a block, as in Chomsky's (1981) classic BT and the Sag et al. (2003) HPSG BT. However, the Reflexivity theory (Reinhart and Reuland 1993) requires examining both binding (coindexation licensed by the BT) and coreference (Rule I) for pronouns. Thus, the latter approach potentially predicts differences in the processing of pronouns compared to reflexives. Evidence that reflexives and pronouns behave differently in processing might support the latter approach, or at least an approach the recognizes the potential relevance of non-structural information in the resolution of pronoun reference. To address the question of how similar the processing of reflexives and pronouns is, our study will include both proform types in order to compare them side by side.

The main evidence for the early effect of Principle A in these previous studies comes from increased latency at (or after) the reflexive when it mismatches the stereotypical gender

of the BT-accessible antecedent (*surgeon…herself* > *surgeon…himself*). For the argument to go through that BT Principle A applies as an initial filter, we must assume that earliest representation of the noun accessed includes stereotyped gender features (like lexically marked NPs like *he* or *princess*). This is a critical assumption if the conclusion is that BT applies as an initial filter on processing (see Nicol and Swinney 1989, and discussion in Sturt 2003). This assumption may be justified, but we will instead manipulate gender without gender-stereotype.

2 Experiment

2.1 Design, Procedure, and Materials

Our experiment was designed to answer the following questions: First, does the degree of "topicality" of the BT-incompatible antecedent (operationalized as subject vs. object of relative clause) affect its influence on binding? And second, does the influence of the inaccessible antecedent hold equally and with similar timelines for both reflexives and pronouns?

Our study employed visual world eye-tracking. Participants (n=25) listened to sentences containing (normed) non-gender-stereotyped occupations like 'pharmacist' while looking at a grid containing pictures of the mentioned characters and two distracter images. Gender was manipulated visually, using a picture of a male or a female e.g. pharmacist (see Figure 1). Half of the materials tested reflexives and the other half pronouns. The inaccessible antecedent (for reflexives) was either the subject of an object relative clause, or the object of a subject relative clause (manipulating the "topicality" of the BT-inaccessible). Participants clicked on the picture corresponding to the proform. The occupations were normed in a separate study which asked native English speakers if a particular occupation was more likely to be a male or a female (on a scale of 1-5); those occupations that scored 3 on average were included in the study. In addition, the images were normed (separately) by asking native English speakers to name each image; we used images for which the noun used in the experiment was the first choice in the norming study.

The recorded sentences were split into two parts and the border was the end of the relative clause. After the audio file containing the relative clause played, the display disappeared and a fixation cross appeared. Participants clicked on the cross and then the scene reappeared and the sentence continued. This was done to ensure that fixations when participants hear the proform were independent of their fixations while listening to the relative clause.

As is standard in visual world eye-tracking, we assume that attentional shifts to objects in the visual field are typically accompanied by a saccade; eye-movements to potential referents are closely time-locked to the input (Cooper 1974; Tanenhaus, Spivey-Knowlton, Eberhard, and Sedivy 1995); and potential referents are fixated in proportion to the likelihood of that referent being the intended target of the spoken materials (Allopenna, Magnuson, and Tanenhaus 1998). Thus, the proportion of looks to different objects provides an indication of which entities the hearer is considering as possible referents over time.

Figure 1

Sample visual display containing mentioned character (e.g. Molly in example (14a)), distractor character (e.g. Darrin), mentioned occupation (e.g. pharmacist) and distractor occupation (e.g. cellist). Scenes were constructed so that the genders of the mentioned and distractor occupations were different. Female and male versions of occupations are shown for illustration only.



The experiment manipulated three variables, each with two levels for a total of 8 conditions. Half of the experimental trials contained reflexives and half pronouns; on half of the trials the inaccessible antecedent matched and on half it mismatched the gender of the proform; and on half of the trials used subject relative clauses and half used object relative clauses. (14) and (15) illustrate the materials.

- (14) Reflexive: inaccessible (NP in RC) gender match (a) and mismatch (b):
 - (a) ORC: The pharmacist(f) [that Molly met] drove herself to the party. SRC: The pharmacist(f) [that met Molly] drove herself to the party.
 - (b) ORC: The pharmacist(f) [that Darrin met] drove herself to the party. SRC: The pharmacist(f) [that met Darrin] drove herself to the party.
- (15) Pronoun: inaccessible (subject) gender match (a) and mismatch (b):
 - (a) ORC: The pharmacist(f) [that Molly met] drove her to the party. SRC: The pharmacist(f) [that met Molly] drove her to the party.
 - (b) ORC: The pharmacist(m) [that Molly met] drove her to the party. SRC: The pharmacist(m) [that met Molly] drove her to the party.

In (14a) the inaccessible antecedent ('Molly') matches the gender of the reflexive, whereas in (14b) it ('Darrin') does not. And in the ORC conditions of (14) the inaccessible antecedent is the subject of the relative clause, and in the SRC conditions, it is the object. In (15) the subject of the sentence is the BT-inaccessible antecedent for the pronoun; in (a) it matches the gender of the pronoun; in (b) it mismatches. In both pronoun cases the RC-internal NP matches the gender of the pronoun, since it is the only BT-compatible antecedent in the sentence. We constructed 8 lists containing 4 lexicalizations of each condition plus 32 fillers, which were sentences of the same type as the experimental items but lacking proforms.

2.2 Results

2.2.1 Click Results We begin with the click responses. These responses indicate the final interpretation listeners assigned to the sentences. Let's first consider the predictions. On the assumption that something like the BT principles have an influence on listeners' final interpre-

tations of sentences containing pronouns and reflexives, we expect that in sentences containing reflexives (like (14)) participants should choose the subject of the sentence (and not the RC-internal NP) as antecedent; in sentences containing pronouns (like (15)) we instead expect participants to choose the RC-internal NP (and not the sentence subject) as antecedent.

Figure 2

Click responses. For reflexives, target is subject of sentence and inaccessible is RC-internal NP; for pronouns target is RC-internal NP and inaccessible is sentence subject.



gender mismatch (-) or match (+)

Figure 2 illustrates the proportions of BT-compatible target choices. As the figure shows there was overall a high proportion of BT-compatible responses. The mean proportions for all conditions were between .90 and .98. The only significant difference was the main effect of proform: overall participants were more likely to choose the BT-compatible target on the reflexive conditions than on the pronoun condition (p<.03). However, with all of the means at . 90 or above, these results indicate that participants understood the sentences and that their final target choice closely followed the constraints of the BT. The fact that our participants clearly understood the sentences is relevant because in some of the previous eye-tracking studies it is difficult to know how well participants actually understood the sentences, leading to the possibility that the varying effects of the inaccessible antecedent could be partially due to the varying degrees to which participants misread or ultimately misunderstood the (fairly complex) sentences. Indeed, Sturt's experiment 1b (a small follow-up off-line study) used a subset of his experiment 1 materials to test readers' final antecedent choice; remarkably, on some conditions up to 40% of the final interpretations were inconsistent with the BT. This both suggests that the materials were complex enough to lead to error and that some of the relevant eye movements during reading may actually have come from readers not interpreting the sentences properly (see Dillon 2012). Our listeners' final interpretations were

overwhelmingly consistent with the BT, suggesting that the processing we observe through their eye movements will reflect a path to a final interpretation consistent with the grammar.

2.2.2 Fixation Data Before moving to the fixation data, let us reconsider the predictions. If the BT conditions A and B both apply from the earliest moments, there should be no gender effect, that is, no differences between trials where the BT-inaccessible matched or mimatched the gender of the proform, and this should hold for both pronouns and reflexives. However, if the BT conditions do not apply from earliest moments, or are separable we may find a gender effect early on, or a difference between how the reflexives and pronouns are processed.

In particular, the Initial Filter view predicts that there should be no early effect of the gender manipulation on participants' fixations; the Defeasible Initial Filter view also predicts no early effects of the gender manipulation, but allows for delayed effects; the Multiple Constraints view allows for the effects of both the BT principles and other factors that may be relevant for the processing of proforms. In addition, the classic and HPSG Binding Theories both predict the BT principles to be applied as a block, predicting that the structural effects should be parallel for reflexives and pronouns; however, the Reflexivity approach, which acknowledges additional constraints on pronouns, seems to predict that the processing of pro-nouns may be delayed or show the influence of other information in the context that reflexive binding should be insusceptible to.

Figure 3

Target advantage fixations for reflexive and pronoun trials where inaccessible mismatched or matched gender of proform



pronoun mismatch • • • pronoun match

Figure 3 illustrates the "target advantage" fixations during trials in which participants chose the BT accessible target (as is clear from Figure 2, this includes over 90% of the data). Target advantage fixations are the proportion of fixations to the BT-accessible antecedent minus the proportion of fixations to the inaccessible antecedent at each 4ms time slice. If positive, it means listeners are looking at the accessible (target) more than the inaccessible; if negative, they are looking at the inaccessible more than the accessible.

It is immediately clear that reflexive and pronoun trials did not have a parallel effect on listeners' eye movements. Fixations to the target for reflexives (the blue lines in Figure 3) increased more quickly than those for pronouns (the red lines), indicating that listeners more quickly shifted their gaze to the BT-accessible antecedent (the target) when the proform was a reflexive. In addition, both reflexives and pronouns showed an early gender effect, indicated by the solid line being higher than the dotted line. That is, when the inaccessible antecedent matched the gender of the proform, listeners were slower to shift their gaze to the accessible (target) than when the inaccessible mismatched. Put another way, the presence of a gendermatching inaccessible antecedent drew fixations to that picture, reducing the target advantage. For both reflexives and pronouns the gender effect began early on, and for pronouns is rather more protracted. It is unexpected that the target advantage fixations would be negative for the pronoun trials before the onset of the proform. We return to this in the discussion.

We now turn to the relative clause manipulation predictions. In object relative clauses the RC-internal NP is the subject and in subject relative clauses it is the direct object. Our prediction was that when the RC-internal NP is subject it should be more "topical" than when it is the object. Thus, we predict a larger gender effect in the object relative clause condition. No specific predictions were made for the pronoun conditions.

The top panel of Figure 4 illustrates the target advantage fixations on the subject relative clause conditions: Both figures show again that the target fixations on the reflexive conditions (blue lines) increased more rapidly than those on the pronoun conditions (red lines). And again, there is evidence of an early gender effect for both reflexives and pronouns (dotted line lower than solid line). With regard to the relative clause manipulation, the prediction was that on the object relative clause condition (where the inaccessible is the subject of the relative clause) there should be a larger gender effect than on the subject relative clause condition (where the inaccessible is an object). Contrary to that prediction, the gender effect appears to be more robust in the subject relative clause (for reflexives) than in the object relative clause. How-ever, the relative clause manipulation did appear to have a large effect on fixations during the pronoun conditions. In particular, target advantage fixations were lower in the object relative clause condition than in the subject relative clause condition. We return to this in the discussion.

To statistically evaluate these effects we isolated a 500ms window starting at 500ms after main verb onset during the trials in which participants chose the BT accessible antecedent (sentence subject on reflexive trials, relative clause-internal NP on pronoun trials). This window was chosen because the average onset of the proform was at 348ms after the verb onset; thus our analysis window begins about 150ms after the average onset of the proform, about where signal-driven fixations are expected to begin to appear. The target fixations in this 500ms window were modeled in a linear mixed effects model with fixed effects of proform (reflexive, pronoun), gender (mismatch, match) and RC-type (SRC, ORC) and their interactions, and with subject and item as random intercepts; to control for over-sampling and state dependencies, we also included a control in the models that represents the fixation region on the previous time sample (Frank, Salverda, Jaeger, and Tanenhaus 2008).

Figure 4



Target advantage fixations in subject (top panel) and object (bottom panel) relative clause conditions

There were main effects of proform (more target fixations for reflexives than for pronouns) and gender (more target fixations when the inaccessible gender mismatched than when it matched the gender of the proform). In addition, the previous fixation control factor was highly significant. These main effects were qualified by two interactions. There was an interaction between proform and gender (the inaccessible NP's gender had a larger effect on pronoun trials than reflexive trials) and a three-way interaction among all three factors indicated that there was a gender effect in subject RCs for both reflexives and pronouns, whereas

in object RCs it is only present for pronouns and not reflexives. Figure 5 graphs target advantage fixations during this 500ms analysis window.



