(Non-)Exhaustivity in French *c'est*-Clefts

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Abstract This paper presents two experimental studies that used an incremental information-retrieval paradigm to compare the exhaustivity in *c'est*-clefts to exhaustivity inferences in other constructions in French, as well as to exhaustivity in comparable constructions in German. Results suggest that exhaustivity in *c'est*-clefts is weak and in some cases shows a divergent pattern from exhaustivity in definite pseudoclefts (that is, identity statements with a definite description), contra predictions of Percus (1997) and Büring & Križ (2013) and differing from an identical study on German (De Veaugh-Geiss et al. 2017, 2018). We seek a unified account of cleft exhaustivity, and propose that the broader discourse semantics of *c'est*-clefts accounts for their weak exhaustivity effect.

Keywords *c'est*-clefts · *es*-clefts · exhaustivity · experimental study · German · French

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1 Introduction

Similar to other cross-linguistic focus-background constructions (e.g., the English *it*-cleft and the German *es*-cleft), the French *c'est*-cleft in (1) is claimed to have three standard components. It conveys a prejacent proposition that amounts to the corresponding canonical form (1a). It carries an existence presupposition (1b). Finally, it gives rise to an exhaustive inference whereby the predicate holds for no individual other than the one denoted by the cleft pivot (1c).

(1) C'est Marc qui a préparé un cocktail.
'It is Marc who prepared a cocktail.'

a. Marc prepared a cocktail. (*prejacent*)
b. Someone prepared a cocktail. (*existence*)
c. Nobody other than M. prepared a cocktail. (*exhaustive*)

It is commonly accepted that the prejacent is part of the asserted content, while the existential is presupposed. The source of exhaustivity is, however, disputed, and this debate is still very much alive, with—broadly speaking—two main theoretical positions offered to explain exhaustivity in clefts, either in semantic or in pragmatic terms. Experimental work, however, suggests that exhaustivity in clefts is generally not strongly conveyed (see, e.g., Destruel 2013 for French; De Veaugh-Geiss et al. 2018 for German), and for French specifically, recent studies found *c'est*-clefts to differ from English clefts in exhibiting weaker exhaustivity effects (Destruel & De Veaugh-Geiss 2018).

This paper seeks to address the following: how does exhaustivity in French clefts compare to (i) exhaustivity in clefts in other languages, in particular, German, and to (ii) other exhaustive inferences, in particular, that conveyed in definite pseudoclefts (that is, identity statements with a definite description)? To this end, we ran two experiments identical to recent studies on German (De Veaugh-Geiss et al. 2018) employing an incremental information-retrieval paradigm. The task involved a mouse-driven falsification/verification task in which participants had to make a truth-value judgment for target sentences conveying exhaustivity, including exclusives, narrow (prosodic) subject-focus, definite pseudoclefts, and clefts. The main contribution of the paper is that it provides additional evidence to the rather small empirical literature on exhaustivity in French, and expands on a prior experimental design to compare exhaustivity cross-linguistically.

2 Background

Exhaustivity is not specific to clefts, but is also conveyed by other sentence forms, most notably exclusives (2a), in situ narrow (prosodic)

subject focus (2b), and definite pseudoclefts (2c).

(2) a. Seul Marc a préparé un cocktail.
'Only Marc prepared a cocktail.' (*exclusive*)
b. MARC a préparé un cocktail.
'MARC prepared a cocktail.' (*focus*)
c. La personne qui a préparé un cocktail est Marc.
'The person who prepared a cocktail is Marc.'
(*def. pseudocleft*)

Exhaustivity is not derived the exact same way in each of these sentence forms. There is a general consensus in the literature on the fact that, with exclusives, exhaustivity is part of the asserted content of the sentence. It is also uncontroversial that exhaustivity is typically obtained via pragmatic enrichment in sentences with (prosodic) narrow focus. Definite pseudoclefts, by contrast, have been argued to share the underlying syntactic structure (Percus 1997) and semantic contribution of focus-background *it*-clefts (Percus 1997, Büring & Križ 2013, Hedberg 2013), and under these analyses exhaustivity is a hard-coded but not-at-issue maximality or homogeneity presupposition. The question concerning how to theoretically model exhaustivity in clefts nevertheless remains hotly debated. We now offer a brief overview of the debate, largely based on English *it*-clefts.

2.1 Theoretical Accounts and Empirical Findings

Past theoretical accounts of cleft exhaustivity generally split along a semantic/pragmatic divide. In a nutshell, this comes down to the question of whether exhaustivity is conventionally coded as part of the cleft's meaning (semantic accounts) or not (pragmatic accounts). Although mainly developed with a view to English, it is important to note that the analyses reviewed hereafter can arguably be applied to other languages in which cleft exhaustivity has been acknowledged as well (e.g., French, German, etc.)

While early semantic approaches analyzed clefts on par with exclusives (Atlas & Levinson 1981, É. Kiss 1998), later analyses are

less strict, claiming that exhaustivity in clefts is in some way presupposed. Within this line of argument, scholars have exploited the similarity between clefts and definite descriptions; see, for example, Percus (1997) and Hedberg (2013) for an account specified in terms of a maximality presupposition, and Büring & Križ (2013) for an analysis in terms of a homogeneity presupposition. Others, such as Velleman et al. (2012), have taken clefts to be *inquiry-terminating* devices, that is, devices that give a final and complete answer to a question. Under this view, the exhaustive component of clefts has a different discourse-semantic status than that in exclusives: it is not at-issue. In other words, exhaustivity is not the main point of what is conveyed by a cleft, rather the prejacent proposition is—and vice versa for exclusives.

Crucially, all semantic accounts contend that the inference is derived directly from the linguistic form of the utterance, making the following predictions: cleft exhaustivity is **systematic** and **robust**, and therefore not (easily) cancellable. It is predicted to arise across experimental manipulations and across speakers. Moreover, according to certain semantic approaches (Percus 1997, Büring & Križ 2013), it is expected to arise in a parallel fashion to definites.

