

English Sprouting: A Construction-Based Approach

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1. Introduction

Sprouting phenomena, which is regarded as a subtype of sluicing, have not been studied widely in a syntactic field since Chung et al (1995) first investigated this phenomenon. The biggest difference between the sluicing and the sprouting is that the isolated *wh*-fragment of the sprouting does not have a corresponding antecedent, whereas that of the sluicing appears with a corresponding antecedent, as shown in (1) and (2).

(1) Sluicing

- a. She's reading something. I can't imagine **what**.
- b. They're going to serve the guests something, but it's unclear **what**. (Chung et al 1995:241)

(2) Sprouting

- a. She's reading. I can't imagine **what**.
- b. They're going to serve the guests, but it's unclear **what**. (Chung et al 1995:242)

The reason why sprouting is a challenging topic for syntacticians is that the isolated *wh*-fragment does not have a linguistic source, though it is syntactically and semantically connected to its antecedent clause.

- (3) a. He served the soup ____, but I don't know to who(m).
b. * He served the soup of Tom.
c. * He served the soup ____, but I don't know of who(m).

As in (3), the sprouted fragment can be *to NP*, but not *of NP*. This selectional restriction does not come from the verb *know* but from the verb *serve*, which belongs to an antecedent clause. That means, even though there is no corresponding antecedent element for the sprouted fragment, it is somehow connected to its source.

In this paper, I will investigate the sprouting phenomena, by means of a HPSG framework and MRS (Minimal Recursion Semantics) because this topic has never been explored in the HPSG and constructions or lexical rules concerned to the sprouting have never been proposed.

2. Phenomena

2.1. Two types of sprouting

The sprouting can be divided into two types – an argument sprouting and an adjunct sprouting.

First, the argument sprouting is the case that the sprouted fragment corresponds to an implicit (unrealized) argument of the antecedent clause.

- (4) a. She's reading _____. I can't imagine **what**.
 b. He shouted _____ again, but I don't know **to whom/who to**.
 c. They're going to serve the guests _____, but it's unclear **what**.

In (4), the linguistic sources of the sprouted fragments are elements that appear on the argument structure of their verbal lexicons (*read, shout, serve*) but not overtly expressed.

On the other hand, in the adjunct sprouting, sprouted fragments are unrealized adjuncts of their antecedent clauses, as in (5).

- (5) He's writing, but you can't imagine **where/why/how fast/with whom**. (Ross 1969, 252)

That is, the sprouted fragments in (5) correspond to unrealized possible adjuncts of the antecedent clause.

In chapter 5, the specific constructions on each sprouting will be proposed.

2.2. Restrictions on sprouting

As briefly mentioned in chapter 1, sprouted fragments are syntactically and semantically connected to its antecedent, for that the sprouting is subject to some selectional restrictions.

First, prepositions cannot be stranded in the sprouting construction (Chung 2006; Chung et al 2011). That is, the object of a preposition alone cannot be sprouted. This is a quite surprising property, considering that it is the very opposite phenomenon to Merchant (2001)'s P-stranding generalization – if a preposition can be stranded under *Wh*-movement, then a preposition should be stranded in sluicing, too. Even though English is a P-stranding language, it is impossible to strand a preposition in the sprouting construction.

- (6) a. They're jealous but it's unclear ***(of) who**
 b. Last night he was very afraid, but he couldn't tell us ***(of) what**.
 (Chung et al 2011)
- (7) a. They're jealous but it's unclear **who they're jealous of**.
 b. Last night he was very afraid, but he couldn't tell us **what he was very afraid of**. (Chung et al 2011)

As in (6), the sprouted *wh*-argument cannot be *NP* but *PP*. That means, the sprouted *wh*-argument should be of the same category as the implicit arguments of *jealous / afraid* and the p-stranding is unacceptable, contrary to the non-elliptical sentence (7), where the preposition stranding is unproblematic.

Second, syntactic subjects cannot be sprouted.

- (8) a. *The message said to show up in the square at midnight, but it didn't say **who** <should show up in the square at midnight>.
 b. *Having to compromise is inevitable, but we know not yet **who** <will have to compromise>. (Chung 2011)

As in (8), the verbs *to show up* and *having to compromise* have implicit subjects and it is impossible to sprout those subjects with *wh*-words.

Third, the sprouting construction shows *fixed diathesis effects* – lexical choic-

es made in the antecedent TP limit the interpretation of the sprouting construction (Levin 1982; Chung et al 2011)¹. Phenomenon-wise, it means that sprouting indirect objects is impossible.

- (9) a. He served the soup _____, but I don't know **to who(m)**.
 b. *He served _____ the soup, but I don't know **who(m)**.
 c. He served some of the guests _____, but I don't know **what**.
 (Chung et al 2011)
- (10) a. He sent a package _____, but I can't find out **who to**.
 b. *He sent _____ a package, but I can't find out **who**. (Chung et al 2011)

As in (9) and (10), it is possible to sprout an implicit dative argument (12a) and (13a) and to sprout an implicit direct object. However, it is ungrammatical to sprout an implicit indirect object as in (9b) and (10b).

