Wh-Licensing in Japanese Right Dislocations: An Incremental Grammar View

Tohru Seraku • Akira Ohtani

Abstract This paper defends an incremental grammar, a syntax model which reflects left-to-right parsing, by exploring Right Dislocations (RDs) in Japanese. We offer new data on the licensing pattern of a *wh*-phrase as the RD part, showing how the pattern follows from the way an RD string is parsed in real time. The account is also supported by other sets of data (e.g., island sensitivity). Our grammar is formalised in Dynamic Syntax.

Keywords *wh*-phrase · case-marking · island sensitivity · Dynamic Syntax

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1 Introduction

Some attempts have recently been made to reflect "parsing incrementality" in a language model, where a structure is built up as a string of words is parsed left-to-right online (Cann et al. 2005, Chung 2008, Phillips 2003, among others). This paper aims at contributing to this research paradigm by investigating Right Dislocations (RDs) in Japanese.

Japanese is prescriptively verb-final as in (1a), but elements may be placed postverbally in colloquial speech. In (1b), the object NP *sushi-o* appears after the verbal element *tabe-ta-yo* 'ate'.[1]

(1) a. Ken-ga sushi-o tabe-ta-yo.
Ken-NOM sushi-ACC eat-PAST-FP
'Ken ate sushi.'

b. Ken-ga Δ tabe-ta-yo, **sushi-o**.
Ken-NOM eat-PAST-FP sushi-ACC

[1]The following glosses are used in this article: ACC accusative case particle, FP final particle, NMNS nominaliser, NOM nominative case particle, PAST past tense marker, Q question marker, TOP topic particle.

We will refer to the postverbal position as the RD part. The gap is theory-neutrally notated with Δ, and *yo* is a final particle (FP) used in casual speech. We use the term "RD" purely for descriptive purposes; in particular, "dislocation" does not entail any movement operations in the formation of RD strings.

A distinctive feature of Japanese RDs is that a *wh*-phrase cannot occur as the RD part (Kuno 1978:71).

(2) a. Ken-ga nani-o tabe-ta-no?
Ken-NOM what-ACC eat-PAST-Q
'What did Ken eat?'

b. *Ken-ga Δ tabe-ta-no, **nani-o**?
Ken-NOM eat-PAST-Q what-ACC

In the literature on Japanese RDs (e.g., Abe 1999, Endo 1996, Inoue 1978, Sells 1999, Soshi & Hagiwara 2004, Takano 2014, Takita 2014, Yamashita 2011), the licensing of a *wh*-phrase as the RD part has not been a centre of enquiry. Takano (2014), Takita (2011), Tanaka (2001), and Whitman (2000) handle the problem at some length, but section 2 offers data that may challenge these analyses.

To make a case for an incremental grammar account, we put forward a new analysis of Japanese RDs in terms of left-to-right parsing. The gist of our analysis is: *wh*-licensing reflects linear parsing, modelled as "monotonic structure building." Pre-theoretically, in (2b), when *Ken-ga tabe-ta-no* is parsed, a structure has been built up which represents a polar question. At the time of parsing *nani-o*, however, the structure is in need of modification to represent a *wh*-question. This violates the monotonicity of structure update.

Our incremental account will be formalised in Dynamic Syntax (Cann et al. 2005), a grammar formalism that, unlike other theories (e.g., Phillips 2003), strictly requires monotonicity of structure update (see section 3). Once the account is formalised, precise predictions will be made for a wide range of RD issues, including the wh-licensing pattern and island sensitivity (see sections 4–5).

2 Previous Studies

To begin with, the intonation pattern of RD strings need to be clarified. For this purpose, consider the string in (3).

(3) Ken-ga tabe-ta-yo sushi-o.
Ken-NOM eat-PAST-FP sushi-ACC
'Ken ate sushi.'

This string is interpreted as an RD example in (1b). It is, however, possible to construe (3) as a non-RD sequence that consists of two separate strings: *Ken-ga tabe-ta yo* and the fragmentary sentence *sushi-o*. Though this interpretation is possible, our concern is the RD strings that constitute a single sentence. Nomura (2008:25–29) states that an RD string displays an intonation pattern distinct from that for the mere juxtaposition of two separate strings: the RD part is uttered with the intonation contour following that of the preceding clause. All of our RD examples should thus be read with this intonation.

Now that the intonational facet of RDs has been clarified, we shall survey previous treatments of Japanese RDs in what follows.

Firstly, our incremental analysis looks similar to Kuno's (1978) functional analysis. Kuno argues that (2b) is ungrammatical due to information controversy between the preceding clause and the RD part. As shown in (4), the preceding clause invokes a polar question, while the RD part invokes a *wh*-question.

(4) *Kuno's (1978) functional analysis*
Ken-ga Δ tabe-ta-no, (polar question) **nani-o**? (*wh*-question)

At the time of hearing *nani-o*, the hearer has to modify the polar question reading into the *wh*-question reading. Kuno contends that this forced change of interpretation results in ungrammaticality.

In this account, however, it is not clear how (5) is treated.

(5) nani-o tabe-ta-no, **Ken-ga**?
Δ what-ACC eat-PAST-Q Ken-NOM
'What did Ken eat?'

The preceding clause invokes a *wh*-question, but how about the RD part *Ken-ga*? Kuno would need to stipulate that the RD part also invokes a *wh*-question, although the RD part does not contain any *wh*-phrase. Further, it is obscure what predictions could be drawn for the island data (section 5). Thus, whilst the insight of Kuno's analysis is shared with our account, its theorising is vague in some respects.