By contrast, the pragmatic view, largely advocated by Horn (1981, 2014), takes exhaustivity to simply be added to the meaning of the sentence as a (generalized) conversational implicature, and this based on the observation that exhaustive effects do not seem obligatory with clefts (see Horn 1981; Horn 2014 for English; Destruel 2013 for French; De Veaugh-Geiss et al. 2015 for German). For instance, De Veaugh-Geiss et al. (2015) present a pragmatic analysis of exhaustivity in clefts in which exhaustivity is a focus-triggered scalar implicature. They argue that the differences between clefts and canonicals in terms of cancellation possibilities are not due to a particularly strong exhaustivity effect in clefts *per se*—unlike the manner implicature account in Horn 1981—but rather due to a weak exhaustivity effect in plain focus constructions given potential projection ambiguities (argued for even narrow subject focus) and thus suboptimal

environment for further pragmatic enrichment (see, however, Križ 2017: 5–6 for arguments against such an approach).

All in all, pragmatic accounts make straightforward empirical predictions contrasting with those made by semantic accounts: cleft exhaustivity is subject to **defeasibility** (i.e., it is not robust) and **variation** across contexts (i.e., it lacks systematicity). However, assuming that the derivation of exhaustivity follows **universal** pragmatic principles, we should expect minimal cross-linguistic variation.

Positioned outside of this semantic-pragmatic divide, the dynamic account of Pollard & Yasavul (2014), which following De Veaugh-Geiss et al. (2018) we draw from in our analysis, does not take exhaustivity to be coded in the cleft, but rather to be the result of the interaction of the existence presupposition of clefts (1b) with the meaning of *wh*-questions (Hamblin 1973). In this account, clefts specify an antecedent discourse referent, and this in two ways. In the non-exhaustive case, clefts pick up some (non-maximal) discourse referent to designate further. This can be illustrated in the case of, for example, correction, when revising misinformation about a referent in the discourse, as in (3).[1]

(3) A: Did you hear, Bob got an NSF grant!
B: Well, actually, it was Peter. And Mike got one, too!
(Adapted from ex. (5) in Pollard & Yasavul 2014)

When clefts answer *wh*-questions, however, an exhaustivity implication arises: the question introduces a maximal discourse referent, and the cleft existential has this discourse referent as its antecedent.

Recent years have seen an increase in experimental work testing

[1]One could claim that the acceptability of the second clause in B's response is an example of domain widening; however, in the same discourse with the exclusive *only* instead of the cleft, the continuation becomes infelicitous. Arguably, domain widening should apply in such cases as well.

(i) A: Did you hear, Bob got an NSF grant!
B: Well, actually, only Peter got an NSF grant. #And Mike got one, too!

predictions from various sides of the debate. One influential study by Onea & Beaver (2009) involved a violation task on Hungarian preverbal focus, later replicated for clefts (with comparable results) in English, German, French, and Greek (see Xue & Onea 2011, Destruel 2012, Destruel et al. 2015, Pavlou 2015). These studies found that in cases when exhaustivity was violated, participants chose a weak *Yes, but* continuation for preverbal focus and clefts, suggesting that exhaustivity in clefts was less robust than predicted under a semantic account. Similar violation diagnostics were applied in acceptability and truth-value judgment studies (e.g., De Veaugh-Geiss et al. 2018). Results again showed that, despite the explicit violation of exhaustivity, clefts were judged as relatively acceptable, and thus exhaustivity was argued not to be coded in the cleft structure itself.

To sum up: although all accounts embody the notion that exhaustivity is present with clefts, semantic approaches predict a systematic and robust link between clefts and the exhaustive inference (especially in unembedded contexts where presuppositions normally cannot be cancelled or suspended), with similar behavior for definites expected under certain proposals. Pragmatic approaches generally predict the opposite. Recent experimental work has mostly challenged strict semantic analyses based on the finding that the strength of the exhaustive inference is rather weak and variable.

2.2 The Case of French *c'est*-Clefts

There is some support for suggesting that French *c'est*-clefts are semantically similar to the focus-background clefts commonly discussed in the literature. Indeed, several French scholars have noted that *c'est*-clefts come with an existence presupposition and convey exhaustivity effects (Lambrecht 1994, Katz 2000, De Cat 2007). However, while exhaustivity in *c'est*-clefts is acknowledged within the literature on French proper (Lambrecht 1994, 2001, Katz 1997, De Cat 2007), few researchers have directly addressed the issue of how it is derived.

Drawing upon analyses in the cross-linguistic literature, Clech-

Darbon et al. (1999) are among these few arguing for a truth-conditional account (citing É. Kiss 1998) under which exhaustivity in clefts is equated to that in exclusives. Most recently, Destruel (2013) follows Horn (1981) in arguing for an alternative pragmatic view, namely, an implicature-based account. Although empirical work on French is quite scarce, Destruel (2013) and Destruel et al. (2015) suggest that *c'est*-clefts are only weakly exhaustive—and to a much lesser extent than exclusives.

Indeed, nothing precludes extending past accounts to French, and yet, there are also some subtle differences that set this language apart. First, *c'est*-clefts are the most common, and thus unmarked, strategy to signal subject focus (Lambrecht 1994, Carter-Thomas 2009, Féry 2013), and thus they have a high frequency in French (see, e.g., Dufter 2009 for a cross-linguistic perspective with corpus data on Romance languages vs. German). This has been argued to be primarily due to constraints on French prosody: whereas in Germanic languages, for example, English or German, prosodic prominence can be shifted to match the location of the focus constituent, French is more rigid, placing prosodic stress only at the right edge of an intonation phrase. The *c'est*-cleft, despite adding syntactic complexity, circumvents this prosodic restriction by creating an extra intonation boundary that can align with the focused constituent (Hamlaoui 2009).

Second and most importantly, French *c'est*-clefts have a broad discourse function: in addition to signaling a narrow focus, they can be used in all-focus contexts, for example, contexts in which the focus falls on the entire sentence. This is evident in examples such as (4) from Clech-Darbon et al. (1999), in which the answer to the question for the cleft of the form *It is X who P* is not congruent with a question derived from the cleft relative, that is, *who P?*—or a subquestion of this question, for example, *which x P?*—but rather, the much broader question *What happened?*[2]

[2]Recent corpus studies have provided further evidence of the occurrence of this type of *c'est*-cleft (Karssenberg & Lahousse 2015).