In summary, the sprouting construction disallows the prepositional stranding, sprouting of subjects and indirect objects

3. Previous studies (Chung et al 1995; 2011)

Chung et al (1995; 2011) analyzed the sprouting construction by *LF-reusing*. This approach assumes that an ellipsis site of the sprouted sentence is empty at surface structure, but the semantic content of the elided elements is filled by reusing a previously constructed syntactic structure with its semantic meaning. That is, the interpretation of the sprouted sentence is completed by reusing an already built syntactic structure, which has already been deployed in discourse processing, in the new sprouted context.

1) According to Chung et al (1995, 2011), there exist two types in the verb *serve* / *send*. The first type has a subcategorization which consists of *SUBJ*<server>, *OBJ*<meal>, *DATIVE*<diner> / *SUBJ*<sender>, *OBJ*<sent>, *DATIVE*<receiver > and the second type consists of *SUBJ*<server>, *OBJ1*<diner >, *OBJ2*< meal > / *SUBJ*<sender>, *OBJ1*< receiver >, *OBJ2*<sent >. *The reason why (12b) and (13b) are ungrammatical is that the antecedent clause contains the first type of the verb while the elided clause contains the second type of the verb. However, in this paper, I will analyze this phenomenon without assuming two distinct types of the verb.*

LF-re-using process undergoes three steps, which is presented in (18).

- (11) They were firing, but at what was unclear.
 (12) a. [_{CP} at what_C [_{TP}]]
 b. [_{CP} at what_C [_{TP} they were firing]]
 c. [_{CP} at what_C [_{TP} they were firing at what]]

As in (12a), the ellipsis site of the sprouted sentence, which is a complement TP of the C head, remains empty in the overt syntax. In order for (12a) to have a complete meaning, at LF, the antecedent TP which is already deployed in the discourse is reused, as in (12b). However, the structure in (12b) is uninterpretable, because *Wh*-features on the C head cannot be checked by the *wh*-phrase, which is not in the c-command domain of the C head. Hence, as in (12c), another operation that creates the same *wh*-phrase within VP is required. Now that the **wh**-phrase is positioned within the c-command domain of the C, the *Wh*-phrase can be integrated into the question meaning.

However, there are some problems on this analysis. First, it is unclear which antecedent structure should be reused to supply the missing interpretation of the elided elements; Chung et al (1995; 2011) just mentioned that *an already built syntactic structure* would be reused, but that is not an enough condition to reconstruct the content of the ellipsis site. Let's consider a conversation in (13).

- (13) A: I won the first prize in the piano contest.
 B: I am so happy for you.
 A: And I was given a huge bunch of flower.
 B: From whom?

In (13), B's second utterance (*From whom*) is a sprouted sentence and has elided elements. According to Chung et al (1995; 2011)'s analysis, the antecedent TP should be copied to the empty complement TP of the sprouted sentence at LF to make it interpretable. In this case, the antecedent clause should be A's second utterance (*And I was given a huge bunch of flower*), not A's first utterance (*I won the first prize in the piano contest*). However, in Chung et al (1995; 2011)'s analysis, there is no constraint on which antecedent clause should

be re-used. Since A's first utterance is also *an already built syntactic structure* which is already deployed in the discourse, it can be a suitable candidate for the LF-reusing as much as A's second utterance is.

According to Bertomeu and Kordoni (2005), they define ellipsis as a local phenomenon; so, the source of ellipsis will be the case that either the most active object is in the focus of attention or structural and semantic information is still in memory. The ellipsis construction which retains the structural semantic information, like the argument and adjunct sprouting, belongs to the representations of "*recent utterances*" in the discourse-record. That means the recent utterance, not an old one, can be the antecedent of the elided fragment. Thus, in (13), the antecedent clause of the sprouted fragment should be A's recent utterance, the second one.

The other problem of the Chung et al (1995; 2011)'s analysis is that it cannot explain the bare interrogative phrases which have discourse or situational environment sources (Ginzburg 1982), because they do not have a linguistic antecedents to be reused at LF.

- (14) a. Coffee sounds good, When? (When shall we have coffee?)
 b. Said by a taxi driver: Where to, lady? (Where do you want to go to?)
 c. Distraught homeowner staring at ashes of his house: Why?
 (Chung et al 1995:264)

Although Chung et al (1995) contradicted this counterargument and claimed that with a pragmatic inference, not only linguistic material but also contextual materials can be the source of the interpretation; they did not present any mechanisms of the pragmatic inference being the source of ellipsis.