Turning to a more formal line of analysis, Takita (2011), Tanaka (2001), and Whitman (2000) address (2b). The heart of these analyses is "bi-clausal"; the pre-RD part and the RD part both form a clause, with the second clause being covert except for an RD item. This is illustrated with example (2b), based on Tanaka 2001.

(6) *Bi-clausal structure (Tanaka 2001)*
[Ken-ga Δ_i tabe-ta-no] [nani-o$_i$ ~~[Ken-ga t$_i$ tabe-ta-no]~~]

For Tanaka (2001), *nani-o* is scrambled within the second clause, and the rest is deleted. Given that the two clauses must be identical, the gap Δ must be occupied by an item that is identical to the RD part. In (2b), the gap is occupied by a *pro* and cannot be a *wh*-phrase. This structural inconsistency results in ungrammaticality.

For the bi-clausal approach, however, mixed *wh*-data such as (7)–(8) would be problematic.

(7) ?Ken-ga dokode Δ tabe-ta-no, **nani-o**?
Ken-NOM where eat-PAST-Q what-ACC
'Where did Ken eat what?'

(8) ?Ken-ga Δ nani-o tabe-ta-no, **dokode**?
Ken-NOM what-ACC eat-PAST-Q where
'Where did Ken eat what?'

These are grammatical, indicating that the clause-identity condition is satisfied. To account for them, one must stipulate that the gap is a covert *wh*-phrase in (7)–(8), but not in (2b). (Otherwise, (2b) would be wrongly predicted to be grammatical.)

In another account, Takano (2014:153) claims that a *wh*-phrase cannot be the RD part in terms of information structure. The RD part is considered

to be a non-focal position. In Takano's theoretical implementation, an RD item is marked with [—F(ocus)], as exemplified in (9) based on (1b).

(9) *[—F(ocus)] assignment (Takano 2014)*
?Ken-ga Δ tabe-ta-yo, **sushi-o**$_{[-F(ocus)]}$.
Ken-NOM eat-PAST-FP sushi-ACC
'Ken ate sushi.'

On the other hand, it is normally assumed that a *wh*-phrase conveys focal information. Thus, if the RD part is a *wh*-word such as *nani* in (2b), it cannot be marked with [—F(ocus)]. This is why a *wh*-phrase is not licensed as the RD part. (The core concept of this analysis, "information structure," is also a basis for the functional analysis presented in Takami 1995a,b.)

The mixed data in (7)–(8) are also a problem for this reasoning. Unlike (2b), (7)–(8) are grammatical, indicating that the RD part is occupied with non-focal information. It is then not clear in what sense *nani* in (7) is construed as non-focal information, though *nani* in (2b) is construed as focal information.

The data surveyed here, as well as other sets of data to be provided later, threaten previous syntactic studies (if not refute them). In this paper, we will seek another mode of analysis, from the perspective of how an interpretation is gradually accumulated, reflecting online parsing.

3 Dynamic Syntax

Dynamic Syntax (DS) specifies a set of procedures/constraints used to update a structured interpretation based on the dynamics of incremental parsing.[2] The notion "syntax" here refers to an abstract system that formalises the growth of interpretation, not a system that generates a structure inhabited by lexical items and their syntactic categories (Cann et al. 2005, Kempson et al. 2001, 2011).

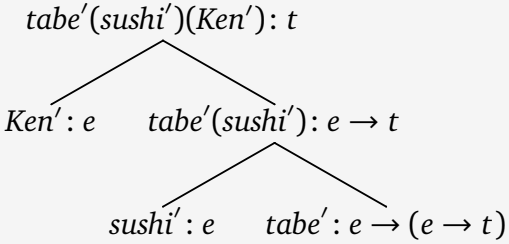
As DS dispenses with syntactic structures, a string of words is directly mapped onto a semantic structure. For instance, as the string in (10) (re-

[2]This paper focusses on "comprehension," but DS models "production" with the same machinery (e.g., Howes 2012, Purver et al. 2014). See also Kahraman 2011, Kamide 2006, etc. for the experimental results suggesting that Japanese sentence processing is incremental.

peated from (1a)) is incrementally parsed, an interpretation of the string is gradually updated, which is formalised as the progressive growth of the semantic tree. The final output of this tree growth is given in (11).

(10) Ken-ga sushi-o tabe-ta-yo.
Ken-NOM sushi-ACC eat-PAST-FP
'Ken ate sushi.'

(11) Parsing the string (10) (ignoring tense)



Note that (11) is a semantic (not syntactic) tree. Each node is decorated with a pair of (i) a semantic content such as *Ken′* and (ii) a semantic type such as *e* (i.e., "entity" type).

In DS, three kinds of tree state are distinguished: (i) an initial state, (ii) mid-states, and (ii) a final state. The initial state is defined as in (12). Any tree update thus starts with this tree state.

(12) AXIOM (= the initial state)
?*t*

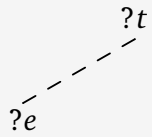
?*t* requires that this node will be decorated with a type-*t* content. In general, ?α at a node forms a requirement that the node be decorated with α before a tree update finishes, where α may be a semantic content, a semantic type, etc. (see below).

The requirement ?*t* is satisfied once a whole string is successfully parsed, as in (11), which is in a final state. The mid-states between the initial state (12) and the final state (11) are derived by two types of action: "general" actions and "lexical" actions.