(4) Q: Qu' est-ce qui s' est passé?
what is-it that REFL.3SG is happened
'What happened?'
(Lit.) 'What is it that happened?'
A: C' est le petit qui est tombé dans l' escalier.
It is the small-one who is fallen in the stairs
'The little one fell down the stairs.'
(Lit.) 'It is the little one that fell down the stairs.'

In contrast, and in line with De Veaugh-Geiss et al. (2015), projection from the cleft pivot to constituents outside of the pivot appears to not be possible in German or English—and thus in these languages only narrow focus is possible. Thus, the question corresponding to a cleft matches the focus-background structure of the cleft-structure (i.e., it is directly derivable from the cleft relative clause); or for complex cleft pivots, a subquestion of the question delimited by the cleft relative, disambiguated by focus-marking (Velleman et al. 2012, Križ 2017). This leads to a (semi-)strict relationship in these languages between the cleft and the question it can answer (Abrusán 2016).

Empirically, a recent study by Tieu & Križ (2017) on the L1 acquisition of exhaustivity hints at differences between English and French clefts. Existing data on the acquisition of English *it*-clefts suggests that children start out by interpreting clefts non-exhaustively, and have partly acquired exhaustivity around the age of 4–5 years old (Heizmann 2007, 2012). In Tieu & Križ's (2017) truth-value judgment task, children looked at pictures containing three familiar objects (created in an exhaustive and a non-exhaustive condition) while a puppet described them in a video using a cleft sentence (among others). Children were asked to judge whether what the sentence uttered by the puppet accurately described the picture or not. Although, like in English, French-speaking children start out by interpreting clefts non-exhaustively, they were found to continue interpreting clefts non-exhaustively at 6 years old (i.e., comparatively later than English-speaking children in Heizmann's studies).

To date, though, virtually no studies have directly compared the exhaustive effects in French clefts versus clefts in other languages. One exception is Destruel & De Veaugh-Geiss (2018), who addressed this deficit by testing the differences in interpretation and processing costs of exhaustivity in French vs. English clefts. Results overall indicate that exhaustivity in *c'est*-clefts is weaker than in *it*-clefts, and that, while English clefts elicited higher processing costs compared to exclusives/canonicals when exhaustivity was violated, French clefts did not. Taken together, these findings provide a more nuanced cross-linguistic picture of cleft exhaustivity, which we aim to complement with the experiments reported in the next section.

3 The Experiments

3.1 Research Questions

The specific questions addressed in this study are:

(i) How does the systematicity and robustness of exhaustivity in French clefts compare to exhaustivity effects reported in an identical study on German clefts?

(ii) Are there parallels between exhaustivity in French *c'est*-clefts and other sentence types, in particular definite pseudoclefts, as reported for German *es*-clefts (De Veaugh-Geiss et al. 2018)?

3.2 Methods and Design

To test the systematicity and robustness of exhaustivity in French clefts, and crucially to be able to compare the results directly to those currently present in the literature for other languages, we adapted for French a design developed in a recent study on German, namely a mouse-guided incremental information retrieval paradigm with a verification (Experiment I) and falsification (Experiment II) task (De Veaugh-Geiss et al. 2017, 2018).[3]

[3] Although the methods and design are identical, we refer the reader to those sources for specifics regarding the German experiments. Also, note that several of the lexicalizations of the items differed; see appendix A and the supplementary materials with this paper for French, and the supplementary materials included

Participants For Experiment I we present the results for 32 French native speakers (20 female, 12 male; average age: 43.2; age range: 32–54), and for Experiment II 32 different French native speakers[4] (18 female, 14 male; average age: 40.2; age range: 24–59), all students and staff at the University of Albi or the University of Pau, France.

Procedure and Design The experiments took part in a quiet room and were run on a computer using Python scripts (v.3.4.2 on GNU/Linux; v.3.3.5 on MS Windows) with the PyGame module (v.1.9.2a0, LGPL, Shinners 2011). Because the timeline and the experimental material for the joint experiments are identical, we will present them together and will emphasize the relevant differences when appropriate.

Before the experiments started, participants first read a set of instructions introducing them to four roommates: Charles, Pierre, Marc, and Jean. They were told that these four roommates, and these alone, were involved in activities together to be described in the experiment. At the beginning of each trial, participants saw four covered boxes on a computer screen, as in the left panel of figure 1, while hearing the target stimulus in their headphones. After the audio stimulus played in their headphones, participants were instructed to uncover as many boxes as necessary, one at a time by moving the mouse over it, in order to decide whether the sentence they heard was true or false. The right panel of figure 1 illustrates the uncovering of the critical second box (Box 2).

A 2000-ms pause was implemented between each box to discourage participants from uncovering boxes unnecessarily. Under each box was a picture of one of the four roommates and a written description of the activity he carried out. As soon as participants moved the cursor away from a box, the description disappeared but the im-

with De Veaugh-Geiss et al. 2018 for German.

[4]There were in fact 37 total participants in Experiment II, but 5 were removed from the final dataset for having less than 75% accuracy (i.e., choosing to continue despite the violation of exhaustivity) in the control condition for exclusives.

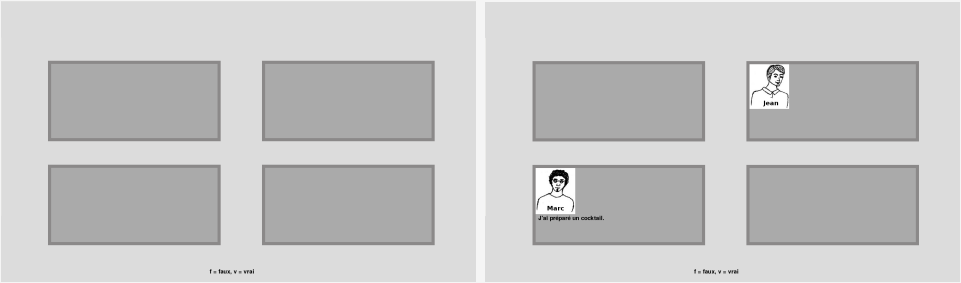

Figure 1 Onset screen (left), and uncovering of Box 2 (right)

age remained visible. Participants were allowed to move the cursor back to an uncovered box at any point during the trial if they wanted to see the description again. Finally, although participants were free to choose which box they uncovered next, it is important to note that the experiment was programmed with a pre-determined order.