However, Bertomeu and Kordoni (2005) suggested a construction that classified various fragments depending on their resolution type – via inference or via identity – and that presented how pragmatic inference or linguistic structural information could affect the fragment interpretation. Though I do not analyze the cases where fragments take their sources from contextual information, I will adopt Bertomeu and Kordoni (2005)'s analysis because it gives us a bigger picture on the whole fragment phenomena and I can analyze the

argument and adjunct sprouting coherently with other fragment phenomena.

4. Theoretical background (Bertomeu and Kordoni 2005).

4.1. Classification of fragment by resolution type

Bertomeu and Kordoni (2005) studied intersentential ellipsis, in which the contextual anchor for the fragment is provided either by the previous discourse or by the linguistic antecedents. They suggested that a new classification of fragments, which is based on the resolution type, is required and there are two types in resolving fragments.

The first type is a *resolution via-identity*: In this type, the fragment is resolved at the semantic-structural level and semantic-structural representation still exists in the *discourse-record (DIS-REC)*.²⁾ Hence, the source of the fragment can be found in the previous utterance, as in (15).

- (15) A: When did 2-Pac release “All eyes on me”?
 B: And Michael Jackson “Thriller”? (Bertomeu and Kordoni 2005:53)

(15B) is a gapped sentence with multiple independent fragments and belongs to the type of the *resolution via-identity* and accordingly the semantic and structural information of the source utterance (15a) is still in the *DIS-REC*. Therefore, the fragment sentence (14B) can be resolved at the semantic-structural level through the linguistic information of the antecedent utterance.

The second type of the resolution is *resolution via-inference*. In this type, resolution takes place at the semantic-conceptual level. Unlike the *resolution via-identity type*, direct linguistic sources do not exist; rather a fragment sentence finds its source at the context. There are two sources of context anchoring – a previous discourse and a surrounding physical environment.

In the first case, a fragment finds its source at the previous discourse. That means, some semantic-conceptual representation of the discourse is in *focus*

2) *Discourse-record* is a memory buffer containing representations of the utterances the order in which they have been uttered. (Bertomeu and Kordoni 2005:56)

of attention³⁾ and then *knowledge*⁴⁾ from the knowledge base enables to do the necessary inferences for resolving the fragment, as in (16).

- (16) A: Has Anastacia released any CDs in the last year?
 B: Yes, “Left outside alone”.
 A: Any prizes?

In (16), A’s second utterance *Any prizes?* can be resolved at the semantic-conceptual level by the previous discourse that *Anastacia released some CDs in the last year* because the previous discourse is still activated, that is it exists in the *focus of attention*.

In the second case, the surrounding physical environment can be the source of a fragment. That means, some scripts in the knowledge-base, in which mapping of the goal and issue that conversational participants pursues at that point is registered, are activated by the situational environment, as in (17)

- (17) Flights to Paris. (Uttered by a customer at the travel agency)

In (17), the situational environment that this utterance took place at the travel agency causes the some script in the knowledge-base to be activated, and therefore the fragment can be resolved at the semantic-conceptual level.

To sum up, Bertomeu and Kordoni (2005) proposed the new way to classify fragments, based on the resolution type, which is presented in figure 1. The resolution type has two subtypes – *sem-struct-res-frag-cl* (*semantic structural resolution fragment clause*) and *sem-conc-res-frag-cl* (*semantic conceptual resolution fragment clause*). The first subtype *sem-struct-res-frag-cl* corresponds to the *resolution via-identity*, where fragments are resolved at the semantic-structural

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- 3) Focus of attention can be understood as activation. Mental representations whose activation degree is over some threshold can be considered to be in focus of attention. When a speaker chooses to refer to something elliptically, his beliefs that the hearer has his focus of attention placed in the same mental representation as he does and, thus, will be able to understand the utterance. (Bertomeu and Kordoni 2005:57)
- 4) Each CPs has a knowledge-base whose intersection is the Shared Beliefs. (Bertomeu and Kordoni 2005:58)

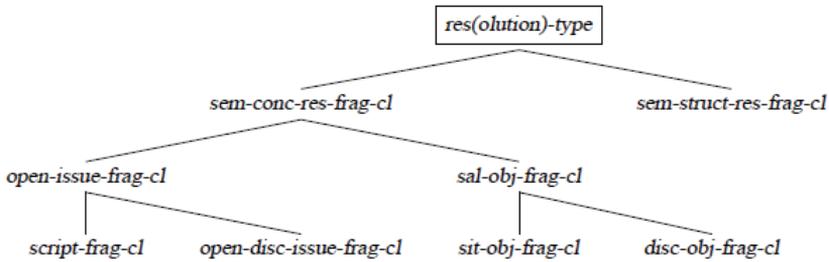


Figure 1. The res-type dimension (Bertomeu and Kordoni 2005:62)