General action: DS defines non-lexically encoded actions, such as LOCAL *ADJUNCTION, an action to introduce a structurally-unfixed node. In the tree (13), the unfixed node (shown by a dashed line) may be a subject

node, an object node, etc.[3]

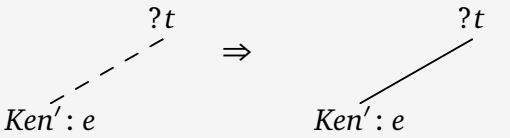
(13) Local *Adjunction



The application of general actions is optional. That is, as long as the input condition to a general action is met, the parser may (but does not have to) apply it. For instance, the input condition to Local *Adjunction is that the present node be decorated with ?t. This condition is met in the tree state (12), and the parser may apply Local *Adjunction, as shown in (13).

Lexical action: Every lexical item encodes a tree-update action. Ken encodes the action to decorate a ?e-node with the pair of (i) the content *Ken′* and (ii) the type e, as in the left-hand tree of (14).

(14) Parsing *Ken* Parsing *Ken-ga*



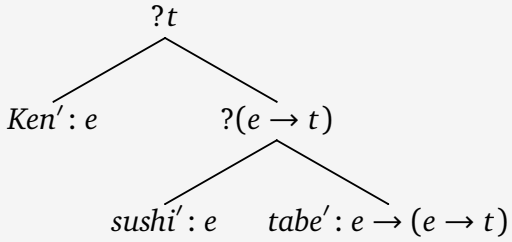
The nominative particle *-ga* encodes the action to resolve an unfixed node as a subject node, as in the right-hand tree of (14).

In this way, tree update proceeds through a combination of general and lexical actions. During the course of tree update, any information cannot be lost or modified, hence monotonicity.

For additional examples of general and lexical actions, consider the subsequent update of (14). After Local *Adjunction creates an unfixed node, it is decorated by the parse of *sushi* and is resolved as an object node by the parse of the accusative particle *-o*. The verb *tabe-* 'eat' then projects a predicate structure.

[3]As DS dispenses with syntactic representations, the terms like "subject node" and "object node" are used for the sake of convenience. These nodes are structurally defined; for instance, a subject node is a left-daughter of a root node in a propositional structure.

(15) Parsing *Ken-ga sushi-o tabe*

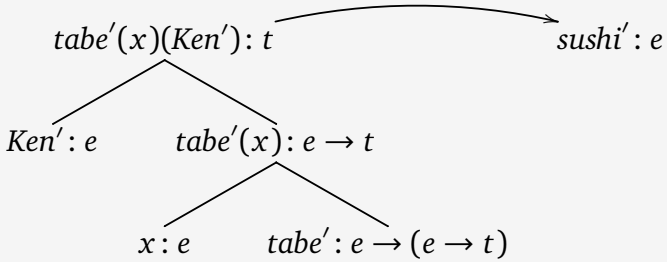


The parser finally performs functional application and type deduction (defined as the general action of ELIMINATION), and the final state (11) is created.

Finally, the LINK mechanism allows two trees to be paired. In (16), the parse of the relative clause *Ken-ga tabe-ta* constructs a tree, which is LINK-ed to a new node, to be decorated by the head noun *sushi*.

(16) [[Ken-ga tabe-ta] sushi]-ga oishikat-ta.
[[Ken-NOM eat-PAST] sushi]-NOM delicious-PAST
'The sushi which Ken ate was delicious.'

(17) Parsing *Ken-ga tabe-ta sushi*



In (17), the gap in the relative clause is simply notated as a variable x, and a LINK relation is expressed as a curved arrow.[4] The node for *sushi* will be identified as a subject node in a matrix structure by the parse of the nominative particle *-ga*. This matrix structure will then be fleshed out

[4]More formally, the content of the gap is notated in the "epsilon calculus" (Kempson & Kurosawa 2009). It is assumed in DS that predicates in Japanese project an open propositional structure where each argument slot is notated with a metavariable (Cann et al. 2005). In the case of the gap, a metavariable is saturated as a term with a maximally abstract predicate.

by the parse of *oishika-* 'delicious'.

In short, DS is an abstract system that models progressive update of interpretation (represented as a semantic tree), reflecting the dynamics of time-linear parsing.

4 Incremental Account

Building upon and extending the DS framework, we shall now formalise our incremental analysis sketched in section 1. We first develop an analysis of RDs without wh-phrases (section 4.1). This will serve as a basis for explaining why the RD of *wh*-phrases is generally banned (section 4.2) but nonetheless why such RDs are permitted in certain syntactic environments (section 4.3).

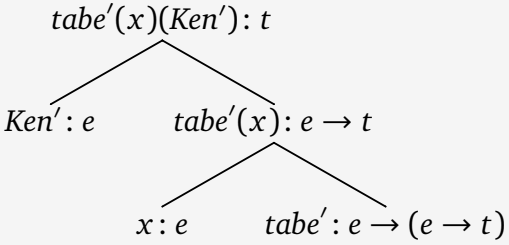
4.1 RDs without *Wh*-Phrases

Consider the RD string (18) (cf. (1b)), where the object NP *sushi* is postposed. (The accusative marker *-o* is optional, more on which see below.)

(18) Ken-ga Δ tabe-ta-yo **sushi(-o)**.
Ken-NOM eat-PAST-FP sushi(-ACC)
'Ken ate sushi.'