Using an incremental information paradigm we are able to measure at which point participants had enough information to make a judgment about the target sentence they heard. Of the four boxes participants uncovered, there were two points of interest for both experiments: the Early Response measure (Box 2) and the Late Response measure (alternating between Box 3 and Box 4, depending on the experimental trial). The early response had three possible values; that is, whether a truth-value judgment was made (*vrai* 'true' or *faux* 'false'), or whether participants chose to continue to uncover the subsequent Box 3/4. The late response refers to the final evaluation given when considering all relevant information in cases when participants chose to continue at Box 2.

For the early response measure, we manipulated how Box 2 (i.e., the critical box in both experiments) related to Exhaustivity, and the primary difference between Experiment I (Verifier) and Experiment II (Falsifier) lies in this factor. In Experiment I, Box 2 always **verified** the prejacent or canonical meaning of the sentence, and hence the name "Verifier"; for example, Marc in fact claims he prepared a cocktail, for example, illustrated in (5).

(5) Target: **C'est MARC qui a préparé un cocktail.**
'It is Marc who prepared a cocktail.'
a. Box 1: Jean 'I served a drink.'
b. **Box 2: Marc 'I prepared a cocktail.'**
c. Box 3: Charles 'I tasted a whiskey.'
d. Box 4: Pierre 'I prepared a cocktail.'

By comparison, in Experiment II, Box 2 always **falsified** the exhaustivity inference, and hence the name "Falsifier"; for instance, participants discover at the second box that someone other than Marc, for example, Jean, claims that he prepared a cocktail (not illustrated here for the sake of space; see the supplementary materials for details). It is important to note that Box 1 was always irrelevant for exhaustivity.

Materials Both experiments involve a 4x2 design: *Sentence* form of the auditory target stimuli (4 levels: EXCLUSIVE, FOCUS, DEFINITE PSEUDOCLEFT, CLEFT) and the late response controls, that is, *Exhaustivity* in Experiment I and *Canonical* in Experiment II (both 2 levels: +/−).

The first factor we will discuss, *Sentence* form, included CLEFTS, as in (1), the EXCLUSIVE control condition, as in (2a), canonical sentences with prosodic subject FOCUS, as in (2b), and DEFINITE PSEUDOCLEFTS (with definite descriptions of the form *la personne* 'the person'), as in (2c). As discussed, these four sentence forms have been claimed to associate with an exhaustive inference, amounting to '*nobody other than Marc prepared a cocktail*' (with the domain fixed to the four roommates Marc, Charles, Pierre, and Jean throughout the experiment).

The second factor, *Exhaustivity* (Experiment I) or *Canonical* (Experiment II), specifically involved the late response measures at Box 3/4, which served as additional controls that participants understood the logic of the experiments.

- In Experiment I, in which Box 2 verified the prejacent, at Box 3/4 in half the trials either (i) no one else is revealed to have prepared a cocktail (+EXH), thus satisfying exhaustivity, or (ii) someone other than Marc, for example, Pierre, is revealed to

have prepared a cocktail (–EXH), thus violating exhaustivity.
- In Experiment II, in which Box 2 falsified the exhaustivity inference, at Box 3/4 in half the trials either (i) Marc is revealed to have prepared a cocktail (+CAN), verifying the canonical meaning of the sentence, or (ii) Marc did something other than prepare a cocktail (–CAN), violating the canonical meaning.

An overview of the conditions can be found in the summary in table 1 (adapted for French from De Veaugh-Geiss et al. 2018).

Audio: C'est Marc qui a préparé un cocktail. 'It is Marc who prepared a cocktail.'

	Experiment I (Verifier)	**Experiment II (Falsifier)**
Box 1	(*irrelevant information*) Jean: "I served a drink."	
Box 2 (EARLY RESPONSE)	(***canonical verified***) Marc: "I prepared a cocktail."	(***exhaustivity falsified***) Pierre: "I prepared a cocktail."
Box 3 / Box 4 (LATE RESPONSE)	**[+EXH]** (*exhaustivity verified*) Charles/Pierre: "I had a whiskey." or **[–EXH]** (*exhaustivity falsified*) Charles/Pierre: "I prepared a cocktail."	**[+CAN]** (*canonical verified*) Marc: "I prepared a cocktail." or **[–CAN]** (*canonical falsified*) Marc: "I had a whiskey."

Table 1 Example conditions of Experiment I (Verifier) & Experiment II (Falsifier).

There were 32 auditory target stimuli and 32 auditory filler items, the latter including sentences with universal quantifiers *tout le monde* 'everybody', expletive constructions beginning with *c'est clair que* 'it is clear that', plural conjunctions, and scalar constructions with *moins de trois personnes* 'fewer than three people'. The 64 total sentences, all with unique lexicalizations, were randomized during presentation.