Figure 5

Target advantage fixations 500-1000ms after verb onset, with standard error bars

2.3 Discussion

Participants' final interpretations of the stimuli were overwhelming consistent with the predictions of all versions of the BT: on reflexive conditions participants clicked on the picture of the subject of the sentence; and on pronoun conditions they clicked on the picture of the relative clause-internal NP. All proportions were between .9 and .98, suggesting that regardless of condition, participants understood the sentences and chose the BT-compatible antecedent. There was a subtle, though statistically reliable, main effect of proform, such that on pronoun trials participants were somewhat less likely to choose the BT-accessible antecedent, though again, they still did so on 90+% of the trials. However, these interpretational differences did perhaps preview the very clear differences in fixation patterns in pronoun and reflexive trials.

Fixations during reflexive trials indicated that participants considered the BT-accessible antecedent more than the BT-inaccessible one from soon after they heard the reflexive. Thus fixations during reflexive trials were consistent with the claim that the BT is at least one of the constraints affecting on-going reflexive interpretation. However, just as early as the effect to fixate the subject more than the RC-internal NP was the effect of the gender of that RC-internal NP: if it matched the gender of the reflexive participants were drawn to looking at it more than if it mismatched. This suggests that alongside the BT, which may account for the overall increase in looks towards the subject NP, there appears to be the consideration of other BT-incompatible NPs, from the earliest moments of reflexive processing. From the point of view of the approaches presented above, these results are inconsistent with both the Initial Filter and Defeasible Filter views, which would have predicted no gender effect, especially early on in processing. Instead, these results are consistent with the Multiple Constraints view. BT Principle A does appear to exert some influence early on, since participants quickly started shifting their fixations to the subject; but this shift was delayed when the BTincompatible NP matched the reflexive gender. Apparently, both BT-compatible and BT-incompatible antecedents were under consideration early on in reflexive processing.

Turning to pronouns, fixations during pronoun trials were different from those in reflexive trials in various ways. It appears that the overall effect of the BT-to resist the BT-incompatible NP as a potential antecedent-was delayed for pronouns compared to reflexives. Indeed, for some time early on participants were more likely to look at the BT-inaccessible antecedent than the BT-accessible one. This is puzzling. However, an important clue is that this effect begins before the onset of the proform, suggesting it cannot be due to pronoun processing per se. What could be driving this different between pronoun and reflexive fixations? We believe the answer lies in a claim made by Koring, Mak, and Reuland (2012), that the subject of a verb is reactivated or retrieved when that verb is processed. In our materials, this would result in looks to the subject triggered by the main verb. In our previous figures, for reflexives, looks to the subject were graphed as looks to the BT-accessible antecedent; but for pronouns, looks to the subject were graphed as looks to the BT-inaccessible antecedent. To examine Koring et al.'s claim, if instead of graphing target advantage (BT-accessible fixations minus BT-inaccessible fixations), we graph looks to the subject, we would expect no difference between pronoun and reflexive fixations prior to the onset of the proform. Figure 6 illustrates fixations recast in these terms.

Figure 6

Fixations to subject NP and RC-internal NP during first 500ms after verb onset, with standard error bars



We can see in Figure 6 that before the onset of the proform participants were more likely to look at the subject of the sentence than the NP inside the relative clause. This is consistent with Koring et al.'s claim that the subject is reactivated during verb processing. Critically, the gender effect is not apparent at this early point, suggesting that this is a drive to look at the subject NP regardless of its gender. If these fixations were driven by the proform (somehow) we would expect the gender effect to appear here: more fixations to the subject NP when it
matches the gender of the proform. Given that these fixations appear prior to the onset of the proform, the lack of a gender effect is expected.

It is important to point out here that the observation that during pronoun conditions participants were more likely to look at the BT-inaccessible antecedent (the sentence subject) is not in conflict with the observation that pronouns were processed differently from reflexives. This is because the gender effect begins to appear quite early after the onset of the proform, as illustrated in Figure 3. The gender effect is a clear indicator that participants tried to interpret the proform with respect to the inaccessible antecedent, qua antecedent. Some of the overall depression of the pronoun fixation curves is probably due to the brief subject retrieval just mentioned, but the large and protracted gender effect strongly suggests that most of the difference is due to listeners' attempting to link the pronoun to the gender-matching BT-inaccessible antecedent.

Turning now to the relative clause manipulation, given that previous studies seemed to show more of an inaccessible effect on reflexives in object rather than subject relative clauses, we had predicted something similar: that the RC-internal NP in an object relative clause, being a subject and thus potentially topical and/or expected to be discourse old (Roland et al. 2012), would have triggered a larger inaccessible gender match effect on our reflexive trials. This did not occur. Indeed the gender match effect for reflexives was somewhat smaller in object RCs than in subject RCs as is clear in Figures 4 and 5. However, the fact that the manipulation did not have the intended effect is not problematic, as the inaccessible gender effect was robust across conditions. Our goal was simply to increase the likelihood of demonstrating the inaccessible gender effect. The manipulation did not work, but the effect appeared nonetheless.

At the outset of this study, we did not have any predictions for how the relative clause manipulation would effect the pronoun conditions. The relative clause manipulation was designed to affect reflexives, based on previous studies of reflexives. However, interestingly, the relative clause manipulation did affect the pronoun fixations. We can speculate why this may have been the case, and leave for future research a more careful investigation of pronoun processing in these structures more carefully. The basic result was that in object relative clauses participants were slower to fixate the target overall and they showed a larger gender effect. One obvious possibility is the claim that object relative clauses are "harder" to process in general (Grodner and Gibson 2005). If this is the case, at least outside of a supporting context (see Roland et al. 2012), then some of the delay for pronouns may have simply been processing difficulty. For this account to work, we need to be able to assume that reflexive binding is not affected by relative clause processing complexity, since participants were not delayed at all on reflexive object relative clause conditions.

A second possibility is that the expectations for which referent was more likely to continue to be referred to may be influenced by the relative clause type. If, for example, after hearing an object relative clause, participants were more likely to expect reference to the subject NP, then reflexive trials would be comparatively easy since the subject NP turned out to be the correct NP; whereas pronoun trials would involve having to override the subjectpreference of the object relative clause. Indeed, this possibility seems to be supported by the early fixations. In the main verb region, preceding the onset of the anaphor, participants fixated the subject NP more on the object RC conditions than on the subject RC conditions. This suggests that after listening to an object RC, participants were expecting reference to the subject of the sentence more than when they heard a subject RC. This is illustrated in Figure 7, which plots the fixations to the subject NP and RC-internal NP across the different relative clause types.



Figure 7

Fixations to subject NP and RC-internal NP during first 500ms after verb onset on subject relative clause (left) and object relative clause (right) conditions

It appears that after a subject relative clause, participants expectations for ongoing reference to the sentence subject and the RC-internal NP were more balanced (though somewhat biased toward expecting reference to the sentence subject); however, after an object relative clause, there was a difference between fixations to the subject NP and fixations to the RC-internal NP, suggesting listeners were expecting ongoing reference to the subject rather than the RC-internal NP. Thus, independent of proform condition, participants expected the subject to be referred to further. On reflexive conditions this bias lines up well with the bias to consider the subject as antecedent for the reflexive; however, on pronoun conditions the bias to expect the subject to be the ongoing referent was in conflict with the expectation triggered by the BT to disregard the subject as a potential antecedent. These conflicting biases could explain the especially notable delay of pronoun reference resolution on object relative clauses.

We briefly mention two additional considerations pointed out by an anonymous reviewer that we cannot completely rule out as having contributed to the pattern of results we have presented. First, in the written language, the reflexive in English is temporarily ambiguous between being a reflexive or a pronoun, as e.g. *herself* begins with *her*-. If this ambiguity is picked up by participants in our study, it is possible that very briefly they misparsed *herself* as *her*, and thus programmed and launched fixations consistent with the pronoun interpretation. This could plausibly account for some of the fixations to the inaccessible antecedent when it matches the gender of the reflexive. However, it is worth pointing out that the materials were presented auditorily and it is less clear how auditorily ambiguous the first syllable of *herself* and *her* are. Additional analysis would be needed to rule this possibility out. Secondly, as is usual in visual world eye tracking studies we have interpreted fixations to pictures as indicating that the listeners' attention is being drawn to a particular picture because they are interpreting the linguistic form as referring to that picture. That is, they look

at the picture of the pharmacist because they have just heard the phrase *the pharmacist* or have heard a proform which they are interpreting as referring to the pharmacist. Since pronouns and reflexives in English are marked for gender, it is possible that when listeners hear a proform, its gender is "activated" and that activated features get more attention. This attention could then trigger fixations to items in the display with the same gender as the proform, even if they are not being considered as potential antecedents. The current study was not designed to test this possibility, so we must leave it to future research to tease apart differences in fixations due to attention to features like gender and attention to potential referents of the linguistic forms.

3 General Discussion

We now return to the main questions we designed our study to answer: First, does the degree of "topicality" of the BT-incompatible antecedent (operationalized as subject vs. object of relative clause) affect its influence on binding? And second, does the influence of the inaccessible antecedent hold equally and with similar timelines for both reflexives and pronouns?

The answer to Question 1 is clearly "no," at least for reflexives, which was what the manipulation was designed for. The relative clause manipulation did affect pronoun processing, though it is not clear to what degree that had to do with topicality. The answer to Question 2 is also "no." There was a larger and longer-lasting effect for pronouns.

In addition, our study addressed the question of the "timing" of the application of BT constraints during processing. Our results are in line with Badecker and Straub's (2002) Multiple Constraints approach. Like their study, ours found early effects of gender-matching inaccessible antecedents on processing. This is in conflict with Sturt (2003) and Xiang et al. (2009), who used the gender-stereotype manipulation but found no early effects of inaccessible antecedents for reflexives (and did not examine pronouns).

Our study also found that the effect of gender-matching inaccessible antecedents was more robust for pronouns than reflexives. This bears on the question of whether the two BT conditions should be treated as a single constraint (applying in a block) or their effects should be treated as emerging from separate constraints (the BT + Rule I). Our results support treating them separately. In particular, our results are consistent with the Reflexivity and Primitives of Binding (Reuland 2001, 2011) approaches in which one set of conditions determines the distribution of coindexation, and an additional rule, taking into account discourse-level information, determines coreference for pronouns. That approach predicts more complexity in processing pronouns and the need to have access to additional features of the context. This is consistent with our findings, showing that pronoun reference was resolved more slowly and was more susceptible to gender-matching BT-inaccessible antecedents.

Though our results are mostly consistent with an approach like the Primitives of Binding approach, which requires an additional constraint (Rule I) to apply in order to finally determine pronoun interpretation, as pointed out above, in principle either of the other two types of BT could incorporate something like Rule I. So, our results really support an approach that recognizes additional constraints on pronoun binding, beyond those relevant to reflexive binding. That said, our results are consistent with any approach which recognizes that nonsyntactic factors can have an influence on proform interpretation. Given the gender effect we found with both reflexives and pronouns it is clear that non-syntactic factors can play a role in processing proforms; and further, the influence of non-syntactic factors appears to be stronger and more ongoing during pronoun processing. Future work will have to examine what non-syntactic factors are at play, but an obvious possibility would be to examine how the extant list of factors applying to pronouns inter-sententially may already be influencing the initial processing of pronouns, even in supposedly BT constrained positions.

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An Experimental Approach to French Attributive Adjective Syntax

Juliette Thuilier

In this paper, we study the alternation of adjective position in the noun phrase. We postulate that this phenomenon is influenced by various factors interacting in a complex way and favoring one position over the other. Thus we use an experimental approach in order to determine which factors are indeed involved in the choice and how they interact. Our approach is based on a corpus data modeling and a questionnaire experiment.

Keywords: word order, corpus, questionnaire, statistical modeling

1 Introduction

In French, as well as in other Romance languages, attributive adjectives can appear both before or after the noun, as shown in example (1).