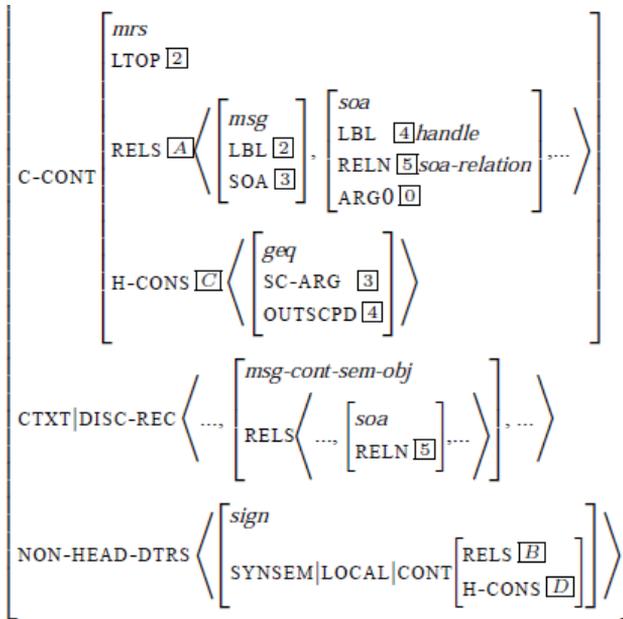
level. And the second type *sem-conc-res-frag-cl* corresponds to the *resolution via-inference*, in which the fragment resolution takes place at the semantic-conceptual level.

4.2. Semantic structural resolution fragment clause

Since the argument and adjunct sprouting requires semantic and structural information of the recent utterance in the DIS-REC, I will propose that the sprouting construction is a subtype of the *sem-struct-res-frag-cl*⁵⁾ and it inherits all the constraints and features of the *supertype sem-struct-res-frag-cl*. So, let's take a look at the *sem-struct-res-frag-cl* proposed by Bertomeu and Kordoni (2005).

$$(18) \left[\begin{array}{l} \textit{sem-struct-res-frag-cl} \\ \\ \text{SYNSEM|LOCAL|CONT} \end{array} \left[\begin{array}{l} \textit{mrs} \\ \text{INDEX } \boxed{0} \textit{ event} \\ \text{GTOP } \boxed{2} \textit{ handle} \\ \text{LTOP } \boxed{2} \\ \text{RELS } \boxed{A} \oplus \boxed{B} \\ \text{H-CONS } \boxed{C} \oplus \boxed{D} \end{array} \right] \right]$$

5) Bertomeu and Kordoni (2005) proposed their constructions based on MRS (Minimal Recursion Semantics). So, for more background information, check on Copestake et al (1995; 2005).



In (18), *sem-struct-res-frag-cl* has a NON-HEAD-DTR (non-head-daughter), a fragment, which is a linguistically realized element. Hence, the NON-HEAD-DTR belongs to the type *sign* and has the specification for the feature SYNSEM.

In the MTR (mother) node, RELS (relations) and H-CONS (handle constraints) of the NON-HEAD-DTR and C-CONT pass up to the MTR. Also, the G-TOP (global top handle) is coindexed with the label of the *msg* (message) type, which represents illocutionary forces.

In C-CONT (constructional content) the *msg* type EP (elementary predicate) has feature SOA and its value is *geq* (equality modulo quantifiers) to a label of a *soa* (state of affairs) type. The reason why the fragment has *msg* type is that the fragment can convey complete meaning, like a stand-alone clause. Also, this *geq* relationship makes the *msg* type EP (illocutionary force) takes the widest scope.

In addition, in CTXT (context), which contains a sub-feature DISC-REC, it has a type *msg-cont-sem-obj* (message-content-semantic-object) as its value. The *msg-cont-sem-obj* belongs to the representations of recent utterances in the

DISC-REC, and it has not lost its structural and semantic information. Also, a *soa*-relation of the *msg-cont-sem-obj* is coindexed to the *soa*-relation of the C-CONT.

5. Proposal

5.1. *Sluicing construction*

As previously mentioned, the sprouting construction is a subtype of the sluicing construction. The common properties of the sluicing and the sprouting construction are first, there should be an isolated *wh*-fragment, which may function as an interrogative clause (Nykiel and Sag 2011); and second, the semantic interpretation of the isolated *wh*-fragment is supplied by an antecedent clause. The difference between two constructions is that the sluicing construction typically appears when there is a corresponding element in the antecedent clause, as in (19), while the sprouting construction usually appears without a correlate, as in (20).

- (19) a. She's reading something. I can't imagine what.
 b. They're going to serve the guests something, but it's unclear what. (Chung et al 1995:241)

- (20) a. She's reading. I can't imagine what.
 b. They're going to serve the guests, but it's unclear what. (Chung et al 1995:242)

Therefore, I propose that the sprouting construction is a subtype of the sluicing construction (*sluicing-sem-res-frag-cl*), which is a subtype of the *sem-struct-res-frag-cl* and *int-m-rel* (*interrogative message relation*).