3.3 Predictions

Predictions for the exhaustivity inferences in the sentence types tested are as follows. If exhaustivity is **semantic**—that is, conventionally coded, with EXCLUSIVES as the control condition—it will be robust and systematic, and thus:

- In Experiment I, in which the canonical meaning or prejacent has been verified at Box 2, a majority of participants will chose 'continue' to check that exhaustivity holds.
- In Experiment II, in which exhaustivity is falsified at Box 2, given the violation of the necessary entailments a majority of participants will make a 'false' judgment without uncovering Box 3/4.[5]
- However, cross-linguistic differences may emerge, since not all languages may encode exhaustivity in the same way.[6]

By contrast, should exhaustivity be **pragmatic**—that is, neither conventionally coded nor truth-functional, with FOCUS as the control condition—it will be defeasible and variable, and thus:

- In Experiment I, verifying the canonical meaning or prejacent may be sufficient to make a judgment, and participants can already make a 'true' judgment at Box 2 (although continuing to uncover Box 3/4 is also possible).
- In Experiment II, falsifying the exhaustivity inference could be insufficient for a final judgment, and participants may continue to uncover Box 3/4 in order to check the yet-unverified prejacent (although making a 'false' judgment is also possible).
- However, if (and only if), the exhaustive inference is derived by universal conversational principles, we predict minimal cross-linguistic variation.

3.4 Data Preparation and Analysis

For data preparation, responses at Box 2 were coded as 1 for judgment (Experiment I: 'true', Experiment II: 'false') and 0 for 'con-

[5]We assume that if exhaustivity is presuppositional, it must be contextually entailed, and contradicting exhaustivity will result in mostly 'false' judgments; see, for example, Abrusán & Szendrői 2013 and Romoli & Schwarz 2015 for results from experimental studies in which there are a majority of 'false' judgments or rejections of presupposition violations.

[6]See, for example, Matthewson 2008 for presuppositional differences between English and St'àt'imcets in determiners and third-person pronouns.

tinue'; proportions for all four sentence types in both experiments are presented in figure 2. Generalized linear mixed-effects models were adopted for the analyses using the *glmer* function of the *lme4* package (GPL-2 | GPL-3: v.1.1-17, Bates et al. 2015b) in the R environment (GPL-2 | GPL-3: v.3.3.3, R Core Team 2017). Treatment contrasts were used: for the factor *Sentence*, CLEFTS were the baseline comparison for DEFINITE PSEUDOCLEFTS (numeric covariates, with clefts coded as 0, and definite pseudoclefts coded as 1); note that exclusives and focus were not included in the statistical models given floor/ceiling effects making meaningful comparisons difficult. For the factor *Language*, FRENCH was the baseline comparison for GERMAN (numeric covariates, with French coded as 0 and German coded as 1), using the dataset from the identical experiment run on German; see De Veaugh-Geiss et al. 2018. In all models reported, the parsimonious random-effects structures were utilized using the *rePCA* function in the *RePsychLing* library (MIT, v.0.0.4)[7] following the recommendations made in Bates et al. 2015a.

4 Results

In what follows, we report the French results with direct comparisons to German (from De Veaugh-Geiss et al. 2018).

4.1 Late Response (Box 3/4)

Since the Late Response measures served as a control that participants understood the logic of the experiments, we discuss them first. The logic is as follows.

- In Experiment I: when participants chose 'continue', verifying the canonical meaning was not sufficient to make a truth-value judgment, and checking that exhaustivity holds must have been relevant enough to motivate further uncovering.

  ⇒ In this case, participants should make a majority of 'true' judgments if exhaustivity holds in Box 3/4 (+EXH), and a

[7] Available at `https://github.com/dmbates/RePsychLing`.

majority of 'false' judgments if it does not (–EXH).

- In Experiment II, by contrast, when participants chose 'continue', violating exhaustivity was not sufficient to make a 'false' judgment, and thus verifying the canonical meaning must have been relevant enough to motivate further uncovering.

  ⇒ In this case, we expect participants to make a majority of 'true' judgments if the canonical meaning holds in Box 3/4 (+CAN), and a majority of 'false' judgments if it does not (–CAN).

As can be seen in table 2, these predictions are generally borne out (modulo cases with very few data points; see the denominator of the fractions reported).

				Exclusive	Focus	Def.Pse.	Cleft
French	Exp. I (Verifier)	[+EXH]	'true'	98% (122/125)	100% (9/9)	100% (96/96)	100% (63/63)
		[–EXH]	'false'	98% (124/127)	64% (7/11)	88% (74/84)	68% (43/63)
	Exp. II (Falsifier)	[+CAN]	'true'	17% (2/12)	99% (119/120)	83% (69/83)	93% (85/91)
		[–CAN]	'false'	100% (7/7)	99% (118/119)	96% (77/80)	99% (91/92)

Table 2 Late Responses as percentages (fractions in parentheses) for [+/–EXH] conditions in Experiment I and [+/–CAN] conditions in Experiment II.

4.2 Early Response (Box 2)

We now concentrate on the Early Responses at Box 2, the critical location for both experiments. For the statistical analysis, we directly compared French to German with the data from De Veaugh-Geiss et al. 2018.[8] Results are presented graphically in figure 2, in which the observed proportions for the four sentence types are illustrated for French by large solid circles, and for German by large hollow circles. Moreover, back-transformations from the model-estimates for

[8]The models reported here were as follows. Experiment I: *glmer(TVJ.Box2 ~ DefPse*Lang + (1+DefPse||Participant) + (1+DefPse||Item), family = binomial)*. Experiment II: *glmer(TVJ.Box2 ~ DefPse*Lang + (1+DefPse||Participant) + (1|Item), family = binomial)*.

clefts and definite pseudoclefts are illustrated by small solid circles with 95% confidence intervals.