(1)	a.	une agréable soirée	(prenominal position)
		a nice evening	
	b.	une soirée agréable	(postnominal position)
		a evening nice	

The postnominal position is generally considered the canonical position because (i) adjectives appear more frequently in this position, both in terms of lemmas and tokens (Forsgren 1978, Wilmet 1981, Thuilier et al. 2010, among others),¹ (ii) most of the new adjectives created in the language appear in postnominal position (Noailly 1999). However, although it is not as frequent as the postnominal position, the prenominal position appears to be the preferred position for short and frequently occurring adjectives. Moreover, it will be shown in this paper that the adjectives that appear in both positions in corpus data seem to occur more frequently before the noun.

In this paper, we focus on the lexical and syntactic aspects of adjective position alternation. We postulate that this phenomenon is influenced by various factors interacting in a complex way and favoring one position over the other. Thus we need an experimental approach in order to determine which factors are indeed involved in the choice and how they interact. Our approach is based on experiences using corpus data and questionnaires. It has been inspired by the work by Bresnan et al. (2007), Bresnan (2007) and Bresnan and Ford (2010) on the dative alternation in English. It also follows up on previous works by Thuilier et al. (2012), which are corpus studies based on written data extracted from a newspaper corpus and comparing the effect of several factors on adjective position by using statistical modeling. In comparison to these previous works, the present paper relies on (i) speech data

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¹For instance, in the corpus study by Thuilier et al. (2010), 71.9% of the adjective occurrences appear after the noun, and 84.5% of the adjectival lemmas are only found in postnominal position.



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in addition to written data; (ii) more accurately annotated data, in particular concerning the potentially homonymous adjectives (cf. section 3.1); (iii) a comprehension experiment investigating the link between the results of the corpus data modeling and the metalinguistic choices of speakers.

The paper is organized as follows: section 2 is dedicated to describing the semantic, syntactic, and lexical aspects of the alternation phenomenon; in section 3, we will present the corpus data and the multifactorial statistical modeling; section 4 will discuss a questionnaire experiment showing that the results of the statistical modeling correlate with speaker preferences about adjective position.

2 The Phenomenon

The alternation of noun-adjective ordering is a long-debated issue in French linguistics and has generated a huge literature (Blinkenberg 1933, Reiner 1968, Waugh 1977, Forsgren 1978, Wilmet 1981, Delbecque 1990, Bouchard 1998, Abeillé and Godard 1999, Noailly 1999, Thuilier et al. 2012, among others). Without reviewing all of the literature, we will give the main factors that have been mentioned and that we will study on the basis of corpus data.

2.1 Semantic Aspects

The semantics of adjectives as well as the semantics of noun-adjective combinations is a complex problem, as shown by the literature: Kamp (1975), McNally and Kennedy (2008), among many others. In French, this semantic problem interacts with the two possible positions of the adjective, which adds complexity to the problem. Given that establishing an exhaustive review of this problem is beyond the scope of this article, we will give a brief overview of the links between position and semantics.

The general idea is that preposed adjectives tend to be subsective, as *petite* in (2), or intensional, as *vrai* in (3), whereas the postposed ones are inclined to be intersective (or predicative), as *fragile* in (4).

- (2) une petite souris a small mouse
- (3) un vrai complot a true plot
- (4) un vase fragile
 - a vase fragile

Some linguists postulated that the alternation of position is a purely semantic phenomenon. In broad outline, Waugh (1977) and Bouchard (1998) considered that preposed adjectives modify internal components of the noun, whereas postposed ones assign the noun referent a property that cannot be assigned to a sub-component of the noun. This approach leads to postulating that there is a systematic difference of meaning between the preposed and the postposed version of the same adjective. However, this generalization appears to be false. First, as pointed out by Abeillé and Godard (1999), there are noun-adjective sequences with the same meaning regardless of the position of the adjective. In (5), both NPs mean 'a charming boy', without any possible variation in interpretation.

- (5) a. un charmant garçon a charming boy
 - b. un garçon charmant
 - a boy charming

Second, we observe semantic effects linked to the position of the adjective in the case of some specific adjective-noun combinations. For instance, the adjective *gros* 'fat' can acquire an intensifying value when it is preposed to agentive nouns, such as *fumeur* 'smoker' in (6), but this value is not present with other agentive nouns, such as *coiffeur* 'hairdresser' in (7).

- (6) a. un gros fumeur a fat smoker 'a heavy smoker'
 - b. un fumeur gros a smoker fat 'a fat smoker'
 - a lat sillokel
- (7) a. un gros coiffeur
 - a fat hairdresser
 - b. un coiffeur gros
 - a hairdresser fat

Moreover, Abeillé and Godard (1999) pointed out that in the case of *un gros fumeur*, the prenominal position is compatible with both interpretations: a person who smokes a lot or a person who is a fat smoker. This means that this is not the position that requires a specific interpretation, but the adjective-noun combination itself.

Thus, following Abeillé and Godard (1999), we consider that there is no semantic property categorically associated with one position. We assume that the semantics does not account for the entire phenomenon (contra Bouchard 1998 and Waugh 1977) and that the choice of the position is mainly driven by lexical properties and syntactic constraints.

2.2 Lexical Aspects

Adjectives show individual preferences which are shaped by formal properties: length, frequency, and morphological properties.

The length of words and constituents plays a role in word order and alternation phenomena (Hawkins 1994). SVO languages as French tend to prefer the short-before-long order. In the case of adjectives, Wilmet (1981), Forsgren (1978), and Thuilier (2012) noticed that what matters is the length of the adjective itself,² with the following tendency: *short adjectives first, long adjectives last.* These corpus studies showed that most of the monosyllabic adjectives are preposed, while adjectives containing more than two syllables are more frequently postposed.

Since Zipf's (1932) work, we know that there is a strong correlation between length and frequency, such as the more frequent the word, the shorter it tends to be. Given the above mentioned *short first* and *long last* preference, corpus data display the expected tendency: frequent adjectives are inclined to be preposed, whereas rare ones tend to be postposed (Wilmet 1981,

 $^{^{2}}$ In corpus data (Forsgren 1978, Thuilier 2012), the relative length of the noun and the adjective does not appear to be as relevant as the length of the adjective itself. Thuilier (2012:142-145) showed that the slight effect of the relative length observed in corpus data can be understood as the result of the effect of adjective length.

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Table 1	
Lexical properties and adject	tive position
Dronominal nasitian	Destrominal

Prenominal position	Postnominal position
short	long
frequent	rare
morphologically simple	morphologically complex

Thuilier 2012). Besides the relation between length and frequency, the effect of frequency on adjective position may be explained by an hypothesis on the diachronic evolution of adjective syntax. Following Bybee (2006), we consider that highly frequent words and word sequences are strengthened in their morphosyntactic structure and are resistant to change. In Old French, the most frequent order was 'adjective noun', and some contexts allowed the adjective to be postposed (Buridant 2000). We can hypothesize that the postposing default rule developed in Modern-French did not affect highly frequent adjectives, because these were resistant to change.

The morphological complexity of the adjective seems to affect its position: derived adjectives tend to be postposed. Apart from adjectives derived by conversion, complex adjectives are generally longer than simple ones, which favors their postposition. Despite this length effect, other properties have been identified as playing a role in their preference for the postnominal position. In particular, part of the deverbals and denominals can be substituted by relative clauses, as shown in (8) and (9). The ability of derived adjectives to be replaced by syntactically more complex and obligatorily postposed sequences correlates with a significant proportion of occurrences of derived adjectives in postnominal position.

- (8) Deverbal
 - a. une décision contestable
 - a decision questionable
 - b. une décision que l'on peut contester
 - a decision that one can contest
- (9) Denominal
 - a. les résultats semestriels
 - the results semiannual
 - b. les résulats du semestre the results of-the semester

In sum, previous works on corpus data showed that a bundle of formal lexical properties converges at each position, as summarized in Table 1.

2.3 Syntactic Aspects

The alternation of position is affected by the internal structure of the adjective phrase (AP) and the noun phrase (NP). We will present five syntactic factors based on the following elements: post-adjectival dependent, pre-modified adjective, coordination of adjectives, other noun dependent in the NP, and type of determiners introducing the NP.

First, adjectives followed by a dependent must be postposed to the noun (Thuilier 2012, Abeillé and Godard 1999, Blinkenberg 1933), as shown in (10). This is the only categorical constraint. The other syntactic constraints do not impose, but rather favor one position over the

2	O	Λ
4	7	υ

other.

(10) a. une musique agréable à écouter a music nice to hear

> b. *une agréable à écouter musique a nice to hear music

Pre-modified adjectives can be both preposed and postposed to the noun, as in (11).

- (11) a. une très agréable soirée a very nice evenim
 - a very nice eveningb. une soirée très agréable an evening very nice

However, the presence of a modifier makes the AP longer, thereby favoring its postposition. Forsgren (1978: 159) observed that among 559 pre-modified adjectives in his corpus data, 73.4% are postposed, whereas only 66% of single adjectives are in this position. This suggests that in addition to the length of the adjective, the length of the AP also plays a role in the alternation.

Furthermore, if an adjective with a very strong preference for one position is pre-modified, its preference becomes less strong by means of the modifier (Wilmet 1981, Abeillé and Godard 1999). For example, the adjective *bon* 'good' strongly prefers the prenominal position (the NP in (12b) sounds odd), but can easily be postposed to the noun when it is pre-modified, as in (12c).

- (12) a. un bon poulet a good chickenb. ?un poulet bon
 - a chicken good
 - c. un très bon poulet / un poulet très bon a very good chicken / a chicken very good

Likewise, the adjective *familial* 'family' has a strong preference for postnominal position, as in (13a-b), but can be preposed if it is pre-modified, as in (13c).

- (13) a. une berline familiale a sedan family
 - b. ?une familiale berline
 - a family sedan
 - c. une berline très familiale / une très familiale berline
 - a sedan very family / a very family sedan

Both the prenominal position and the postnominal position are also possible for coordinated adjectives, as shown in (14). As has been observed for pre-adjectival modifiers, coordination tends to favor the postnominal position because of the length of the AP. Forsgren (1978) found around 73% of coordinated adjectives, and around 67% of noncoordinated adjectives in postnominal position.

(14) a. un petit et confortable canapé a small and comfortable sofa

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b. un canapé petit et confortable a sofa small and comfortable

Moreover, coordination is comparable to pre-modification insofar as it allows adjectives with strong lexical preferences to have more flexibility. For instance, *grand* 'big' and *calme* 'quiet' sound better, respectively, in prenominal position and in postnominal position, as in (15a-b). Once coordinated, these adjectives can be naturally either preposed or postposed to the noun, as in (15c).

- (15) a. un grand appartementa big apartmentb. un appartement calme
 - an apartment quiet
 - c. un grand et calme appartement / un appartement grand et calme a big and quiet apartment / an apartment big and quiet

The effect of coordination is also observable when both adjectives have a strong preference for the same position. For example, Abeillé and Godard (1999) draw attention to the case of two intensional adjectives, *vrai* 'true' and *false* 'false', which sound very odd when they are postposed, as in (16b) and (17b). However, the coordination of these adjectives can occur either before or after the noun, as in (18).

- (16) a. des vrais coupables some true culprits
 - b. ?des coupables vrais some culprits true
- (17) a. des faux coupables some false culprits
 - b. ?des coupables faux some culprits false
- (18) a. des vrais ou faux coupables some true or false culprits
 - b. des coupables vrais ou faux some culprits true or false

Grevisse and Goosse (2007) mentioned a tendency to produce, in planned and written discourse, "balanced NPs," with material before and after the head noun in order to avoid the accumulation of postnominal dependents. For example, when the NP contains a prepositional phrase (PP), which cannot be preposed to the noun, placing the adjective before the noun avoids separating the noun from its complement, as shown in (19c).

- (19) a. un recueil [de textes grecs]_{PP} a collection of texts Greek
 - b. un recueil récent [de textes grecs]_{PP} a collection recent of texts Greek
 - c. un récent recueil [de textes grecs]_{PP} a recent collection of texts Greek

More generally, the presence of dependents postposed to the noun, as relative clauses, PPs, or other adjectives, tends to favor the prenominal position of adjectives:

- (20) a. l'air habituel [que Paul joue]_{RC} the-tune usual that Paul plays
 - b. l'habituel air [que Paul joue]_{RC} the-usual tune that Paul plays
- (21) a. un animal étrange [indomptable]_A a animal strange untameable
 - b. un étrange animal $[indomptable]_A$ a strange animal untameable

According to Forsgren's (1978) corpus study, the nature of the determiner introducing the NP influences the position of the adjective. This author observed that definite determiners, for example, demonstratives, possessives or definite articles, favor the prenominal position. For each NP, the indefinite counterpart in (b) sounds less natural.