First, due to the features and constraints inherited from the supertype the *sem-struct-res-frag-cl*, the sluiced fragment can have a complete semantic interpretation, supplied from an antecedent clause.

Second, since the *sluicing-sem-res-frag-cl* is a subtype of the *int-m-rel*, the sluiced fragment can function as an interrogative clause, that is, it has an illocutionary force of question. Ginzburg and sag (2000) defines clauses seman-

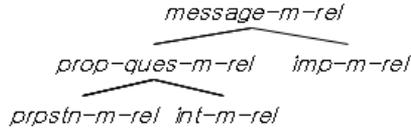


Figure 2. *message* type (Spreyer and Frank 2005)

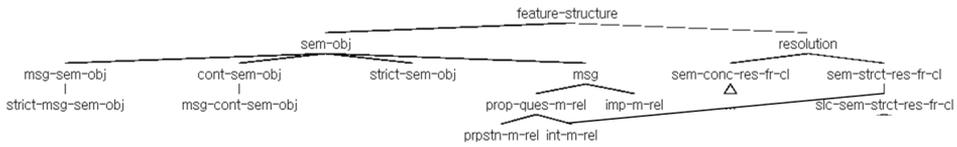


Figure 3. Type hierarchy of the *sluicing (slc)-sem-res-frag-cl*

tically, as conveying a *message*. *Message* carries illocutionary force and has subtypes such as assertion, querying, commanding, exclaiming and the like (Ginzburg and Sag 2000:121).

- (21) a. *clause*: [CONT *message*] → ...
 b. *inter-cl*: [CONT *question*] → ... (Ginzburg and Sag 2000)

As in (21), a *clause* type conveys message, and its subtype *inter-cl* (interrogative clause) carries question as its illocutionary force.

In MRS, message relation has a hierarchy, as in figure 2, and *int-m-rel* is a subtype of the *msg-m-rel*.⁶⁾ Thus, I suggest that the sluicing construction has *int-m-rel* as a message type, in its C-CONT feature. To sum up, the *sluicing (slc)-sem-res-frag-cl* takes the *sem-struct-res-frag-cl* and *int-m-rel* as its supertypes.

Now I propose *sluicing-sem-struct-res-frag-cl*, which inherits its features and constraints from supertypes.

- (22) *sluicing-sem-struct-res-frag-cl* (inherited from supertypes)

6) *prop-ques-m-rel* (proposition question message relation) is an underspecified type

	<i>sluicing -</i>	<i>sem - struct - res - frag - cl</i>	
SYNSEM LOCAL	HEAD	$\begin{bmatrix} v \\ \text{vFORM } fin \end{bmatrix}$	
	SUBJ	<>	
	SPR	<>	
CONT	mrs		
	INDEX	\square event	
	GTOP	\square handle	
	LTOP	\square handle	
	RELS	$\square \oplus \square$	
H - CONS	$\square \oplus \square$		
C - CONT	mrs		
	LTOP	\square	
	RELS	$\square \begin{bmatrix} int - m - rel \\ LBL \square \\ SOA \square \end{bmatrix} \oplus \square$	
H - CONS	\square $\begin{bmatrix} qeq \\ HARG \square \\ LARG \square \end{bmatrix} \oplus \square$		
	msg	<i>-cont - sem - obj</i>	
C TXT DISC - REC	ARG - ST		$\langle \dots XP \begin{bmatrix} CAT \square \\ CONT \square \end{bmatrix} \dots \rangle$
	LTOP		\square
	RELS	$\square \langle \dots \begin{bmatrix} soa - rel \\ LBL \square \\ ARG \square \\ \vdots \end{bmatrix}, \begin{bmatrix} pquant - rel \\ LBL \square \\ ARG0 \square \\ RESTR \square \end{bmatrix}, \begin{bmatrix} ref - rel \\ LBL \square \end{bmatrix} \dots \rangle$	
H - CONS		$\square \langle \dots \begin{bmatrix} qeq \\ HARG \square \\ LARG \square \end{bmatrix} \dots \rangle$	
NON - HD - DTRS	sign		
	SYNSEM LOCAL	$\begin{bmatrix} CAT \square [HEAD nominal] \\ CONT \begin{bmatrix} mrs \\ LTOP \square \\ RELS \square \oplus \square \\ H - CONS \square \end{bmatrix} \end{bmatrix}$	