(18) is incrementally processed. If it is parsed up to the final particle *yo* (i.e., prior to the RD item *sushi*), the semantic tree (19) has been built up, where the gap is simply notated as a variable x.

(19) Parsing *Ken-ga tabe-ta-yo*



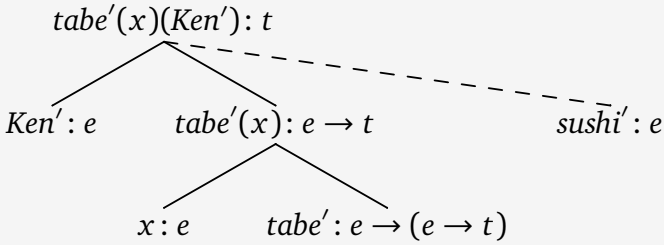
In order to parse the RD item *sushi*, the general action of LOCAL *ADJUNCTION needs to be run, but the action can apply only if the root node is decorated with ?t (Cann et al. 2005). This restriction models Japanese as verb-final. Still, on the assumption that RDs are colloquially abundant,

we extend the formalism with (20).

(20) *Proposal 1.* In colloquial speech, the ?t-restriction on LOCAL *ADJUNCTION is relaxed.

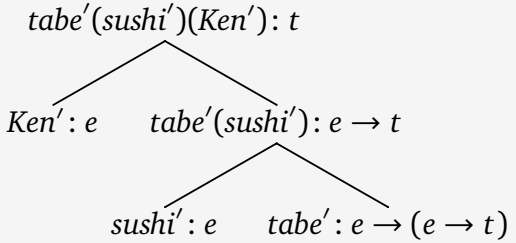
This proposal has the potential of capturing register variation. The idea is that some grammatical rules may be violated colloquially and that such violations (prescriptively seen as the wrong use of language) are a factor responsible for register variation. Once LOCAL *ADJUNCTION is allowed to apply in the environment (19), it creates an unfixed ?e-node, where the RD element *sushi* is parsable.

(21) Parsing *Ken-ga tabe-ta-yo, sushi*



In (18), the case-marking of *sushi* is optional. If *-o* is present, it resolves the node for *sushi* as an object node, updating x with the content *sushi*′. If *-o* is absent, the general action of MERGE unifies the unfixed node with the already-fixed object node (Cann et al. 2005:chap. 2). After ELIMINATION is run, the final state is as in (22).

(22) Parsing the RD string (18) (= final state)



In our analysis, the presence of a case particle triggers a lexical action to resolve an unfixed node, whereas the absence of it triggers a general action to the same effect. No matter which action applies, the identical

structure emerges.

In sum, DS offers a uniform analysis of RDs with/without case-marking, where "uniform" means: though case-marking affects the way a tree is updated, the output is identical, ensuring that case-marking does not affect the truth-conditional content of RDs.[5]

4.2 RDs with *wh*-Phrases: Ungrammatical Cases

We now explicate why the RD of a *wh*-phrase is generally prohibited. Consider example (23).

(23) *Ken-ga Δ tabe-ta-no, **nani-o**?
Ken-NOM eat-PAST-Q what-ACC
Intended: 'What did Ken eat?'

Interrogatives have not yet been seriously studied in DS. Kempson et al. (2001:chap. 5) assume that a *wh*-question is represented by a structure with a WH feature. In order to analyse the *wh*-licensing data of RDs, we shall advance this feature-based analysis with reference to Japanese interrogatives in what follows.

Japanese has a question marker *no* which licenses a string with a *wh*-phrase as a *wh*-question, as in (24), or a string without a *wh*-phrase as a polar question, as in (25).

(24) Ken-ga nani-o tabe-ta-no?
Ken-NOM what-ACC eat-PAST-Q
'What did Ken eat?'

(25) Ken-ga tabe-ta-no?
Ken-NOM eat-PAST-Q
'Did Ken eat that?'[6]

In line with Kempson et al. (2001:chap. 5), we maintain that a *wh*-question is modelled by a WH feature at the root node. In a similar vein, we assume that a polar question is modelled by a POL(ar) feature. We then propose

[5]Tanaka & Kizu (2007) and Takita (2014) hold that the case-marking of the RD part affects island sensitivity. Section 5 shows that this contrast in terms of island sensitivity follows from our unified analysis without stipulations.

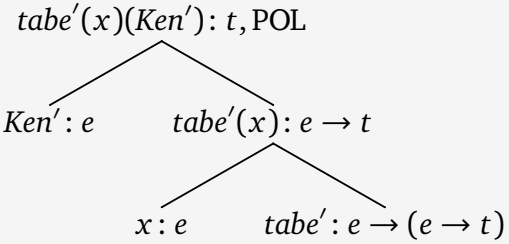
that (i) the parse of a *wh*-word posits the requirement ?WH at the root node, and that (ii) the parse of a question marker satisfies this requirement (that is, it deletes the requirement and posits a WH feature).[7] This idea is formulated as (26).

(26) *Proposal 2.* A *wh*-word in Japanese puts ?WH at the root. ?WH is licensed as WH by a question marker such as *no*. If ?WH is absent, a question marker puts POL at the root.

With this proposal, the ungrammaticality of (23) as well as the *wh*-licensing pattern in various types of RD string follow from the general mechanism of DS incremental, monotonic tree update.