(22)	a.	cet éblouissant spectacle (demonstrative) this dazzling show
	b.	un éblouissant spectacle a dazzling show
(23)	a.	son habituel refrain (possessive) her usual record
	b.	un habituel refrain a usual record
(24)	a.	le traditionnel thé (definite article) the traditional tea
	b.	un traditionnel thé a traditional tea

2.4 Specific Combinations of Nouns and Adjectives

Given that we are interested in the factors affecting the placement of attributive adjectives with respect to the noun, it is important to mention that the noun itself plays a role in a number of cases.

First, some adjective-noun pairs are strongly collocational in the sense that the choice of the adjective depends on the noun. For instance, the noun *hommage* 'tribute' is generally associated with the adjective *vibrant* 'vibrant' in order to idiomatically refer to a big or intense tribute. Not only does the collocational effect affect the selection of the adjective with respect to the noun, but it also affects its position. Indeed, the adjective *vibrant* is inclined to be postposed to the noun, as in (25), partly due to the fact that it is a derived adjective (cf. section 2.2). Nevertheless, the noun *hommage* strongly favors its placement in prenominal position, as in (26).

(25) a. une voix vibrante / ?une vibrante voix a voice vibrant / a vibrant voice

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- b. un ton vibrant / ?un vibrant ton a tone vibrant / a vibrant tone
- (26) un vibrant hommage
 - a vibrant tribute

Second, as mentioned in section 2.1, we observe that some adjective-noun combinations convey a particular meaning when the adjective is preposed. (6) and (7) above show that in a number of cases, the noun selects the adjective and its position. Thus not only is the position of the adjective determined by its lexical properties, but it is also affected by the particular noun the adjective combined with.

3 Corpus Data Modeling

By looking over the factors playing a role in adjective position alternation, we observed that a variety of constraints influences the choice for one position. In order to better understand their effects and to capture their relative importance, we conducted a corpus study. Using statistical modeling, we tested most of the factors mentioned in the previous section with attested data excerpted from speech and written corpora. We assume that, with statistical tools, we are able to free ourselves from variations due to the sampling of the corpora.

3.1 Building the Database

The data were excerpted from two corpora:

- the *French TreeBank* (henceforth, FTB), which comprises 20,000 sentences (400,000 tokens) from the newspaper *Le Monde* fully annotated and manually validated for syntax purposes (Abeillé et al. 2003, Abeillé and Barrier 2004).
- the French part of the spoken corpus C-ORAL-ROM (henceforth, CORAL), which comprises about 300,000 tokens (Cresti and Moneglia 2005)

We must make an initial observation concerning the adjective position alternation in the FTB data. In this corpus, there are 1,750 adjectival lemmas in attributive position. These include 1,488 only-postposed adjectives and 92 only-preposed ones. These only-preposed and only-postposed lemmas represent around 64% of the 13,399 adjectival occurrences. Thus, only 170 lemmas occur in both positions. These alternating adjectives represent 4,486 occurrences and thus are the most frequent lemmas on average. These observations are summarized in Table 2.

So, even though we assume that alternation is possible for the entire adjective category, (i) for a number of adjectives the alternation is very rare and the probability that we observe it in a corpus is low; (ii) more that two fifths of the adjectives (747) in attributive position appear only once in the corpus, thus making it impossible to regard alternation for them.

Table 2Attributive adjectives in the FTB corpus

•	-	
	Number of lemmas	Number of occurrences
Only-preposed adjectives	92 (5.3%)	462 (3.3%)
Only-postposed adjectives	1,488 (85%)	8,485 (60.9%)
Adjectives in both positions	170 (9.7%%)	4,986 (35.8%)
Total	1,750 (100%)	13,933 (100%)

The fact that the proportion of nonalternating adjectives is so high means that for a large part of the data, the identity of the adjective is enough to categorically determine its position in the dataset. This kind of data distribution leads to convergence problems of estimation algorithms with the statistical tools used here (see section 3.4).

Given that we are interested in the factors explaining the alternation and that including nonalternating adjectives raises an issue of statistical soundness, we focus on adjectives that do alternate in the FTB. In a sense, this methodological choice limits the scope of the present corpus study because we don't have a comprehensive picture of the entire category position alternation. However, we made sure that the data and the statistical modeling are reliable.

To build our database, we first excerpted the attributive adjectives that appeared in both positions in the FTB. Given that the presence of post-adjectival dependents categorically determines the position of the AP (cf. section 2.3), we left these adjectives aside. Then we excerpted the same adjectives from CORAL.

We set apart two lemmas for each of the following potentially homonymous adjectives: *ancien* 'ancient/former', *propre* 'own/clean', *pur* 'pure', *seul* 'alone/single', *simple* 'simple/modest'. For each adjective, both meanings are illustrated in examples (27)–(31).

(27)	a.	un coffre ancien a chest old 'an ancient chest'
	b.	un ancien coffre a old chest 'a former chest'
(28)	a.	son propre pantalon her own pants
	b.	son pantalon propre her pants clean
(29)	a.	un pur produit a pure product 'an archetypal product'
	b.	un produit pur a product pure 'a pure product' (not mixed)
(30)	a.	un seul homme a alone man 'a single man'
	b.	un homme seul a man alone 'a lonely man'
(31)	a.	une simple phrase a simple sentence 'a mere sentence'
	b.	une phrase simple a sentence simple 'a simple sentence'

Figure 1 Proportions of preposed and postposed adjectives



As shown in the examples, the meaning of these adjectives is canonically associated with a position, but one can find occurrences of each meaning in both positions (see Thuilier 2012 for examples). We observed alternation in the data for 5 out of the 10 disambiguated lemmas. These alternating adjectives, whose meaning is presented in (27a), (28a), (29a), (30a), and (31a), were thus included in the database. For instance, the examples in (32) show the adjective *ancien* with the 'old' meaning in both positions; the examples in (33) display both positions for the 'own' meaning of the adjective *propre* (these examples are extracted from CORAL corpus).

(32)	a.	c'est	plus	de	la	variété	plus	des	trucs	anciens
		it-is	more	some		commercial-music	more	some	things	old
		'the 1	nore	it's co	mı	nercial music, the 1	nore i	t's old	l stuff'	

- b. j'avais acheté beaucoup de livres déjà quand j'avais les anciens appareils
 I-had bought a-lot of books already when I-had the old devices
 'I had already bought a lot of books when I had the old devices'
- (33)chacune des communautés faisait passer son intérêt propre avant a. each of-the communities made pass its interest own before l'intérêt national the-interest national 'each community put its own interest before the national interest' b. on les attache sur nos propres maillots on our own we them tie jerseys
 - 'we tie them on our own jerseys'

3.2 Alternating Adjectives in Two French Corpora

The database contains 6,612 occurrences of attributive adjectives: 4,986 from FTB, 1,626 from CORAL. As shown in Figure 1, there are 68.9% of the adjectives occurring in prenominal position in the dataset, which means that adjectives that do alternate in the corpus data tend to

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be preposed. Moreover, this proportion is higher in speech than in writing. Given that in our data, writing corpus corresponds to planned discourse and speech data comprise more spontaneous and unplanned discourse, it may be the case that unplanned discourse slightly favors prenominal position.

As for the number of lemmas, FTB data contain 170 alternating adjectives, whereas there are only 130 lemmas in CORAL and 43% of them appear in both positions. These observations are presented in Table 3. Thus, there is less alternation in speech than in writing. This seems to reveal that in spoken French, the adjectives tend to have a more fixed behavior than in the written variant.

Section 2.2 mentions that lexical properties have an effect on the adjective position, leading to particular behavior for each adjective. This can be observed in the database through variation according to the lemmas. For instance, as shown in Figure 2, the adjective *unique* 'unique' is preposed in 20.7% of the cases, whereas *sérieux* 'serious' appears in this position in 51.4% and *petit* 'small' in 98.6%.

These observations go against the idea that the default position of an adjective is after the noun and argue for considering that there is not a canonical position for the adjective category as a whole but rather a canonical position for each lemma.

3.3 Annotation of the Data

In order to capture the constraints described in section 2, the data were annotated for the 11 variables presented in Table 4. The first eight variables are binary variables capturing syntactic

Table 3Repartition of the lemmas

	FTB	CORAL
Number of lemmas	170	130
Alternating lemmas	170	56
	100%	43%

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Varia	bles annotated	in the database
	Variables	Description
1	COORD	the adjective is coordinated or not
2	MOD	the adjective is pre-modified or not
3	demDet	the NP is introduced by a demonstrative determiner or not
4	possDet	the NP is introduced by a possessive determiner or not
5	defArt	the NP is introduced by a definite article or not
6	PP	the NP contains a PP or not
7	REL	the NP contains a relative clause or not
8	postAdj	the NP contains a postposed or not
9	COLLOCAN	collocation score for A+N bigram (log(χ^2))
10	COLLOCNA	collocation score for N+A bigram (log(χ^2))
11	MODALITY	the modality is speech (s) or writing (w)

11 MODALITY the modality is speech (s) or writing (w) constraints mentioned in the literature. Variables 9 and 10 (COLLOCAN and COLLOCNA) were designed in order to take into account the influence of the noun combined with the adjective (cf. section 2.4). Their values correspond to χ^2 scores (Manning and Schütze 1999)³ calculated with data from the *Est-Républicain* corpus⁴ and they estimate the strength of the association of the noun and the adjective in a given position. Finally, in order to know whether the way data were produced affects the adjective position, we included the MODALITY variable (variable number 11 in the table).

3.4 Multifactorial Statistical Modeling

The statistical modeling of adjective position alternation was done using mixed-effects logistic regression (Agresti 2007, Gelman and Hill 2006). This statistical tool allows one to model the behaviour of a binary variable. More precisely, in our case, it estimates the probability that the adjective will be preposed to the noun as a function of the predictive variables presented in Table 4. One advantage of the mixed-effects logistic regression model is that it is predictive, in the sense that one can build a model on a set of data and use this model to predict the choice between prenominal position and postnominal position on new data. This way, we can assess how well the model generalizes from the training set.

The construction of the model consists in estimating the coefficients that are associated with each variable. Each coefficient can be interpreted as the preference of its variable: in the case of a variable having only positive values, a positive coefficient indicates a preference for

³Using contingency tables (2-by-2 tables) such as the ones presented below, "[t]he [χ^2] statistic sums the differences between observed and expected values in all squares of the table, scaled by the magnitude of the expected values" (Manning and Schütze 1999:169).

	Noun = <i>hommage</i>	Noun \neq hommage		Noun = <i>hommage</i>	Noun \neq hommage
Pre-adj = <i>vibrant</i>	152	8607	Post-adj = vibrant	10	8749
$Pre\text{-}adj \neq vibrant$	238	2797624	Post-adj ≠ <i>vibrant</i>	380	4578757

In other words, the χ^2 statistic is an estimation of the distance between the observed frequencies and the expected frequencies for independent variables. So, the more greater the distance, the higher the χ^2 and the stronger the association of the noun and the adjective.

 $^{4}\mbox{It}$ is a new spaper corpus comprising 148 million words and downloadable from http://www.cnrtl.fr/corpus/estrepublicain/.

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Table 4

 Table 5

 Corpus model

 Random effects

 Variance
 Std.Dev.

 ADJECTIVE
 2.3938
 1.5472

Number of obs: 6621, groups: ADJECTIVE, 170

Fixed effects

	Estimate	Std. Error	z value	P(> z)
Intercept	-0.782	0.182	-4.304	<.001
demDet=1	1.226	0.246	4.99	<.001
possDet=1	1.185	0.235	5.04	<.001
defArt=1	0.370	0.107	3.47	<.001
postAdj=1	0.587	0.154	3.82	<.001
PP=1	0.840	0.104	8.04	<.001
REL=1	0.714	0.210	3.40	<.001
COLLOCAN	0.378	0.018	20.52	<.001
MOD=1	-1.957	0.174	-11.26	<.001
coord=1	-1.266	0.266	-4.76	<.001
COLLOCNA	-0.443	0.020	-22.12	<.001
MODALITY = W	0.458	0.121	3.78	<.001

prenominal position, and negative one a preference for postnominal position. Besides the predictive variables, also called fixed effects, mixed-effect models are able to take into account the variation in the data by means of random effects.