As with *sem-struct-res-frag-cl*, NON-HEAD-DTR is a linguistically realized element. However, its category is restricted to be nominal, because the syntactic category of the sluiced fragment is typically *noun* or *preposition*. Moreover, RELS and H-CONS lists of the NON-HEAD-DTR is identical to those of the *pquant-rel* (positive quantificational relation), which is the representations in the DISC-REC. Also, a referential index (ARG0) of the *pquant-rel* in the DISC-REC is coindexed with ARG of *soa-rel*, and that means the *pquant-rel* object is a semantic argument of the *soa-rel* object. Thus, RELS and H-CONS lists of the NON-HEAD-DTR's coindexation with those of the *pquant-rel* object means that NON-HEAD-DTR has the same semantic content as the previous utterance's *pquant-rel* object. In addition, NON-HEAD-DTR's CAT value is coindexed with XP in ARG-ST of the DISC-REC, which carries the *pquant-rel* as its semantic content. Since NON-HEAD-DTR and the *pquant-rel* argument in the DISC-REC takes the identical CAT value, syntactic correspondence be-

tween the sluiced fragment and its antecedent element can be captured.⁷⁾

Furthermore, the *msg* type becomes the *int-m-rel* type in the *sluicing-sem-struct-res-frag-cl*, to convey a questioning interrogative force. Unlike *sem-struct-res-frag-cl*, SOA's value of the *int-m-rel* type is *qeq* to a label of the NON-HEAD-DTR's LTOP, because the sluiced *wh*-element takes wider scope than *soa-rel*. Thus, through the *qeq* relation between NON-HEAD-DTR and the *int-m-rel* type, questioning illocutionary force gets to take the widest scope in the *sluicing-sem-struct-res-frag-cl*.

Finally the MTR node's syntactic category becomes a "vFORM *fin*", contrary to NON-HEAD-DTR's syntactic category *nominal*, so that the sluiced fragment serves as a clause.

5.2. Sprouting construction

5.2.1. Implicit element

As mentioned in the previous chapters, the sprouting construction is different from sluicing construction in that the sprouted fragment appears without a correlate, repeated in (23).

- (23) a. She's reading. I can't imagine **what**.
 b. They're going to serve the guests, but it's unclear **what**. (Chung et al 1995:242)

Even though the sprouting construction lacks the overt antecedent element, I suggest that there should be an implicit (unrealized) element in the antecedent sentence, to which the sprouted fragment is connected.

- (24) a. He served the soup _____, but I don't know to who(m)
 b. * He served the soup of Tom.
 c. * He served the soup _____, but I don't know of who(m)

7) It has been discussed by many researchers that a sluicing fragment and its antecedent correlate show some syntactic connectivity, such as case agreement in German sluicing sentences. Since the topic of this paper is the sprouting, not the sluicing sentences, I will not go into the details. For more information, refer to Merchant (2001; 2006).

- (25) a. * She knew French for Tom.
 b. * The ship sank with a torpedo. (Chung et al 1995:249)
- (26) a. * She knew French, but I don't know for whom.
 b. * The ship sank, but I don't know with what. (Chung et al 1995:249)

As in (24b) and (25), the examples are ungrammatical because inappropriate argument and adjuncts have been used and they are not licensed by their verbal lexicon. If the unlicensed argument and adjuncts are sprouted, as in (24c) and (26), it turns out to be ungrammatical, as well. That means, the sprouted fragment is licensed by the verbal lexicon of the antecedent clause by connecting itself to the implicit element in the antecedent clause.

Therefore, I suggest that the antecedent clause of the sprouted clause have an implicit element and the unrealized element be connected to the sprouted fragment.

5.2.2. *The type of implicit antecedent*

Before we go into a specific construction of the sprouting, let's figure out which type the implicit antecedent of the sprouting sentence belongs to. Fillmore (1986) suggested that an implicit argument should be distinguished in two types – *indefinite null complements* (INC) and *definite null complements* (DNC).

In the first type INC, the referent's identity is unknown or a matter of indifference (Fillmore 1986:96). That is, the referent is markedly indefinite as well as independent from context. On the other hand, in the second type DNC, the omitted element should be recovered from the context and potentially has a contextually definite meaning.

- (27) a. I contributed to the movement.
 b. I contributed **something** to the movement.
 c. I contributed five dollars. (Fillmore 1986:98)

For example, the verb *contribute* has both types of implicit arguments. The verb *contribute* has three arguments – GIVER, GIFT and RECEIVER- and the

GIFT is INC whereas the RECEIVER is DNC. In (27a), when the GIFT argument is omitted, the nature of the argument is a matter of indifference, hence, it is equivalent to (27b). However, in the case of the RECEIVER argument is omitted (27c), its identity should be retrieved from the context. Therefore, omitting DNC is possible only when its identity is previously *given*, so that the null arguments have definite referent.

Moreover, there is a test for distinguishing INC/DNC. In the case of DNC, it sounds odd if a speaker admits ignorance of the identity of the implicit argument. On the other hand, it sounds fine with INC, even though a speaker admits ignorance of the identity of the null argument.

- (28) a.* She found out. I wonder what she found out.
 b.* They applied yesterday. I wonder what they applied for. (Chung et al 1995:267)

- (29) a. She read until midnight. I wonder what she read.
 b. They were eating. I wonder what they were eating. (Chung et al 1995:267)

As in (28) and (29), the implicit arguments of the verb *find out* and *apply* are DNC type, whereas those of the verb *read* and *eat* are INC type. In the case of DNC, it is odd to wonder about what they already know because the referent of the implicit argument is given in the context. However, in the case of INC, it is not odd to wonder about the implicit argument because its identity is unknown.