The pre-RD clause in (23) does not contain a *wh*-phrase, and thus yields the tree where *no* has posited a POL feature. (Note that the parse of *no* does not create any new nodes but puts the feature POL at the root node.)

(27) Parsing *Ken-ga tabe-ta-no* in (23)

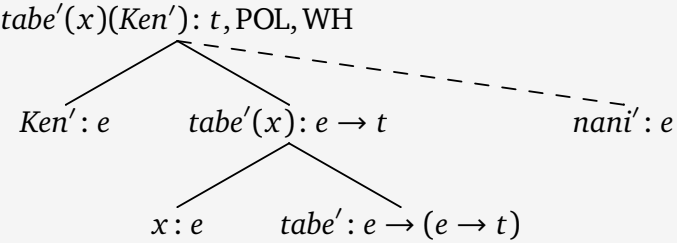


The tree contains a POL feature which indicates that the tree represents a polar question. In fact, this part of the string in (23) is identical to the string (25), which is interpreted as a polar question (but not as a *wh*-question).

The parse of (23), however, is not complete. What comes next in the string is the RD element *nani* 'what'. The parse of this *wh*-phrase adds ?WH to the root node of the tree (27), as illustrated in (28).

[7] The issue of question scope (Nishigauchi 2004) is disregarded. This would be dealt with in terms of the interaction between (i) the entry of a question marker and (ii) the general mechanism of "scope statement" (Cann et al. 2005:chap. 3).

(28) Parsing *Ken-ga tabe-ta-no, nani* in (23)



The features POL and WH indicate different types of question and cannot cooccur. As stated in section 2, a DS tree update is monotonic, disallowing any information to be lost during structure building. In particular, it prevents the feature POL from being deleted or modified. Thus, inconsistency of features necessarily arises, and the string (23) is deemed to be ungrammatical.

Note that our account also handles the non-RD example (29) and its scrambled analogue (30).

(29) Ken-ga nani-o tabe-ta-no?
Ken-NOM what-ACC eat-PAST-Q
'What did Ken eat?'

(30) Nani-o Ken-ga tabe-ta-no?
what-ACC Ken-NOM eat-PAST-Q
'What did Ken eat?'

In these examples, *nani-o* posits ?WH, and the question marker *no* licenses it as WH. (In DS, word order in Japanese is captured as the order in which LOCAL *ADJUNCTION applies for an incoming word (Cann et al. 2005:chap. 6). Thus, neither informational deletion nor structural destruction occurs in these examples.

We have explicated our account by extending the DS formalism. The key concept is incremental, monotonic structure growth. Thus, once a feature such as WH or POL is introduced, it can be neither deleted nor modified. Then, if incompatible features are detected, the structure becomes ill-formed and the string parsed becomes ungrammatical. The core of our analysis is summed up in table 1. The second column specifies a feature

ex.	pre-RD part	RD part	grammaticality
(18)	ϕ	ϕ	✓
(23)	{POL}	{POL, WH}	*
(29)–(30)	{WH}	n/a	✓

Table 1 Examples considered in sections 4.1 and 4.2

set *prior to* the parse of the RD part. The third column specifies a feature set *after* the parse of the RD part. The RD of a wh-phrase as illustrated in (23) is not possible due to the inconsistent features: WH and POL. An expectation, then, is that if one can avoid positing inconsistent features at a node, an RD string containing a *wh*-phrase could be grammatical. This expectation is borne out, as will be demonstrated in the next subsection.

4.3 RDs with *wh*-Phrases: Grammatical Cases

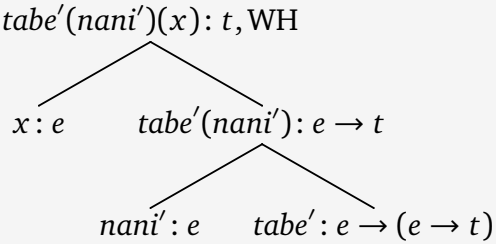
We turn to the grammatical cases of RDs with *wh*-phrases. These also fall into place in our incremental analysis.

First, consider the RD example (31).

(31) Δ nani-o tabe-ta-no, **Ken-ga**?
what-ACC eat-PAST-Q Ken-NOM
'What did Ken eat?'

The parse of the preceding clause gives rise to the tree (32). As this clause contains *nani* 'what', the root node is annotated with the WH feature. (More precisely, the parse of *nani* first posits the requirement ?WH, and it is subsequently satisfied as WH by the parse of the question marker *no*.)

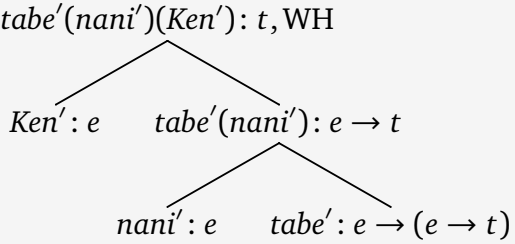
(32) Parsing *nani-o tabe-ta-no* in (31)



The RD element *Ken* is then parsed at an unfixed node. This parse incorpo-

rates Ken' into the tree (32) but does not add any information incompatible with the WH feature. This can be seen in the final state (33), where the unfixed node for *Ken* has been resolved as a subject node by the parse of the nominative particle *-ga*.