In our case, the adjectival lemma is the random effect in order to model the adjectival idiosyncrasies. Each lemma constitutes a group in the data, which is assigned a randomly varying normally distributed effect in the model. Thus, associating each value of the random effect with a specific coefficient accounts for the different behaviors according to adjectives (cf. previous subsection).

Using our database, we built a model with 11 fixed effects and 1 random effect. All the effects are significant and thus participate in predicting the position of the adjective.

The corpus model is presented in Table 5. For each random effect, the standard deviation of the normal distribution is given. For the fixed effect, the estimated coefficient (Estimate) indicates the way each variable affects the adjective position. The *p*-values testify that the coefficients associated with the variables are significantly different from 0 (i.e. the variable has a significant effect). The model has a mean accuracy of 0.88 (10-fold cross-validation) and the mean concordance probability is C = 0.947 (10-fold cross-validation). These numbers indicate that the model's predictions are very accurate. The goodness of fit can also be evaluated by means of the graph presented in Figure 3. The plot compares the grouped mean probabilities with the observed proportions of prenominal position. A perfect fit would correspond to the straight line. The distribution of the data points suggests that the model fits the data very well.

3.5 Results

Each coefficient associated with fixed effects can be interpreted as the preference for a position: a positive coefficient indicates a preference for prenominal position and a negative one for postnominal position. For example, the model shows that the nature of the determiner has an effect on the position: demonstrative, possessive determiners and definite articles favor pre-

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Figure 3

Observed proportions of prenominal position and the corresponding mean predicted probabilities for the corpus model



mean predicted probabilities

posed adjectives. This result can be identified as providing evidence that in anaphoric contexts, when the relation between the referent of the noun and the property denoted by the adjective is established, the adjective can be more easily preposed (Waugh 1977).

As expected, the presence of a relative clause, a PP, or another adjective after the noun also favors the prenominal position. Given that it is argued that in planned and written discourse, adjectives are inclined to be preposed when they occur with other dependents postposed to the noun, we checked the significance of the interaction between MODALITY and the three variables: PP, REL, and POSTADJ. The fact that these interactions were not significant (p > .1) tends to show that the tendency to produce "balanced NPs" applies in both speech and writing production.⁵

Moreover, APs containing coordinated adjectives or pre-adjectival modifiers tend to be postposed. This can be analyzed as a clear effect of heaviness: long and complex APs are inclined to be postposed. This is in accordance with the generalization that in SVO languages, heavy constituents tend to appear last.

Concerning lexical preferences and noun-adjective combination, each adjective has a more or less strong preference for one position, which is captured by the random effect. The noun the adjective is combined with also affects the choice: the more the adjective and the noun tend to be a collocation in a given order, the more the sequence is inclined to occur in the given order. Moreover, the model shows that the noun appearing with the adjective can favor the non-preferred position. For instance, the adjective *fort* 'strong' has a slight preference for prenominal position, but when it is combined with the noun *point* 'point', the postnominal position is strongly preferred because the sequence *point fort* is much more likely to be produced.

⁵Thuilier and Grant (2014) found complementary evidence. They studied the effect of postnominal PPs on the position of adjectives using a sentence-recall experiment in order to test whether the presence of NP dependents affects sentence production in real time. Preliminary results show a clear effect of postnominal PPs on the position of adjectives in sentence production, which means that the tendency to produce "balanced NPs" seems to be also at play in speech production.





We observed that there is less alternation in the speech data. One explanation could be that in unplanned discourse, speakers tend to comply more often with lexical preferences because they have less time to produce the NP. Finally, contrary to what we observed in section 3.2, the model shows that the prenominal position is more likely in written data than in speech. This means that the apparent preference for preposed adjectives in speech data reflects the effect of a set of lexical idiosyncrasies and syntactic constraints that the statistical modeling allows us to neutralize.

4 Speaker Preferences

The corpus model estimates the probability of prenominal position of each adjectival occurrence given the syntactic environment and taking into account the specificity of each lemma (random effect). A questionnaire experiment was then conducted to test whether these probabilities are related to the judgments of native speakers.

4.1 Methodology

Our hypothesis is that, for many speakers, the frequency of choice for prenominal position will correspond to the probability of prenominal position estimated in the corpus model. Thus, we hypothesize that the factors favoring one position over the other will favor the choice of the speakers for the same position during a metalinguistic task.

The questionnaire is made up of 29 sentences picked out from the database (the FTB part) and selected according to their probability in order to have a sample containing the range of possible probabilities (from 0 to 1). The probabilities of prenominal position for the sentences are represented in Figure 4.

Each sentence is part of a pair of sentences containing the original sentence and a modified

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Probability of prenominal position in the corpus model

version with the adjective-noun sequence in the opposite order. As shown in (34a), in both versions of the sentence, the NP is in bold and colored letters in order to help the participant to notice the difference in the pair. The pairs and the sentences within the pairs are randomly ordered in each questionnaire.

(34)	a.	Henri Guitton a joué un rôle important dans la modernisation de
		Henri Guitton has played a role important in the modernization of
		l'enseignement de l'économie en France.
		the-teaching of the-economics in France
	b.	Henri Guitton a joué un important rôle dans la modernisation de

 b. Henri Guitton a joué un important rôle dans la modernisation de Henri Guitton has played a important role in the modernization of l'enseignement de l'économie en France. the-teaching of the-economics in France

The participants were contacted via social networks and scientific mailing lists. 141 participants completed the questionnaire online. During the experiment, they saw both versions of the sentence on the screen and were asked to select their preferred version by means of a check box.

4.2 Results

As predicted, the proportion of choice for preposed adjectives significantly correlates with the probability of prenominal position estimated in the corpus model: 0.74 (p < .0001). As shown in Figure 5, the correlation is not perfect but there is a clear relation between the probability of prenominal position and the preferences of the speakers.

This result suggests that language users are sensitive to the factors used in the corpus

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model when they make metalinguistic choices. More precisely, if the context strongly favors one position, the speakers tend to mostly choose this position, whereas when the context is not clearly in favor of one position, a part of the speakers selects one position and the others choose the other position. This result is in accordance with Bresnan's (2007) experimental work on the dative alternation in English. Her experiment (Experiment 1 in the paper) indicated that subjects' intuitions are affected by the same constraints as those that have an effect on the probability of dative PP realization calculated in a corpus model.

Finally, this experiment is an argument in favor of the idea that the statistical modeling proposed on the basis of usage data is an appropriate way of describing and accounting for a rather complex syntactic phenomenon such as the alternation of attributive adjective position.

5 Conclusion

This paper presented an experimental approach to the alternation of adjective position in the NP, combining the modeling of corpus data and a questionnaire experiment.

From the linguistic point of view, the results suggest that there are three levels of organization involved in the phenomenon. The first level is related to the lexicon insofar as each adjective has a more or less strong preference for one position. In the model, this is captured via the random effect. The second level concerns the combination of two lexical items: the noun can strongly affect the position of the adjective as the collocation variables show in the model. The third level is related to syntax and corresponds to the constraints concerning the structure of the AP and the NP.

We have offered a very accurate modeling of the phenomenon, based on corpus data and providing the probability of having a preposed adjective in a given context. The result of the comprehension experiment showed that the probabilities estimated in the corpus model seem to partly reflect the speaker preferences. This is a further argument in favor of the idea that what corpus data tell us is in accordance with a form of linguistic knowledge of language users.

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Prohibiting Inverse Scope: An Experimental Study of Chinese vs. English

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Quantifier scope is an interface phenomenon that raises important questions concerning the processing of not only monolingual but also bilingual speakers. In this paper, we build upon the findings by Scontras et al. (to appear) by investigating and comparing the scope interpretations available for doubly quantified sentences such as *Every shark attacked a pirate* not only in Mandarin Chinese and English, but crucially in heritage Mandarin. Our results reinforce that (i) Mandarin does not exhibit inverse scope; and (ii) English exhibits inverse scope even when a quantifier is embedded in a relative clause, thus supporting the head-raising analysis of relativization (Vergnaud 1974, Kayne 1994). They also prove that (iii) heritage Mandarin does not demonstrate inverse scope, which conforms to the Processing Scope Economy principle (Anderson 2004).

Keywords: quantifier scope, Mandarin Chinese, heritage Mandarin, relativization

1 Introduction

English sentences with more than one quantificational expression exhibit scope ambiguities (May 1977). For instance, (1) has two readings: surface scope (1a) and inverse scope (1b). Likewise, (2) also has two readings:

- (1) Every shark attacked a pirate.
 - a. Surface scope (*every* > *a*): For every shark, there is a pirate that it attacked
 - b. Inverse scope (a > every): There is a pirate such that every shark attacked him
- (2) A shark attacked every pirate.
 - a. Surface scope (a > every): There is a shark such that it attacked every pirate
 - b. Inverse scope (*every* > *a*): For every pirate, there is a shark that attacked him

Despite its observed preference for surface interpretations (Tunstall 1998, Anderson 2004, among others), English is a language that employs Quantifier Raising (QR) to generate inverse scope in

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doubly quantified sentences. Crucially, QR's mapping to Logical Form need not remain faithful to the scope relations expressed in the surface string.

Scope calculations are notoriously difficult and are also known to be quite fragile. This is not surprising given that scope readings bring together at least three levels of representation: syntax, semantics, and pragmatics. Preferences and dispreferences in scope readings are often accounted for under the notion of pragmatic calculus (Musolino and Lidz 2006); the leading idea is that listeners start with the assumption that each interpretation is mapped to an unambiguous pattern, and only give up on that assumption if forced to do so. To put it differently, listeners assume a more economical model (one pattern: one interpretation) unless forced to map one pattern to more than one interpretation.

Recently, this idea was tested, in a novel way, on bilingual populations. Lee et al. (2011) investigated the possible effect of bilingualism on scope interpretation in English, focusing on early sequential bilinguals (children and adults) who had learned Korean before they learned English but who were dominant in English at the time of testing. The authors reported that early exposure to Korean seemed to interfere with learners' scope calculation in English. In their interpretation of sentences such as (3), these sequential bilinguals strongly preferred the full-set interpretation, parallel to what is observed for Korean (where such an interpretation is motivated by the surface word order), and did not demonstrate the partitioned-set interpretation that is otherwise characteristic of English.

- (3) Robert did not cut down all the trees.
 - a. Full set interpretation (*all* > *not*): Robert did not cut down any trees.
 - b. Partitioned set interpretation (*not* > *all*): Not every tree was cut down by Robert.

Crucially, these bilinguals evidence a grammar of scope that lacks ambiguity: like in Korean, only one reading is possible. The mechanism that yields the availability of (3a) (and not (3b)) remains unclear. It is likely the case that the reading in (3a) results from an obligatory definite interpretation of the object, *all the trees*, forcing it to scope above negation. We do not yet know whether in Korean the situations in which none of the trees were cut are judged against an interpretation that is licensed by the grammar (*all* > *not*) or as a subcase of the *not* > *all* reading. Lee et al. (2011) only tested quantification expressions involving *all*, an element whose status as a true universal quantifier is subject to much debate (see Brisson 1998 for discussion).

Whatever the explanation for this result, it nevertheless raises important questions concerning the representation of scope in both monolingual and bilingual speakers. However, Lee et al. (2011) did not test the scope preference of their bilingual subjects in the Korean language. Since that language was, at the time of the study, the weaker of the two in the subjects' bilingual representation, it is important to determine whether the scope preferences observed in monolingual Korean are still present in that language when it is weakened by a dominant L2. In addition, the authors tested a rather small group of speakers (seven adults and nine children).

In this paper, we further address the question of scope in bilinguals by comparing doublyquantified sentences in Mandarin Chinese (henceforth Mandarin), English, and heritage Mandarin; "heritage Mandarin" refers to the language spoken by early sequential bilinguals who learned Mandarin before English but are dominant in English at the time of testing. We focus on these three populations because they present an interesting comparison case: English is known to have scope ambiguities, while Mandarin is generally assumed to have only surface scope (although this assumption has recently been contested by Zhou and Gao 2009; see Scon-

tras et al. to appear for discussion). Meanwhile, the nature of scope calculations in the Mandarin of the English-dominant bilinguals is unknown.