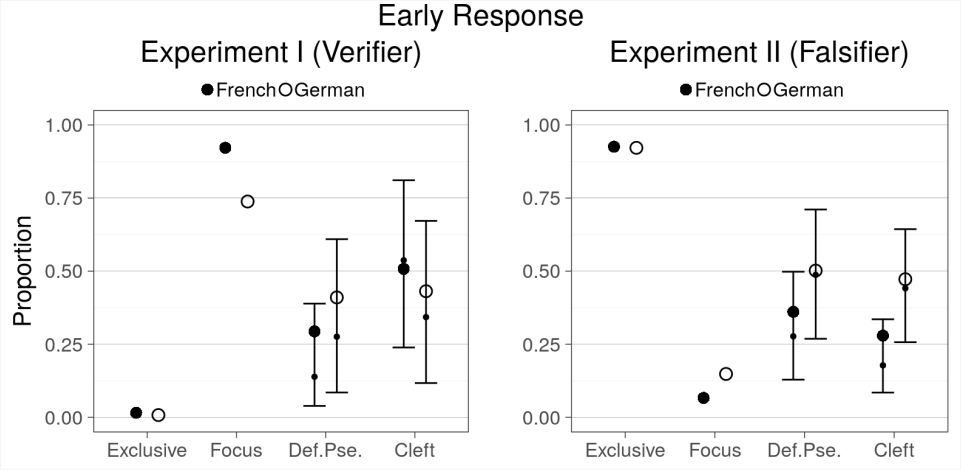

Figure 2 Early Responses ('true'/'false' judgment = 1, continue = 0) at Box 2 for Experiment I (left) and Experiment II (right): presented here are the observed proportions for all sentence types (French = large solid circle, German = large hollow circle) and the back-transformed model estimates for definite pseudoclefts and clefts (small solid circles with 95% CIs).

4.2.1 Experiment I (Verifier)

Looking at the main effect of *Sentence* form in Experiment I, when verifying the canonical meaning at Box 2, French DEFINITE PSEUDOCLEFTS elicited a significantly lower proportion of 'true' responses compared to the baseline *c'est*-CLEFTS ($\hat{\beta}$ = −1.9753, SE = 0.3634, z = −5.436, p = 5.45e−08), suggesting that French participants interpreted definite pseudoclefts with a different strength of exhaustivity than clefts. Turning to the main effect of *Language*, when comparing French *c'est*-clefts (baseline) to German *es*-clefts, there was no significant effect found ($\hat{\beta}$ = −0.7997, SE = 0.9652, z = −0.828, p = 0.407407). However, while GERMAN participants treated DEFINITE PSEUDOCLEFTS and CLEFTS on a par, FRENCH participants responded differently to the two sentence forms, with DEFINITE PSEUDOCLEFTS

eliciting a lower proportion of 'true' responses than CLEFTS, and this interaction of *Sentence* x *Language* was significant ($\hat{\beta}$ = 1.6605, SE = 0.5036, z = 3.297, p = 0.000977).

4.2.2 Experiment II (Falsifier)

Looking at the main effect of *Sentence* form in Experiment II, when encountering a violation of exhaustivity at Box 2, *c'est*-CLEFTS (baseline) and DEFINITE PSEUDOCLEFTS in French showed no statistically significant difference ($\hat{\beta}$ = 0.5724, SE = 0.3505, z = 1.633, p = 0.102427). However, turning to the main effect of *Language*, FRENCH clefts (baseline) were significantly less likely to elicit 'false' judgments compared to their GERMAN counterparts ($\hat{\beta}$ = 1.2962, SE = 0.6032, z = 2.149, p = 0.031644). Nevertheless, unlike in Experiment I (Verifier), the interaction of *Language* x *Sentence* was not significant ($\hat{\beta}$ = –0.3881, SE = 0.4880, z = –0.795 , p = 0.426456), with CLEFTS and DEFINITE PSEUDOCLEFTS showing parallel response patterns across the languages tested.

4.3 Post hoc Analysis: Exhaustive vs. Non-Exhaustive Responders

In order to understand better the nature of the intermediate result patterns for cleft constructions, participants were divided into three groups based on their response patterns in this condition: that is, 'exhaustive', 'non-exhaustive', and 'chance' responders. The 'exhaustive' group includes participants who (i) in Experiment I chose at Box 2 to make a 'true' judgment 40% or less of the time (i.e., they instead chose to check that exhaustivity holds by uncovering Box 3/4); and who (ii) in Experiment II chose at Box 2 to make a 'false' judgment 60% or more of the time (i.e., for these participants, the violation of exhaustivity was sufficient to make a truth-value judgment). By contrast, the 'non-exhaustive group' includes participants who (i) in Experiment I chose at Box 2 to make a 'true' judgment 60% or more of the time (i.e., for these participants, verifying the canonical meaning of the cleft was sufficient to make a judgment); and who (ii) in Experiment II chose at Box 2 to make a 'false' judgment 40%

Figure 3 Observed proportions for definite pseudoclefts and clefts (French = solid circle, German = hollow circle) for Early Responses ('true' judgment = 1, continue = 0) for Experiment I (Verifier) divided into two participant groups: non-exhaustive responders (left) and exhaustive responders (right).

or less of the time (i.e., for these participants, falsifying exhaustivity was not sufficient to make a truth-value judgment, and instead they chose to continue uncovering Box 3/4). Participants who fell between 40–60% judgment in either experiment were put into the 'chance' group (Experiment I: French 4, German 0; Experiment II: French 1, German 2). (Note that we only report the observed proportions per responder type in this section due to the low number of data points in some conditions.)

Based on this division, we observe the following: broadly speaking, for participants who interpreted clefts exhaustively, this interpretation was very strong in both languages; and vice versa for those who interpreted clefts non-exhaustively (illustrated in the near ceiling and floor effects per responder type in figures 3–4). Moreover, definite pseudoclefts generally patterned with clefts in both languages, with the exception of the non-exhaustive responders in the French version of Experiment I, for whom definite pseudoclefts elicited nearly 50-50 responses (see the left graph in figure 3). Cru-