(33) Parsing *nani-o tabe-ta-no Ken-ga* in (31)



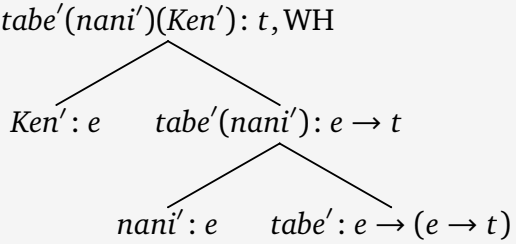
In (33), feature inconsistency is not detected, and the monotonicity of tree update is not violated either. Therefore, the RD string (31) is grammatical even though it contains the *wh*-word *nani*.

Second, if a preceding clause receives a *wh*-interrogative reading, a *wh*-phrase can constitute the RD part.

(34) Ken-ga nani-o tabe-ta-no, **nani-o**?
Ken-NOM what-ACC eat-PAST-Q what-ACC
'What did Ken eat?'

In (34), *nani*, which is located at the gap position in the preceding clause, posits ?WH. The question marker *no* then licenses it as WH.

(35) Parsing *Ken-ga nani-o tabe-ta-no* in (34)



Subsequently, the parse of the RD item *nani* adds ?WH to the root, but it is harmless; the requirement ?WH is immediately satisfied by the feature

WH which has already been posited by the parse of *nani* in the preceding clause. Thus, (34) is acceptable.[8]

Third, consider the mixed *wh*-data, repeated here from (7) and (8), respectively.

(36) ?Ken-ga dokode Δ tabe-ta-no, **nani-o**?
Ken-NOM where eat-PAST-Q what-ACC
'Where did Ken eat what?'

(37) ?Ken-ga Δ nani-o tabe-ta-no, **dokode**?
Ken-NOM what-ACC eat-PAST-Q where
'Where did Ken eat what?'

In each example, the preceding clause comprises a *wh*-phrase, and it posits ?WH (to be licensed by *no*). Then, even if another *wh*-phrase is processed as the RD part, it does not alter the WH feature specification. This is because the type of *wh*-word (e.g., *what*, *where*) is not reflected in the feature specification.

Finally, (38) looks like a (putative) counterexample; it is acceptable though *nani* appears sentence-finally. (38), however, receives a "specificational" reading (Declerck 1988, Nishiyama 2003), as in the cleft string (39). (In (38)–(39), *no* is regarded as a nominaliser; *no* in Japanese is lexically ambiguous between a question particle and a nominaliser.)

[8]The standard DS machinery (Cann et al. 2005) generates strings such as (i), where *sushi-o* is duplicated.

(i) Ken-ga sushi-o sushi-o tabe-ta.
Ken-NOM sushi-ACC sushi-ACC eat-PAST
'Ken ate sushi.'

As for the first instance of *sushi-o*, *sushi* is parsed on a locally unfixed node, and this unfixed node is resolved as an object node by the parse of the accusative particle *o*-. Then, *sushi* in the second instance of *sushi-o* is also parsed on a locally unfixed node, and this unfixed node is resolved as an object node by the parse of *o*-. As the object node has already been created, this second resolution is structurally vacuous. Examples like (i) may be unacceptable prescriptively, but they would be acceptable colloquially, with the assumption that the speaker utters *sushi-o* as a repetition for discourse purposes (e.g., emphasis, clarification). We are grateful to an anonymous referee for bringing this issue to our attention.

ex.	pre-RD part	RD part	grammaticality
(31)	{WH}	{WH}	✓
(34)	{WH}	{WH, WH}	✓
(36)–(37)	{WH}	{WH, WH}	✓

Table 2 RD examples considered in section 4.3

(38) Ken-ga tabe-ta-no nani?
Ken-NOM eat-PAST-NMNS what
'What is it that Ken ate?'

(39) [Ken-ga tabe-ta-no]-wa nani?
[Ken-NOM eat-PAST-NMNS]-TOP what
'What is it that Ken ate?'

So, (38) is likely to be a *wa*-stripped cleft. A cleft with an *o*-marked focus is said to be degraded for many speakers (Hiraiwa & Ishihara 2012); in fact, if the accusative particle *-o* is attached to *nani*, both (38) and (39) are degraded. Thus, it seems (38) is not an RD but a cleft (see Seraku 2013 for a DS account of Japanese clefts).

In sum, as an RD string is parsed left to right, a tree is incrementally updated. The monotonic nature of DS tree update accounts for why RD strings with *wh*-phrases are sometimes (though not always) grammatical. The insight of the analysis is delineated in table 2. In each example, no incompatible features are present at a node. It is thus correctly predicted that these RD strings are all grammatical (modulo other grammatical principles and rules).

Let us close this subsection by pointing out a residual problem. Data such as (40) (repeated from (34)) are cited in Takita 2011 and Tanaka 2001. We further note that case-marking affects acceptability, as in (41). Our analysis predicts that the strings under (41) are all grammatical.

(40) Ken-ga nani-o tabe-ta-no, **nani-o**?
Ken-NOM what-ACC eat-PAST-Q what-ACC
'What did Ken eat?'

(41) a. ?Ken-ga nani-o tabe-ta-no, **nani**?
Ken-NOM what-ACC eat-PAST-Q what
b. ??Ken-ga nani tabe-ta-no, **nani-o**?
Ken-NOM what eat-PAST-Q what-ACC
c. Ken-ga nani tabe-ta-no, **nani**?
Ken-NOM what eat-PAST-Q what

It seems a string is degraded when the form of an item at a theta position does not match that of an RD item. To take (41a) as an example, *nani-o* at a theta position is case-marked with *-o*, while *nani* at an RD position is not case-marked. We suspect that this formal difference may lower acceptability: when the speaker repeats part of a clause postverbally, its effect (e.g., emphasis) is not achieved well if the form is different. In fact, the same acceptability pattern obtains if *nani* in (41) is replaced with a non-*wh*-word like *sushi*. The upshot is that the strings in (41) are grammatical (especially, compared with (23)), and that they should not be ruled out by a grammar.