The rest of our paper is structured as follows. Section 2 presents and analyzes scope relations in Mandarin; in particular, we follow Scontras et al. (to appear) in refining the conditions under which such scope relations should be tested, and show that Mandarin does indeed have surface scope only. Section 3 presents an experiment in English which follows the same design as the Mandarin experiment. Finally, section 4 presents a study of scope in Mandarin as spoken by heritage bilinguals. We discuss our main results and present the directions for further study in section 5.

2 Experiment 1: Mandarin

We take as our starting point the finding from Scontras et al. (to appear) that English allows inverse scope in doubly-quantified sentences, whereas Mandarin does not. We begin by motivating the current experiments in light of this finding.

In his seminal work, Huang (1982) argues that Mandarin does not display scope ambiguity (see also Huang 1981): if one quantificational expression c-commands the other one in its surface configuration, then that c-command relation is preserved at LF. Sentence (4), therefore, has only one reading, according to which none of the contextually relevant students came. Other scope readings are not possible.

 Mei-yi-ge xuesheng dou mei-you lai.
 every-one-cL student all not-have come 'Every student did not come.'

While this claim from Huang (1982) has survived in the theoretical literature for three decades, it was not experimentally examined until recently by Zhou and Gao (2009), who came to a different conclusion. Zhou and Gao tested the following configuration for doubly-quantified sentences in Mandarin, where the subject contains a universal quantifier and the object an existential quantifier.

(5) Mei-ge ren dou qu-le yi-jia gongchang. every-cl person all go-ASP one-cl factory 'Everyone went to a factory.'

In their experiment, participants (from Beijing) were provided with one of two possible context scenarios for each test sentence and asked to rate, on a 5-point scale, how well the sentences described the scenarios. In the case of (5), one scenario featured three different factories and each person went to a different factory. In the second scenario there was only one factory, and every-one went to it. The scenarios are meant to satisfy one of two possible scope interpretations for the test sentence. The first, many-factory scenario corresponds to surface scope ('every'>'a'); the second, single-factory scenario corresponds to inverse scope ('a'>'every'). Zhou and Gao's results show that although the surface scenarios are rated more highly, both scenarios receive relatively high ratings.¹ Zhou and Gao thus conclude that doubly-quantified sentences in Mandarin (like (5)) are actually scopally ambiguous, permitting both surface and inverse interpre-

¹Zhou and Gao examined, for each scope interpretation, three different types of verbs (action, locative, and psych-verbs), and found that the mean ratings of inverse scope were higher than 3 (out of 5) across all verb types.

tations.

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However, the design of Zhou and Gao's study faces a serious problem: we cannot tell whether their stimuli indeed allow inverse scope interpretations. This is because the inverse scope reading in (5) entails the surface scope reading (see Reinhart 1976, 1997, Ruys 1992, Abusch 1994, and more recently Meyer and Sauerland 2009): if there is a single factory that every person went to, then it is necessarily true that every person went to a factory. In other words, both scenarios mentioned above are compatible with the surface scope reading of (5); that everyone went to the same factory is not inconsistent with a surface parse of the sentence. Therefore, whether (5) is ambiguous remains unknown, and Zhou and Gao's conclusion from is not supported by their experimental findings.

Data that can demonstrate genuine inverse scope without the entailment problem just described are those like (6), where a singular indefinite c-commands a universal quantifier in the surface structure. In this case, the inverse reading does not entail the surface scope: where there are multiple factory-goers, the inverse parse will be true while the surface parse is false.

(6) A person went to every factory.Inverse scope reading: For every factory, there is a person that went to it.

In Scontras et al. to appear, we tested precisely this configuration in Mandarin using a truthvalue judgment task, and found a lack of inverse scope availability for Mandarin speakers: none of our 19 subjects judged inverse conditions true. Recent work has demonstrated that heritage speakers, whose judgments are less sure, respond better to scalar than to binary tasks (Orfitelli and Polinsky 2013). Given that our present aim is to investigate the grammar of scope in heritage speakers, our first task is to replicate the findings from Scontras et al. (to appear) using a different method: acceptability ratings.

2.1 Participants

132 subjects (from either Mainland China or Taiwan) participated in this experiment. We evaluated native language on the basis of two demographic questions: "What was the first language you learned?" (Mandarin) and "What is the language you speak most at home?" (Mandarin). Data from 53 native speakers were included in the analysis.

2.2 Materials

All materials come from Scontras et al. (to appear). We tested two types of doubly-quantified sentences: one where the subject contained 'every' and the object the indefinite/numeral 'one' (E>O), as in (7a), and one with the reverse configuration (O>E), as in (7b). Sentences were recorded by an adult male speaker of Mandarin from Beijing and normed to ensure neutral intonation.² Disambiguating pictures came from Benjamin Bruening's Scope Fieldwork Project.³

(7)	a.	Mei-yi-tiao	shayu dou g	gongji-le	yi-ge	haidao.	
		every-one-ci	shark all	attack-ASP	one-ci	pirate	
		'Every shark	attacked a/c	one pirate.	,		E>O

²We normed intonation to avoid prosodic disambiguation of scope configurations. However, Leddon et al. (2004) show that prosody does not provide reliable cues for disambiguating scope interpretations, at least in English. ³http://udel.edu/ bruening/scopeproject/scopeproject.html

Figure 1

An example item, Experiment 1 (Mandarin)

	Surface scope	Inverse scope	
E>O			
	Mei-yi-tiao shayu dou gongji-le yi-ge haodao.	Mei-yi-tiao shayu dou gongji-le yi-ge haodao.	
	every-one-CL shark all attack-ASP one-CL pirate	every-one-CL shark all attack-ASP one-CL pirate	
	'Every shark attacked a/one pirate.'	'Every shark attacked a/one pirate.'	
O>F.		A CONTRACTOR	
	You yi-tiao shayu gongji-le mei-ge haidao.	You yi-tiao shayu gongji-le mei-ge haidao.	
	exist one-CL shark attack-ASP every-CL pirate	exist one-CL shark attack-ASP every-CL pirate	
	'A/One shark attacked every pirate.'	'A/One shark attacked every pirate.'	
L		· · ·	

 b. You yi-tiao shayu gongji-le mei-yi-ge haidao.
 exist one-cL shark attack-ASP every-one-CL pirate 'A/one shark attacked every pirate.'

O>E

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We manipulated two factors, ORDER and SCOPE. Order corresponds to the linear configuration of quantifiers, that is, whether the surface structure is E>O ('every' over 'one/a') or O>E ('one/a' over 'every'); scope corresponds to the intended interpretation, that is, whether the co-occurring picture depicts the surface or inverse scope reading. An example item is given in Figure 1.

2.3 Design

Participants took the experiment online using the web-based experiment platform ExperigenRT (Becker and Levine 2010, Pillot et al. 2012). They began by filling out a demographic survey, then completed a training session consisting of three slides. The training items served to ensure that the sentences and pictures were correctly displayed and that participants understood the instructions as well as the correspondence between the sentence and the picture.

In each trial, a picture was shown first and the participants were asked to click on an audio button below the picture to play the sentence. After hearing the sentence, they were asked to judge whether the sentence they heard appropriately described the picture using a 7-point scale (1 = 'completely inappropriate', 7 = 'completely appropriate'). Participants completed 16 trials in a random order (8 critical items and 8 fillers). Only one version of each test item was presented

to any given subject.

2.4 Results

Averaged ratings for each of the four conditions are given in Table 1. We fit a mixed logit model predicting response by order, scope, and order/scope interaction. The model included random intercepts for participants and items and random slopes for order and scope grouped by participant and item. There was a significant effect of order ($\chi^2(1)=19.2$, p<0.01): the E>O configuration received higher ratings than O>E. We also found a significant effect of scope ($\chi^2(1)=21.6$, p<0.01): inverse scope conditions received lower ratings than surface scope.

Table 1

Average response by condition (Experiment 1: Mandarin)

order	scope	rating	
E>O	surface	6.4	
O>E	surface	4.7	
E>O	inverse	3.7	
O>E	inverse	1.6	

2.5 Discussion

Recall that the E>O + inverse condition does not reliably probe the existence of inverse scope because whenever the sentence *every shark attacked one pirate* holds true on its inverse interpretation, the surface interpretation holds true as well. The critical test case is the O>E +inverse condition, where, for example, the participants saw a picture of multiple sharks attacking different pirates individually and heard the Mandarin sentence 'one shark attacked every pirate'. Crucially, this condition received the lowest ratings, demonstrating the infelicity of inverse scope for Mandarin speakers and replicating the finding from Scontras et al. (to appear). Were inverse parses a viable option (as is claimed in Zhou and Gao 2009), we would expect ratings for this condition to be well above the floor level. To repeat: the acceptability of inverse scope in Mandarin was rated on average 1.6 out of a possible 7 points.

We also found that the O>E order received lower ratings than E>O regardless of scope interpretation. We interpret this effect as demonstrating the degraded status of universally quantified phrases in object position. This might have to do with the fact that in Taiwanese, a southern Chinese language spoken in Taiwan, definite/specific expressions are banned in postverbal position in several constructions (James Huang, p.c.; Teng 1995 and references therein). If we take a universal quantifier containing *every* to be definite/specific in a broad sense, as it typically requires a restricted domain of quantification, the dispreference for the O>E order may be seen as a consequence of cross-linguistic influence. We return to this point in our discussion of the English results in section 3.4.

Finally, we remark on two features of the Mandarin quantified sentences used in this experiment. First, in sentences with a numeral subject, the existential predicate *you* 'exist' is required before the numeral; see (7b). If we assume that *you* is a verb meaning 'exist' or 'have' (following the recent proposal by Fang and Lin 2008 and Fang 2010), sentences like (7b) receive an embedding, bi-clausal structure where the numeral subject is actually the object of *you* 'exists' and the rest of the sentence is a relative clause modifying the numeral subject. In other words, *you* sentences receive a structure that resembles that of English *there*-existential constructions.

We will take this point into account in the design of the English experiment in section 3, where existential *there*-sentences will be examined.

Second, Mandarin does not have an article system: we have been translating English a as Mandarin yi 'one', but it is not obvious whether the singular numeral yi is semantically ambiguous between an indefinite article and a true numeral expression. We therefore do not know whether yi contributes merely existential force (like a), or whether it behaves always as a full-fledged numeral (like *one*).⁴

To better understand the potential contributions of these properties of the stimuli to the significantly degraded status of inverse scope in Mandarin, we conducted a second experiment using the same set of materials. In this experiment, we focus on English, a language uncontroversially claimed to allow inverse scope.

3 Experiment 2: English

Experiment 2 allows for a comparison between scope interpretations in Mandarin and English doubly quantified sentences. Again, we replicate a parallel study conducted by Scontras et al. (to appear), but replace the original binary task with a scalar task. We split this experiment into four sub-experiments according to whether the head of the singular indefinite is the article *a* or the numeral *one*, and whether sentences in the O>E configuration participate in a *there*-existential.

3.1 Participants

We recruited 130 participants via the Mechanical Turk Crowdsourcing Service of amazon.com. Participants were compensated for their participation. Only native speakers of English (n=114) were included in the analysis.

3.2 Materials

All items come from Scontras et al. (to appear). As in Experiment 1, we manipulated two factors, ORDER (E>O or O>E) and SCOPE (surface or inverse). Test sentences were translations of the Mandarin stimuli used in Experiment 1. Direct translation was not possible given the language-specific properties discussed above (i.e. universal *dou*, existential *you*, and the article/numeral *yi*). We therefore used four English constructions as targets for translation. A set of example sentences for the O>E configuration is given in (8).

(8)	9	Sub-experiment	Example
	a.	А	A shark attacked every pirate.
	b.	ONE	One shark attacked every pirate.
	c.	THERE-A	There is a shark that attacked every pirate.
	d.	THERE-ONE	There is one shark that attacked every pirate.