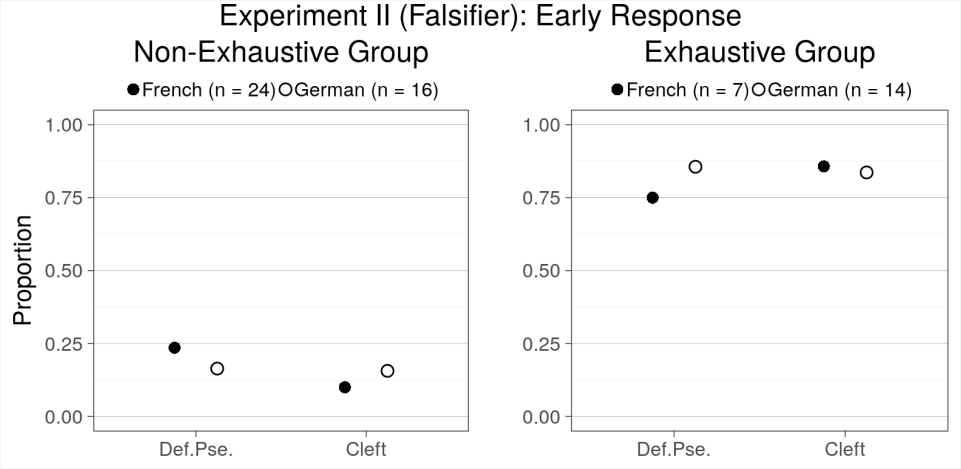

Figure 4 Observed proportions for definite pseudoclefts and clefts (French = solid circle, German = hollow circle) for Early Responses ('false' judgment = 1, continue = 0) for Experiment II (Falsifier) divided into two participant groups: non-exhaustive responders (left) and exhaustive responders (right).

cially, in terms of the total number of participants for each group:

- In Experiment I, there are two groups splitting participants roughly in half for both French (14 non-exhaustive, 14 exhaustive) and German (13 non-exhaustive, 19 exhaustive), as seen in figure 3.
- In Experiment II, however, the two languages differ: whereas for German the responder-type division was again just about 50-50 (16 non-exhaustive, 14 exhaustive), for French 24 out of the 32 participants fell into the non-exhaustive group and only 7 participants fell into the exhaustive group. Furthermore, definite pseudoclefts patterned on a par.

4.4 Summary of Results

To sum up the results reported above, we draw the reader's attention to the following points:

(i) For French and German, clefts and definite pseudoclefts elicited intermediate response patterns with high variation (cf. the con-

trol conditions for exclusives and focus constructions, which generally showed floor and ceiling effects).

  - French vs. German: In Experiment I (Verifier), no significant difference was found between French and German clefts; by contrast, in Experiment II (Falsifier), French clefts showed significantly weaker exhaustivity effects than their German counterparts.
  - Clefts vs. definite pseudoclefts: In Experiment I (Verifier), French definite pseudoclefts showed stronger exhaustivity effects than *c'est*-clefts; however, in Experiment II (Falsifier) this effect was not found.

(ii) In a post hoc analysis, participants generally split into two groups in both languages: those who reliably treated clefts exhaustively, and those who reliably treated clefts non-exhaustively.

  - Exhaustive vs. Non-Exhaustive Responders: while for German Experiments I (Verifier) & II (Falsifier) and for French Experiment I (Verifier) this division roughly split participants in half, for French Experiment II (Falsifier) a clear majority of participants fell into the non-exhaustive group.

5 Discussion and Proposal

Returning to the first research question formulated in section 3.1, we were interested in the systematicity and robustness of exhaustivity in French clefts, in particular compared to their German counterparts. Despite French clefts being noted to associate with exhaustivity (Lambrecht 2001, Destruel 2013), there were reasons to expect that exhaustivity effects might be different, namely weaker, because of their broader discourse semantics and higher frequency of use (see section 2.2).

Our results are, at least in part, compatible with this line of thinking. Although the results from Experiment I (Verifier) do not show a significant difference between the behavior of German and French

clefts, we think the more revealing results to consider are those from Experiment II (Falsifier). In this experiment, in which participants were directly confronted with violations of exhaustivity, we found considerable variation in the strength of the exhaustive inference in clefts: in fact, there was a significant difference between the French *c'est*-cleft and the German *es*-cleft, with the response patterns for French participants compatible with a relatively weak exhaustive interpretation. Furthermore, descriptively speaking, there was a lower number of participants falling into the exhaustive group in French compared to German.

None of the theories on cleft exhaustivity discussed in section 2.1 can account for these differences: the fact that exhaustivity was neither robust nor systematic across experiments and participants does not align with semantic theories that predict a hardwired exhaustivity inference, and the variation across languages appear at odds with claims that exhaustivity arises via universal pragmatic principles. So how should one account for these differences?

One might be inclined to argue French is different enough that it should be excluded from accounts trying to model exhaustivity in clefts. We, however, think it is preferable to seek a unified account that can embrace variation across languages and speakers. To this end, we take an approach following De Veaugh-Geiss et al. (2018) (which itself is based on Pollard & Yasavul 2014), in which exhaustivity is neither semantic nor pragmatic, but derived indirectly via the resolution of the anaphoric existence presupposition in clefts (echoing Horn 1981). The crux of our proposal is in the cross-linguistic differences in the derivation of this existence inference.

In a nutshell, exhaustivity arises in how the antecedent of the existence presupposition of the cleft is accommodated (Pollard & Yasavul 2014, De Veaugh-Geiss et al. 2018). If the existence presupposition is accommodated to the maximal discourse referent that answers the Question Under Discussion (QUD), then an exhaustive interpretation arises; if it is accommodated to a non-maximal discourse referent, than a non-exhaustive interpretation arises (see De Veaugh-

Geiss et al. 2018).

Regarding the existence presupposition, Abrusán (2016) claims that for English *it*-clefts this presupposition is derived from the background question generated by the cleft plus the presuppositional constraint that the disjunction of the Hamblin set is true. The QUD of clefts is of the form *Who P?* (or a sub-question of this QUD), which is derivable directly from the cleft relative. For French, however, we follow Destruel & De Veaugh-Geiss (2018) and claim that the QUD for *c'est*-clefts—unlike for English or German—can, but crucially need not, correspond to the cleft relative, since it can also signal broad focus; see (4). Given this less strict question-answer congruence, the background question that the cleft answers is potentially ambiguous—especially when little context is provided, such as in our experiment where clefts appeared out-of-the-blue—and the existence inference of French clefts may not arise (see the discussion on hard vs. soft existence in clefts and focus in Abrusán 2016). Consequently, this 'soft' existence presupposition may hinder the derivation of the exhaustive inference, making it a weaker inference.

One advantage of this approach is that differences observed for French do not depend on the nature of exhaustivity being pragmatic or semantic; rather, it is due to the way clefts interact with context and discourse, specifically in terms of the QUD.