With this test, the type of an implicit antecedent in a sprouted sentence can be determined.

- (30) a.* She found out. I wonder what.
 b.* They applied yesterday. I wonder what for. (Chung et al 1995:267)

- (31) a. She read until midnight. I wonder what.
 b. They were eating. I wonder what. (Chung et al 1995:267)

- (32) a. She read **something** until midnight.

The biggest differences between the *sluicing-sem-strict-res-frag-cl* and the *sprouting-arg-sem-strict-res-frag-cl* are that *soa-rel* of the DISC-REC carries IARG (Implicit argument) and the ARG-ST of the DISC-REC involves XP argument, which is *inc* (indefinite null complements) type.⁸⁾ This mechanism represents that the antecedent utterance of the sprouting, which is registered in the DISC-REC, has an implicit argument.

Someone might think that the implicit argument should not be listed in the ARG-ST, but listed only in a semantic CONT list, because it is not a syntactically realized argument. Maybe it can be true for some sentences, except for the sprouting sentence. As we have discussed in the chapter 2, the sprouting construction shows the syntactic connectivity, such as restrictions on sprouting a syntactic subject and an indirect object as well as a preposition stranding. That is, since there is the syntactic connectivity between the implicit antecedent and the sprouted fragment, the implicit antecedent should be listed in the ARG-ST, as well as the semantic CONT list.

In addition, involving an implicit element in the ARG-ST is not an unusual idea. A similar account is made by Ball (2008) to account for an athematic pronominal, *pro* in Tongan.

(34) The Argument Realization Principle

$$word \Rightarrow \left[\begin{array}{l} \text{SYN} \mid \text{VAL} \\ \text{ARG} - \text{ST} \quad \text{list}(\text{overt}) \quad \text{list}(\text{covert}) \end{array} \right]$$

As with (34), ARG-ST includes syntactically-unrealized arguments (*covert*) as well as syntactically-realized arguments (*overt*), which are present on the VAL list.

Let's go back to the *sprouting-arg-sem-strict-res-frag-cl*. First, the semantic CONT of the NON-HD-DTR (a sprouted fragment) is coindexed with the IARG of *soa-rel* in the DISC-REC. That means, the sprouted fragment and the implicit antecedent of the *soa-rel* in the DISC-REC shares the same semantic interpretation. Second, the ARG-ST in the DISC-REC carries an argument

8) This idea was inspired by Nykiel and Sag's 2011 Stanford Ellipsis' Event handout data.

XP, which is of the type *inc*. Moreover, the CAT value and CONT value of the argument XP is coindexed with those of the NON-HD-DTR. That is, the implicit antecedent and the sprouted fragment shares not only semantic content but also syntactic characteristics.

In chapter 2, we discussed the syntactic restrictions of the sprouting. The first restriction is not allowing the preposition stranding, as repeated in (35).

- (35) a. They're jealous but it's unclear ***(of) who**
 b. Last night he was very afraid, but he couldn't tell us ***(of) what**.
 (Chung et al 2011)

This preposition stranding restriction can be solved by coindexing the CAT value of the implicit argument XP of the ARG-ST in the DISC-REC with that of the NON-HD-DTR. For example, in (35) the CAT of the implicit arguments of *jealous-rel* and *afraid-rel* should be PP (*of*), not NP, and this CAT PP should be shared by the CAT value of the NON-HD-DTR. Hence, the sprouted fragment should be PP and sprouting NP object of the preposition is not acceptable because CAT value of the NON-HD-DTR does not correspond to that of implicit argument.

The other syntactic restrictions of the sprouting are not allowing the subject sprouting in (36) and the indirect object sprouting in (37).

- (36) a. *The message said to show up in the square at midnight, but it didn't say **who** <should show up in the square at midnight>.
 b. *Having to compromise is inevitable, but we know not yet **who** <will have to compromise> . (Chung 2011)
- (37) a. He served the soup _____, but I don't know **to who(m)**.
 b. *He served _____ the soup, but I don't know **who(m)**.
 c. He served some of the guests _____, but I don't know **what**.
 (Chung et al 2011)

If we look into this restriction from the point of view of “ordering”, we can find out that only the rightmost argument is to be sprouted. Comparing (37a) with (37b), the verb *serve* involves an implicit argument, whose semantic role

is GOAL. Even though both a dative PP (37a) and an indirect object NP (34b) can serve the GOAL role, only the dative PP, which is on the rightmost argument position, can be licensed as an implicit antecedent of the sprouted fragment. Considering all the examples above, a direct object NP (37c) and the dative pp (37a), which are the rightmost arguments, can be sprouted, whereas non-rightmost arguments – subject NP (36) and indirect object NP (37b) – cannot be sprouted. Thus, I suggest that only the rightmost argument can serve as an implicit antecedent of a sprouted fragment.