Our analysis is thus vindicated by a wide spectrum of RD data. Nevertheless, there are several topics that cannot be covered in the present paper. Japanese allows other types of RD element than NPs, such as AdvPs and APs. Furthermore, it also allows more than a single RD element (Abe 1999). These issues are handled in Seraku & Ohtani 2016.

5 Island Sensitivity of RDs

Section 4 unified case-marked and caseless RDs by arguing that they are mapped onto the identical structure (though the way a structure is built up differs depending on whether or not the RD part is case-marked). This unified analysis, though theoretically preferable, encounters the puzzle of how to explain away the data which have been taken to motivate a non-uniform analysis: island sensitivity of RDs. This section shows that our account accommodates such data without relinquishing uniformity of analysis.

5.1 Data and Previous Treatments

Tanaka & Kizu (2007) and Takita (2014) note that case-marked RDs are sensitive to island constraints while caseless RDs are not. In (42), the gap

Δ is found in the relative clause *Mari-ga age-ta*. What matters here is the Complex NP Constraint (Ross 1967).

(42) Ken-ga [[Mari-ga Δ age-ta] hito]-o sagashitei-ta-yo,
Ken-NOM [[Mari-NOM give-PAST] person-ACC looking.for-PAST-FP
ano-hon(*-o).
that-book(-ACC)
'Ken was looking for a person to whom Mari gave that book.'
(Takita 2014:139, modified)

If the RD part *ano-hon* 'that book' is case-marked, the string is sensitive to the island constraint, hence ungrammatical. By contrast, if *ano-hon* is caseless, it is not sensitive to the island constraint, hence grammatical. (See Takita 2014 for other types of island.)

Both Tanaka & Kizu (2007) and Takita (2014) tackle this island sensitivity pattern by positing radically distinct structures depending on whether an RD item is case-marked. For example, Tanaka & Kizu hypothesise the following structures:

(43) *Structure for case-marked RDs (Tanaka & Kizu 2007)*
Op_i [… [$_{\text{CP}}$ t_i [$_{\text{CP}}$ … t_i …]] …] XP_i-case

(44) *Structure for caseless RDs (Tanaka & Kizu 2007)*
Op_i [… t_i [$_{\text{CP}}$ … pro_i …] …] XP_i

In both structures, an RD item corresponds to XP and is co-indexed with the null Op(erator). In (43), Op moves from a theta position in an island to the sentence-initial part. In this movement, Op *crosses* an island, hence the island sensitivity of case-marked RDs. In (44), the theta position is inhabited by a *pro* co-indexed with Op. Op movement starts from the outside of an island; notice the position of the trace t_i. In this movement, Op does *not* cross an island, and this is why caseless RDs appear to not be island sensitive.

This distinct-structure approach looks reasonable, but there is a reservation. Nothing seems to prevent us from attaching a case particle to XP in (44). That is to say, it is not clear how a structure like (45) is banned.

(45) *Structure for caseless RDs (Tanaka & Kizu 2007)*
Op_i [… t_i [$_{\text{CP}}$ … pro_i …] …] XP_i-case

Unless structure (45) is blocked, case-marked RDs are predicted to not be island sensitive, contrary to fact. The same problem arises for Takita (2014), who also posits distinct structures depending on the case-marking of an RD element.

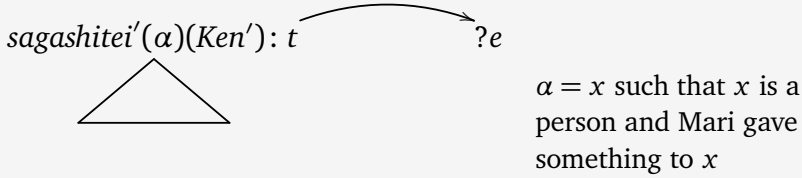
Whilst there may be syntactic solutions to this problem, the next subsection shows that the problem does not arise in our account in the first place.

5.2 LINK-Based Analysis

According to our analysis of RDs in section 4, an RD item is parsed at an unfixed node introduced by Local *Adjunction. An unfixed node created by this action, however, must be resolved in a "local" structure, and so it cannot handle island data.[9]

Instead of an unfixed node, however, the parser could launch a LINK relation to parse an RD element. As LINK allows information passing across an island, the RD part *ano-hon* in (42) is parsable at the LINK-ed ?*e*-node, as shown in (46).

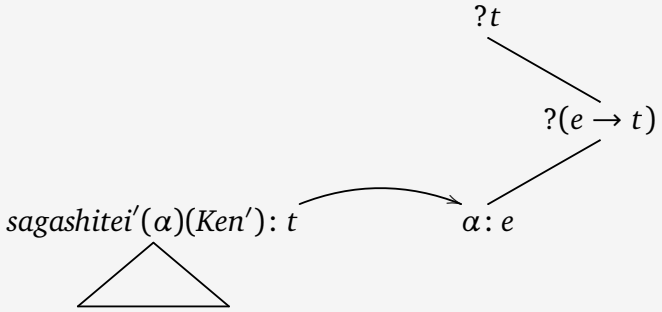
(46) Parsing (42) prior to the RD item *ano-hon*



If the accusative particle *-o* is absent, the term at the LINK-ed node (i.e., *hon′*) is incorporated into the main tree (formalised as the general action of LINK Evaluation). Therefore, the caseless RD in (42) is grammatical. If *-o* is present, the current node will be fixed as an object node within a new tree (Seraku 2013), as shown in (47).