Turning to the second research question formulated in section 3.1, we asked how the interpretation of French clefts compared to that of other sentence forms, in particular, definite pseudoclefts. This question was motivated both by several theoretical accounts which treat the two sentence types in parallel ways, as discussed in section 2.1, as well as by the results reported for German in De Veaugh-Geiss et al. 2018. In fact, while the results for German are compatible with a fully parallel analysis of clefts and definite pseudoclefts (albeit not as had been previously proposed in literature; see De Veaugh-Geiss et al. 2018 for details), the results for French are less clear. Indeed, one surprising result was the inconsistencies for French definite pseudoclefts across experiments: there was a stronger exhaustivity effect for

definite pseudoclefts compared to *c'est*-clefts in Experiment I (Verifier) which was absent in Experiment II (Falsifier).

Although lacking a full-blown analysis of definite pseudoclefts here, we nevertheless wish to discuss a few observations of interest. First, the differences found between clefts and definite pseudoclefts may in part be compatible with the analysis for clefts presented above. If one assumes anaphoric reference is part of the meaning of French definite pseudoclefts, the derivation of exhaustivity may arguably be similar to that of clefts (and in line with De Veaugh-Geiss et al. 2018 for German), with one critical difference: the discourse semantics of the two sentence forms differ. In fact, based on native-speaker intuitions, French definite pseudoclefts are not suitable as answers to broad focus questions such as *What happened?* Just as for the argumentation regarding French vs. German clefts above, the stricter question-answer congruence for definite pseudoclefts could explain why exhaustivity was found to be stronger in definite pseudoclefts than in clefts in French, at least in part.

A second observation to note is that the French definite pseudocleft form tested here, *la personne*, may be dissimilar to the form tested in German. In De Veaugh-Geiss et al. 2018 it is claimed that the German definite compound tested (*derjenige* 'that one there') is not a run-of-the-mill definite description, specifically in terms of anaphoricity. In fact, we note that there is a more colloquial form of the definite pseudocleft in French, namely, *celui qui ...* 'that.one-DEMONSTRATIVE who ...', which on the surface—being derived from a demonstrative form—may in fact make for a more direct comparison to the anaphoric definite pseudocleft tested in German. At the time of writing we leave such considerations for future research.

6 Conclusion

This paper tested the robustness and systematicity of cleft exhaustivity in French compared to German and to exhaustivity inferences found in other structures, in particular, clefts and definite pseudoclefts. The main finding is that French clefts appear in part to have

weaker exhaustivity effects than in German, whereas the comparison with definite pseudoclefts was less straightforward. We sketched a proposal for a unified account of exhaustivity, following previous analyses in arguing that clefts do not conventionally encode exhaustivity; rather, an exhaustive inference may or may not arise depending on how the anaphoric existence presupposition is resolved, and we account for the cross-linguistic differences reported here in terms of the derivation of this existence presupposition. This work constitutes a modest step towards better understanding the exhaustive inference associated with French clefts.

A Target Stimuli

In order to derive the exclusive, focus, and definite pseudocleft conditions, please compare (1) to examples (2a)–(2c).

(1) C'est Jean qui a mis un pull.
'It is Jean who put on a sweater'

(2) C'est Marc qui a préparé un cocktail.
'It is Marc who prepared a cocktail.'

(3) C'est Charles qui a changé un pneu.
'It is Charles who changed a tire.'

(4) C'est Pierre qui a fait un repas.
'It is Pierre who made a meal.'

(5) C'est Charles qui a imprimé une carte.
'It is Charles who printed a card.'

(6) C'est Pierre qui a caressé un chat.
'It is Pierre who pet a cat.'

(7) C'est Jean qui a repassé une chemise.
'It is Jean who ironed a shirt.'

(8) C'est Marc qui a récité un poème.
'It is Marc who recited a poem.'

(9) C'est Charles qui a acheté un tapis.
'It is Charles who bought a rug.'

(10) C'est Pierre qui a cuisiné une tarte.
'It is Pierre who baked a pie.'

(11) C'est Jean qui a fermé une fenêtre.
'It is Jean who closed a window.'

(12) C'est Marc qui a planté un cactus.
'It is Marc who planted a cactus.'

(13) C'est Jean qui a brossé un cheval.
'It is Jean who brushed a horse.'

(14) C'est Marc qui a tricoté une écharpe.
'It is Marc who knit a scarf.'

(15) C'est Charles qui a porté une échelle.
'It is Charles who carried a ladder.'

(16) C'est Pierre qui a raconté un mensonge.
'It is Pierre who told a lie.'

(17) C'est Jean qui a arrosé une plante.
'It is Jean who watered a plant.'

(18) C'est Marc qui a écrit une lettre.
'It is Marc who wrote a letter.'

(19) C'est Charles qui a lancé une balle.
'It is Charles who threw a ball.'

(20) C'est Pierre qui a escaladé une montagne.
'It is Pierre who climbed a moutain.'

(21) C'est Charles qui a vendu un ordinateur.
'It is Charles who sold a computer.'

(22) C'est Pierre qui a pressé une orange.
'It is Pierre who squeezed an orange.'

(23) C'est Jean qui a lu un livre.
'It is Jean who read a book.'

(24) C'est Marc qui a organisé une fête.
'It is Marc who organized a party.'

(25) C'est Charles qui a dessiné un arbre.
'It is Charles who drew a tree.'

(26) C'est Pierre qui a volé un crayon.
'It is Pierre who stole a pen.'

(27) C'est Jean qui a lavé une assiette.
'It is Jean who washed a plate.'

(28) C'est Marc qui a allumé une bougie.
'It is Marc who burnt a candle.'

(29) C'est Jean qui a bu une boisson.
'It is Jean who drank a soda.'

(30) C'est Marc qui a claqué une porte.
'It is Marc who shut a door.'

(31) C'est Charles qui a épluché une carotte.
'It is Charles who peeled a carrot.'

(32) C'est Pierre qui a regardé un film.
'It is Pierre who watched a movie.'

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