⁴Another property of the Mandarin stimuli which we are unable to address in the current study concerns the particle *dou*. When a subject or preverbal phrase contains *mei* 'every', the particle *dou* 'all' must appear in a VP-adjacent position; see (7a). *Dou* is a VP-external particle generally obligatory with a strong NP subject like *every student*. When the strong NP is an object (see (7b)), *dou* does not appear. The nature of this particle has been the subject of much debate, with many authors treating it as a universal quantifier of some sort (e.g. Huang 1982, Lee 1986, Cheng 1991). This move leads to the question of why strong NP subjects require the company of this universal quantifier.

Sentences were recorded by an adult male speaker of American English and normed to neutral intonation. 5 fillers were added to the 8 critical items and 8 fillers from Experiment 1.

3.3 Design

Experiment 2 featured the same design as Experiment 1. Participants first filled out a demographic survey and then entered the training phase. They began with a training session of three slides. In each trial, a picture was shown first and the participants were asked to click on a button to play the sentence. They were then asked to judge whether the sentence they heard was acceptable in the context of the picture displayed. Subjects used a 7-point Likert scale for ratings (1 = 'completely unacceptable', 7 = 'completely acceptable'). Subjects completed a total of 21 trials (8 critical items and 13 fillers).

3.4 Results

For the purpose of analysis, we split the results into four sub-experiments corresponding to the syntactic frame in (8) used to translate the original Mandarin. All results are given in Table 2.

We begin with the A sub-experiment, which featured sentences containing indefinite *a* and no *there*-existential, (8a). We fit a mixed logit model predicting response by order, scope, and their interaction (analyses were identical to Experiment 1). We found a significant effect of order $(\chi^2(1)=6.50, p<0.05)$: O>E sentences received lower ratings than E>O sentences. We also found a marginal effect of scope $(\chi^2(1)=3.28, p=0.07)$: inverse conditions received lower ratings than surface conditions.

Table 2

order	scope	A	ONE	THERE-A	THERE-ONE
E>O	surface	6.5	6.6	-	_
O>E	surface	5.6	6.2	6.2	6.5
E>O	inverse	5.5	5.6	-	_
O>E	inverse	4.5	2.1	3.1	2.3

Rating responses by condition of Experiment 2 (English)

For the ONE sub-experiment, (8b), we found significant effects of order (p<0.01) and scope (p<0.01), as well as a significant interaction between the two (p<0.01). Inverse conditions were rated lower than surface conditions, O>E lower than E>O, and O>E inverse lower than we would expect based solely on the combined main effects.

With the THERE-A sub-experiment, (8c), no order manipulation was possible; only the O>E configuration enters into a *there*-existential (cf. **There is every shark that attacked a pirate*). We therefore analyzed only the effect of scope, which was significant (p<0.01): the O>E inverse condition was rated lower than O>E surface.

As with the THERE items, in the THERE-ONE sub-experiment, (8d), no order manipulation was possible. We found a significant effect of scope (p<0.01): O>E inverse was rated lower than O>E surface.

3.5 Discussion

The pattern of results found in the English A sub-experiment with indefinite a and no *there*-existential is similar to that found for Mandarin in Experiment 1: the O>E configuration is

degraded relative to E>O, and inverse conditions are dispreferred.⁵ While in Mandarin the dispreference for O>E may be explained in terms of language contact, there is no comparable motivation for such a dispreference in English. The degraded status of the O>E configuration in both English and Mandarin argues against the language contact hypothesis considered in section 2.5. It remains to be seen how common the O>E dispreference is cross-linguistically, and why.

On the other hand, the ratings for the critical condition (O>E + inverse) are markedly different across the two languages: 1.6 (Mandarin) vs. 4.5 (English). This finding confirms the current consensus that English allows inverse scope while Mandarin does not (replicating Scontras et al. to appear, *pace* Zhou and Gao 2009).

In addition, two properties of the English data deserve further attention. First, in the ONE and THERE-ONE sub-experiments, inverse scope is less preferred than in the A and THERE-A sub-experiments. One might hypothesize that this result derives from the fact that the English numeral *one* has a stronger tendency to be interpreted as specific/wide-scope-taking than is indefinite *a*, perhaps due to some competition between the two lexical items. But if *one* is always interpreted as specific, taking wide scope, then we should find a decrease in the ratings for E>O + surface conditions for this item: *one* corresponds to many objects in these scenarios (cf. Figure 1). This is not what we find. In object position, *one* readily accepts narrow scope, which means it is not interpreted as specific. A more likely explanation is that *one* is subject to the *single reference principle* (Fodor 1982, Kurtzman and MacDonald 1993) to a higher degree than *a*: upon hearing *one*, English speakers want to associate it with a single entity (see Scontras et al. to appear for a similar finding and fuller discussion). But upon hearing *one* in object position following *every*, speakers have evidence against the single reference interpretation, resulting in the positional differences we report here: only in subject position must *one* be interpreted as specific.

Second, the results of the O>E + inverse condition shed new light on the syntactic analysis of English *there*-existentials. On the surface, *there*-existentials have an embedding bi-clausal structure [*CP* there be [[*DP* head noun] [*CP* relative clause]]]. In the doubly quantified sentences tested in this study, one quantifier phrase is base-generated as the object of be and the other inside the relative clause (RC), for example, *there is <u>a shark</u>* [_{RC} *that attacked <u>every pirate</u>*]. Assuming QR is clause-bound, the RC object *every pirate* cannot move out of the RC that embeds it. One way to get the inverse scope reading (*every* > *a*) is for the head NP, *shark*, to be basegenerated inside the RC and then to move out, as schematized in (9). This raising approach allows *shark* to be reconstructed back into the embedded clause at LF, where it may be scoped over by *every*. Raising plus reconstruction thus gives rise to inverse scope readings for *there*existentials. On the contrary, under an operator movement account (e.g. Chomsky 1977), what is moved inside the RC is an implicit operator; the head NP *shark* originates outside of the RC, as in (10). Since there is no way to reconstruct the head NP into the RC, *every* cannot scope over it (due to locality conditions) and inverse scope is thus predicted to be impossible.

⁵The lower ratings given to English inverse conditions across all sub-experiments, regardless of word order, are consistent with previous studies on English scope interpretation (e.g. Tunstall 1998, Anderson 2004). We return to this point in our discussion of Experiment 3.

DP

(9) *head-raising* analysis: reconstruction of *shark* possible

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(10)



If speakers of English employ only the operator movement strategy, scope ambiguity should not be observed for relative constructions; if they adopt the head-raising strategy, scope ambiguity may or may not arise, depending on whether reconstruction of the head NP has taken place. Scontras et al. (to appear) report truth-value judgments for the same stimuli used in the current experiment. In that study, subjects demonstrated no difference in their willingness to accept inverse scope in the plain A items, and in the bi-clausal THERE-A existentials (56% true responses for A; 50% true responses for THERE-A). This finding is interpreted by Scontras and colleagues as supporting a raising analysis of English RCs, which would yield the observed availability of inverse scope on the basis of reconstruction. In the current experiment, we find higher ratings for the biclausal THERE-A items than Scontras et al. did, but these ratings are a full point lower than the ratings for the mono-clausal A items (cf. Table 2). We believe two factors contribute to this decrease in perceived acceptability: the difference in the nature of the task, and complexity.

In Scontras et al. (to appear), the task was to provide truth judgments. If the sentence could describe the co-occurring image, subjects were instructed to judge it as true; therefore, as long as the inverse scenario was possible, no matter how improbable, truth judgments had to be available. In the current study, the task was to provide ratings. Computing inverse scope is a

costly operation, and this cost is reflected in the ratings that the inverse conditions received (Anderson 2004). In other words, the task of providing truth judgments is more likely to force the costly operation of reconstruction than is the task of providing acceptability ratings. In addition, complexity in general, and clausal complexity in particular, is known to affect processing, which is reflected in acceptability ratings (see Gordon and Lowder 2012 for discussion). It should therefore come as no surprise that the biclausal THERE-A items are rated lower than the monoclausal A items. Still, our results, together with those reported in Scontras et al. (to appear), demonstrate the ability for scope interactions to cross a relative-clause boundary, a finding that supports the raising analysis of these constructions (Vergnaud 1974, Kayne 1994, Aoun and Li 1993).

To summarize, using data from doubly quantified sentences, our study has demonstrated (i) that Mandarin does not exhibit inverse scope (contra Zhou and Gao 2009); (ii) that English does allow inverse scope, (iii) that the numeral *one* evidences a processing effect wherein single-referent parses are built early; and (iv) that English prefers to avoid inverse scope when a quantifier is embedded inside a relative clause (cf. Scontras et al. to appear). Our next question is what happens when the two grammars, English and Mandarin, meet. We turn now to heritage Mandarin.

4 Experiment 3: Heritage Mandarin

Having replicated the finding that English permits inverse scope while Mandarin prohibits it, we now test the robustness of this prohibition in Mandarin. To do so, we investigate the grammar of heritage speakers of Mandarin, that is, individuals who spoke Mandarin in childhood, can understand and speak it to some degree still, but are now more comfortable in their dominant language, American English.⁶ Demographically, this group is most comparable to the group investigated by Lee et al. (2011) for Korean. Essentially, our goal in this experiment is to test the degree to which the Mandarin prohibition is susceptible to interference from a dominant language. To do this, we replicate Experiment 1 on a population of heritage Mandarin speakers.

4.1 Participants

We recruited 21 heritage speakers of Mandarin. These speakers learned Mandarin as their first language, but currently live in the United States and are English-dominant (e.g. they speak English mostly at home).

4.2 Materials and Design

As in the previous experiments, we tested two types of doubly quantified sentences and manipulated two factors, ORDER (E>O or O>E) and SCOPE (surface or inverse). All stimuli and pictures were identical to those in Experiment 1, but the written instructions were given in English (identical to those in Experiment 2). Subjects rated the acceptability of the sentences they heard in the context of the scenarios depicted in the co-occurring images. Subjects completed 16 trials (8 critical items and 8 fillers).

⁶For a general overview of heritage languages and their speakers, see Benmamoun et al. 2013a,b.

4.3 Results

We present the results of heritage Mandarin in parallel with those from native Mandarin in Experiment 1 (Table 3). We fitted a mixed logit model predicting response by order and scope, together with the factor NATIVENESS (heritage vs. native); we also included their interactions. We found significant effects of order (p<0.01) and scope (p<0.01): across the two groups, the O>E configuration received lower ratings than E>O, and the inverse conditions received lower ratings than the surface conditions. We also found a significant effect of nativeness (p<0.01): native Mandarin speakers gave lower ratings than heritage speakers. There is marginal interaction between nativeness and scope (p=0.07): native speakers rated inverse conditions lower than heritage speakers.

Table 3

order	scope	HERITAGE	NATIVE
E>O	surface	6.9	6.4
O>E	surface	5.2	4.7
E>O	inverse	4.8	3.7
O>E	inverse	2.8	1.6

Average ratings by condition for Experiment 3 (heritage vs. native Mandarin)

In addition to the ratings, we also recorded reaction times (measured from the end of the audio file to the point at which subjects provided their ratings); results are presented in Table 4. We found significant effects of order (p<0.01) and scope (p<0.01): across both groups, responses to O>E configurations took longer than those to E>O, and responses to inverse scope took longer than responses to surface scope. We also found a significant interaction between order and scope (p<0.05): responses to O>E inverse conditions were faster than we would expect on the basis of the combined effects. Finally, there was marginal interaction between order and nativeness (p=0.09): native speakers were faster on O>E configurations than heritage speakers.

Table 4

Reaction times (ms) by condition for Experiment 3 (heritage vs. native Mandarin)

order	scope	HERITAGE	NATIVE
E>O	surface	3706	4014
O>E	surface	7120	5728
E>O	inverse	6167	5640
O>E	inverse	7941	5678

4.4 Discussion

Recall the finding from Lee et al. (2011) on scope in heritage Korean: speakers who were dominant in English nevertheless demonstrated scope behavior characteristic of their weaker language, Korean. Moreover, this scope behavior evidenced a simpler system that avoided ambiguity. In this context, let us consider the current results.

Important for our present purposes is the fact that the heritage group rated the critical inverse condition higher than the native group did (2.8 vs. 1.6), and took longer to provide these ratings than the native group (7941ms vs. 5678ms). The slower reaction times for heritage

speakers suggest that these participants were puzzled by the sentence-picture pairs for this condition.