[9] In DS, each node position is defined in the "Logic of Finite Trees" (Blackburn & Meyer-Viol 1994). An unfixed node indicates that it may occupy any node position in a restricted domain. In the case of Local *Adjunction, an unfixed node must be resolved within a local propositional tree.

(47) Parsing (42) (with *-o* in the RD item *ano-hon-o*)



$\alpha = x$ such that x is a person and Mari gave something to x

In (47), the emergent tree cannot be further built and the requirements $?t$ and $?(e \rightarrow t)$ are left outstanding. Thus, the case-marked RD in (42) is ungrammatical.

In DS, a LINK-analysis has been proposed for RDs in several languages: English (Cann et al. 2004), Greek (Chatzikyriakidis 2011, Gregoromichelaki 2013), and Mandarin (Wu 2005). These accounts themselves are motivated theoretically and empirically, but since a LINK-analysis is inconsonant with case markers (see the paragraph above for details), they are not applicable to Japanese case-marked RDs (unless stipulations are made). In our account, case-marked RDs are treated by dint of unfixed nodes (not LINK-ed nodes).

So, in our account, there are two means of parsing an RD string: unfixed-node-based and LINK-based. This conforms to the general DS stance that a string-structure pair is not predetermined. Given the two parse routes and the two types of RD, there are logically four pairings, as summarised in table 3. (Note that the "Result" in this table specifies whether a parse fails for the kinds of RD string where the gap is found inside a relative clause in a complex NP.) Although the LINK-based parse alone has so far been examined for (42), the unfixed-node-based parse does not alter the conclusion of our discussion, as will be argued in what follows.

Let us first consider case-marked RDs, namely, (i)/(ii) in table 3. If the case-marked RD item *nani-o* in (42) is parsed at an unfixed node, the parse fails (see (i)). This is because, as mentioned at the outset of the present subsection, an unfixed node introduced by Local *Adjunction

	Type of RD	Type of Parse	Result
(i)	case-marked	unfixed-node	parse fails
(ii)	case-marked	LINK	parse fails
(iii)	caseless	unfixed-node	parse fails
(iv)	caseless	LINK	parse succeeds

Table 3 Type of RD and Type of Parse

must be resolved within a local structure. Further, the LINK-based parse also fails because the LINK-ed node is identified as an object node in a new structure by the parse of *-o*, but this structure cannot be further updated, as illustrated in (47) (see (ii)). Therefore, our account correctly predicts the island sensitivity of case-marked RDs.

Let us turn to caseless RDs, namely (iii)/(iv) in table 3. If the caseless RD element *nani* in (42) is parsed at an unfixed node, the parse fails (due to the reason in the previous paragraph; see (iii)). This result differs from the one based on a LINK-based parse (see (iv)). But this is not problematic; in DS, a string is grammatical if there exists a successful parse of the string. For the caseless RD in (42), there is indeed a successful LINK-based parse, namely, (iv), and so the string is grammatical. Hence, the island insensitivity of caseless RDs also follows from our account.

In a nutshell, DS enables us to integrate case-marked and caseless RDs without failing to account for their discrepancy in terms of island sensitivity. Moreover, our analysis avoids the potential problem of previous works mentioned in section 5.1.

In closing, it should not go unnoticed that the present account is applicable to other sets of data beyond RDs. Fukaya (2007) points out the same island sensitivity pattern as (42) for clefts, stripping, and sluicing (see also Hoji 1990). In DS, Seraku (2013) deals with them in virtue of LINK, which is fully consonant with the analysis presented in this section. Thus, our account of RDs is generalisable to these focus/ellipsis constructions, too.

6 Conclusion

The distribution of *wh*-phrases in Japanese RD constructions follows from the incremental, monotonic growth of interpretation. The main results of this paper are condensed into the following points:

- We observe that there are instances where a *wh*-phrase is licensed as the RD part. These data challenge past analyses, making a case for an incremental account.
- Our incremental account integrates case-marked and caseless RDs, and correctly predicts the *wh*-licensing pattern.
- The account is further confirmed by other sets of data such as island sensitivity of RDs.
- The formalisation of the analysis leads to advances in the DS framework.

As general implications, putting a grammar on an incremental footing develops a "realistic" grammar (Sag & Wasow 2011), and it makes claims experimentally testable in terms of incremental parsing (Kiaer 2014). A specific benefit of adopting DS in this light is that there is a growing body of DS research on dialogue (Purver et al. 2014). Since RDs appear in casual speech, and casual register is typically manifested in dialogue, DS opens up the avenue of addressing spontaneous RD data. Seraku & Ohtani (2016) present a preliminary analysis of naturally-occurring RDs in the conversational part of Japanese novels.

Another future prospect is to test the claims made in this paper against cross-linguistic data. In the context of DS, RD data from languages like English, Greek, and Mandarin have been considered (recall the references in section 5). It is left for future research to examine cross-linguistic parallelisms and differences in the syntax of RDs in terms of incremental, monotonic growth of interpretation.

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