Although the heritage group gave higher ratings than the native group to the inverse conditions, it bears noting that the heritage speakers rated *all* conditions higher. Moreover, when we compare the responses of English and heritage Mandarin speakers, we find that the two groups are doing different things with inverse scope: English speakers rated inverse scope on average 4.5 out of 7 points, compared to 2.8 from heritage Mandarin. We take these facts as suggesting that the heritage participants did not employ inverse scope to resolve the interpretation. The higher ratings for inverse conditions (relative to native speakers) stems instead from the "yes-bias": heritage speakers are known to rate unacceptable/ungrammatical sequences higher than native controls (Benmamoun et al. 2013b, Laleko and Polinsky 2013). Heritage speakers respond differently from native ones in avoiding the lower end of the rating scale when judging ungrammatical sentences. In other words, when our heritage speakers heard a sentence that did not match the picture in the critical condition, they were less certain, and eventually gave higher ratings than the native speakers. This hypothesis is further supported by the reaction times, which show that heritage participants took more time to judge the critical items than all other conditions. This pattern contrasts with that of the native group, whose reaction times across all conditions were more uniform.

But if heritage Mandarin speakers do not allow inverse scope, does it follow that they have a robust Mandarin grammar? Not necessarily. Heritage grammars are less dominant and more costly to employ. Heritage speakers might therefore prefer simpler grammars. Suppose that QR is the mechanism by which we achieve inverse scope. A grammar with QR will be more complex than one without it: in addition to implicating an additional grammatical mechanism, it will produce more ambiguities. The heritage Mandarin speakers we tested are thus likely to adopt the Mandarin-like system because it is simpler, perhaps along the lines of the following principle from Anderson (2004):

(11) *Processing Scope Economy* (Anderson 2004:31)

The human sentence processing mechanism prefers to compute a scope configuration with the simplest syntactic representation (or derivation). Computing a more complex configuration is possible but incurs a processing cost.

Put differently, a Mandarin-like grammar for scope is adopted by the heritage speakers not because this heritage grammar never undergoes interference but because it happens to be a simpler one than the speakers' other available grammar (i.e. English). To fully test this hypothesis, it will be necessary to investigate how Mandarin-dominant heritage speakers of English respond to doubly quantified sentences (in English). If the principle in (11) is applicable to a two-language system and the simpler, Mandarin-like grammar is always an option, we would expect these speakers to assign OE + inverse sentences lower ratings than native English speakers; that is, they should lose the ability for inverse scope because the rigid scope grammar is simpler. This seems to be what Lee et al. (2011) found for English-dominant speakers with early exposure to Korean. The confluence of evidence suggests that bilinguals prefer simpler, less ambiguous grammars for scope – a preference visible in both the weaker and the dominant language. We fail to find interference from a dominant language when its system is more complex than the alternative.

5 General Discussion

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The general question that inspired this study was: do bilingual speakers show interaction between the languages they speak in their calculation of scope? In other words, does the grammar of scope from one language influence how scope calculations proceed in the other? If yes, what is the direction of such interference, and are there constraints on it? While we have so far taken only the first step in the direction of addressing this question, the answer appears to be a qualified no. In our study, we tested speakers of Mandarin dominant in English. English possesses a more complex system than Mandarin for calculating scope in doubly quantified sentences: the availability of QR delivers ambiguity between surface and inverse scope. In Chinese, no such ambiguity is found. Were English, the dominant language, to influence the weaker language, we would expect these heritage speakers to show evidence of scope ambiguity. Crucially, we do not observe any such ambiguity: the heritage speakers remain faithful to the baseline grammar, prohibiting inverse scope.

5.1 Conclusions

We began with Lee et al.'s (2011) observation that English scope calculations may be simplified in English-dominant heritage speakers of Korean. We interpret this finding as evidence that, when the unambiguous Korean system meets the ambiguity-generating English system, the result is diminished ambiguity. To further our understanding of the scope representation of bilingual speakers, we explored the treatment of doubly quantified sentences in heritage Mandarin speakers dominant in English. We chose this pair of languages because previous work indicates that English allows inverse scope in doubly quantified sentences while Mandarin does not (see Scontras et al. to appear).

Why Mandarin and English have diverging scope possibilities is far from clear. Mandarin makes use of a preverbal quantificational particle *dou* (often glossed as 'all') when the subject of a sentence contains a strong quantifier. As *dou* has no close counterpart in English, it seems plausible to hypothesize that it is this creature that leads to a difference between E>O sentences in Mandarin and English, especially in light of the ratings in the E>O + inverse condition (3.7 in Mandarin vs. 5.5 in English A). As for O>E sentences, the existential *you* 'exist' predicate, the presence of which is generally obligatory with indefinite subjects in Mandarin, may be a crucial syntactic clue. It remains to be seen whether *you* signals a bi-clausal configuration for O>E sentences, as English *there*-existentials do, but disallows head-raising, rendering reconstruction unavailable.

Our findings indicate that heritage Mandarin speakers continue to adhere to surface scope in their processing of Mandarin. However, there are at least two possible explanations for this result. One possibility is that there is no transfer from the stronger language to the weaker language in the scope domain.⁷ The other possibility is that, when two systems meet, the result is reduction of ambiguity and simplification. Such simplification has been independently observed in other linguistic phenomena under language contact (see Camacho and Sanchez 2002, Pfaff 1981, Romaine 1992, Silva-Corvalan 1991, Thomason and Kaufman 1991 and Trudgill 2002). Whatever the explanation, we do not observe heritage Mandarin speakers applying

⁷Note that we do observe transfer from dominant languages in other domains. For example, Ionin et al. (2011) find semantic transfer: heritage speakers accept bare plurals in subject position as grammatical in Spanish, and interpret the definite article as having a specific interpretation more often than a generic interpretation. See Benmamoun et al. (2013a,b) for further discussion.
their English grammar in scope calculation.

The principle of Processing Scope Economy (Anderson 2004) shown in (11), which maintains that human sentence processing prefers the simplest representation/derivation in computing a scope configuration, offers an explanation for our findings. That is, a Mandarin-like grammar for scope is adopted by the heritage speakers not because their heritage grammar never undergoes interference, but because the Mandarin system, which lacks inverse scope, happens to be a simpler system than the English system. To fully test this hypothesis, it would be necessary to investigate the behavior of heritage speakers whose linguistic system is the opposite of the one addressed in the present study: that is, how do heritage speakers of a language allowing scope ambiguity (e.g. English), whose dominant language only allows surface scope (e.g. Mandarin), respond to doubly-quantified sentences in their weaker language? If the principle in (11) is applicable to a two-language system and the simpler, ambiguity-free scope grammar is always an option, we would expect such heritage speakers to lose inverse scope and stick with the simpler, rigid-scope grammar. In our experimental paradigm, these speakers.

It should be noted that, throughout our experiments, it is the O>E + inverse condition that serves as the diagnostic for inverse scope. Because inverse scope does not entail surface scope in this configuration (i.e. existential > universal), it is free from the entailment problem associated with doubly-quantified sentences involving *every* and indefinites. Although this problem has long been noted (since at least Reinhart 1976), it has not been taken into serious consideration in the theoretical literature on Mandarin quantification, to the best of our knowledge. This has consequences which leads us to our final topic, concerning outstanding theoretical issues in Mandarin quantification.

5.2 Open Issues

Two important problems in Mandarin quantification do not immediately lend themselves to experimental testing. The first concerns quantification in passive sentences. Aoun and Li (1989:146–147) claim that passive sentences such as (12) are ambiguous in the same way as the English sentence *Someone is loved by everyone*. In other words, the authors claim that passive sentences are exceptions to the general rigid scope requirement in Mandarin.

(12) mei-ge ren dou bei yi-ge nuren zhuazou le. every-cl person DOU PASS one-cl woman arrested ASP 'Everyone was arrested by a woman.'

Therefore, it is difficult to argue unequivocally for the existence of the inverse-scope reading in (12), because this reading entails the surface scope interpretation: if there is a single woman that arrested everyone, then it is necessarily true that everyone was arrested by a woman, albeit the same one; the latter scenario does not justify an inverse-scope interpretation.

An obvious way to avoid the entailment problem when testing doubly quantified sentences is to use quantifiers of other types, for example, *These sharks did not attack a/one pirate*, where the relevant quantificational expressions are negation and a singular indefinite, and the inverse scope reading in the present experiment does not entail surface scope. We did not use such sentences as stimuli because, for unknown reasons, quantifiers in Mandarin sound awkward when they are objects below negation. If *These sharks did not attack a/one pirate* in Mandarin is grammatical at all, the interpretation has the singular expression contrastively focused, implying it is not the case that these sharks attacked one pirate, but rather two pirates or more. Strong quantifiers (e.g. 'every', 'most', 'all') show a similar pattern under negation in Mandarin.

The second outstanding issue in Mandarin quantification has to do with the scope of numerical expressions. Jiang (2012:112–113) cites examples like (13) and (14) and claims that the numeral indefinites therein show exceptional wide scope with respect to an adjunct *if*-clause and another numeral indefinite. Hence, they are ambiguous in terms of scope interpretation (on a par with English indefinites).

- (13) ruguo ni neng dai yi-ge nusheng lai wode party dehua, wo hui hen kaixin. if you can bring one-CL girl come my party if I will very happy 'If you can bring one girl to my party, I will be very happy.'
 - a. Wide scope: *one girl* > *if* 'There is a specific girl, if you can bring this girl to my party, I will be very happy.'
 - b. Narrow scope: *if > one girl*'I will be very happy if you can bring any girl to my party.'
- (14) wo mai-le [NP wu-ben [san-ge ren xie] de shu].
 - I buy-ASP five-CL three-CL man write DE book
 - a. Wide Scope: *three men* > *five books*
 - 'There are three men *x* such that there are five books *x* wrote that I bought.'
 - b. Narrow Scope: *five books > three men*'I bought five books that three men wrote.'

Again, we face the same problem of unambiguously identifying inverse scope. In this case, the problem resides in the fact that the conditional, (13), is felicitous regardless of whether there is one specific girl in the relevant context. On the narrow/surface scope reading (if > one girl), (13) is true as long as I will be happy in the situation when you bring one girl to my party. Whether I (the speaker) have a specific girl in mind is irrelevant—even if I do, the interpretation is still compatible with the narrow/surface scope reading. On the wide/inverse scope reading, on the other hand, (13) is true only when there is a specific girl that I am referring to, and it is false otherwise. This means that only the latter interpretation yields clues to the scope interpretation of *one girl*: if (13) can be judged *false* when there is no specific girl in the speaker's mind, we can conclude that *one girl* indeed has a wide scope reading over the *if*-clause. However, given the phenomenon of *Truth Dominance* (Meyer and Sauerland 2009), it is very unlikely that a speaker would provide such a judgment, since the sentence has one reading that holds true of this scenario (i.e. the narrow/surface scope reading, which is the most accessible reading).⁸ Hence, (13) does not provide solid evidence for scope ambiguity.

In the discussion of (14), Jiang (2012: 113) remarks that "... the numeral 'five' c-commands the NC [numeral constructions] 'three men' in the complex NP, and both wide and narrow scope readings of 'three men' are available." She provides two paraphrases corresponding to the two possible scope interpretations, as shown in (14) above. What Jiang seems to refer to by the term "wide scope" reading is, again, the specific interpretation of 'three men'; thus, this scope reading corresponds to a scenario where the speaker of (14) has in mind three specific men such that I bought five books they wrote. But note that the wide/inverse scope reading

⁸The *Truth Dominance* constraint states that, "whenever an ambiguous sentence S is true in a situation on its most accessible reading, we must judge sentence S to be true in that situation" (Meyer and Sauerland 2009:140).

entails the narrow/surface scope reading: if there are three men who (cumulatively) wrote five books I bought, then it necessarily holds true that I bought five books (cumulatively) written by three men, albeit the same three. Thus the specific reading does not evidence true wide scope of 'three men' over 'five books'. On the other hand, if (14) can be judged *false* in the scenario where each of the five books was written by a distinct three-man group, we can conclude that wide/inverse scope obtains, because in this scenario, the narrow/surface scope is true while the wide/inverse scope is false. However, speakers are unlikely to produce such a judgment for this type of scenario, because there is at least one reading where (14) is true. As a result, whether this example demonstrates true inverse scope or not cannot be conclusive.

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