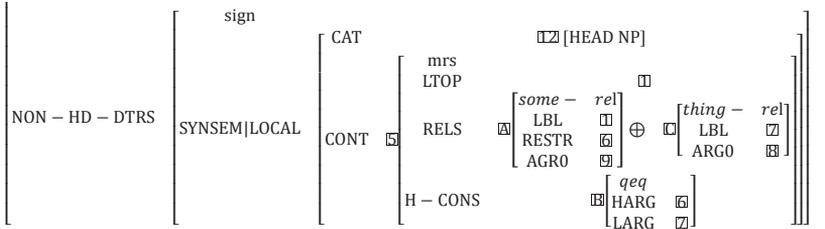
This restriction can be well-captured in the *sprouting-arg-sem-struct-res-frag-cl*. As you can see in (33), the argument XP of the ARG-ST, which is of the type *inc*, is placed as the last argument of the ARG-ST list. Since value of the ARG-ST is an ordered list, the rightmost position of the implicit antecedent in its ARG-ST list corresponds to its surface position.

Since the *sprouting-arg-sem-struct-res-frag-cl* is all set up, let's apply this to the example (38).

(38) John was eating _____, but I don't know **what**.

(39)

<i>sprouting - arg</i>	<i>-sem - struct - res - frag - cl</i>																				
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In (39), the sprouted fragment *what* corresponds to the NON-HD-DTR and it carries *pquant-rel (some-rel)* as its semantic content relations. In addition, the CONT value of the NON-HD-DTR 5 is coindexed to that of the IARG of the *eat-rel*, which is in the DISC-REC. That means, IARG of the *eat-rel* and the NON-HD-DTR *what* shares the identical CONT value.

Furthermore, the CAT value of the NON-HD-DTR [12] is coindexed with that of the last argument of the ARG-ST in the DISC-REC, whose type is *inc*. This constraint ensures that the implicit antecedent of *eat-rel* and the NON-HD-DTR *what* have the same CAT value and the implicit antecedent is the rightmost argument. Therefore, the restrictions on the prepositional stranding, the subject and indirect object sprouting can be resolved.

Finally, by *int-m-rel* type in the C-CONT, which represents a questioning illocutionary force, outscoping the other scopal elements, the sprouted fragment *what* can function as an interrogative clause.

5.2.4. Adjunct sprouting

As previously mentioned, the adjunct sprouting is the case that sprouted *wh*-fragments are adjuncts; even though there are no corresponding antecedents for the sprouted fragments, the fragment is syntactically and semantically connected to its antecedent clause, as repeated in (40).

- (40) a. He's writing, but you can't imagine **where/why/how fast/with whom**<He's writing>. (Ross 1969, 252)
 b. This opera was written in the 19th century, but we're not sure **by whom** <This opera was written in the 19th century>.
 c. If Sam was going, Sally would know **where** <Sam was going>.

In analyzing this adjunct sprouting phenomenon, I will adopt *adjunct-as-complements* approach by Bouma et al (2001). According to the *adjunct-as-complements* approach, adjuncts are selected by verbal lexicons, in the same way as complements are selected. That is, adjuncts are treated as optional complements. There are some evidence which shows that there is little difference between arguments and complements, as in (41) and (42) (Bouma et al 2001:40).

- (41) a. Lapsen taytyy lukea kira kolmannen kerran
 child.GEN must read book.NOM third time.ACC
 The child must read the book for a third time.
 b. Kekkoseen luotettiin yksi kerta
 Kekkonen.iLL trust.PASS one time.NOM
 Kekkonen was trusted once. (Bouma et al 2001:41)

First, in Finnish, usually nominative case is assigned to the least oblique argument. However, as in (41a), if the least oblique argument is assigned quirky case by its verb, the second least oblique argument gets the nominative case. Even though the second least oblique argument is an adjunct as in (41b), the adjunct gets the nominative case. This phenomenon is hard to explain unless we assume that adjuncts are selected by verbal lexicons.

- (42) a. ... dat Marie Jan dikwijls een boek liet lezen
 that Mary John often a book made read
 ... that Mary (often) made John (often) read a book (Dutch)
 b. often(cause(mary,read (john,book)))
 c. cause(mary,often(read(john,book))) (Bouma et al 2001:40)

Second, Dutch adjunct *dikwijls (often)* can take either wide scope over a complex predicate *liet lezen (made read)* (42b) or take narrow scope over only a part of the complex predicate (42c). The narrow scope reading can be provided only if adjuncts are placed on the COMPS list of the verb. In other words, the adjunct *dikwijls (often)* should be selected by the part of the complex predicate *liet (cause)* as one of its complement to scope over (*read(john,book)*).

From the evidence above, Bouma et al (2001) proposed Argument structure

extension in (43).

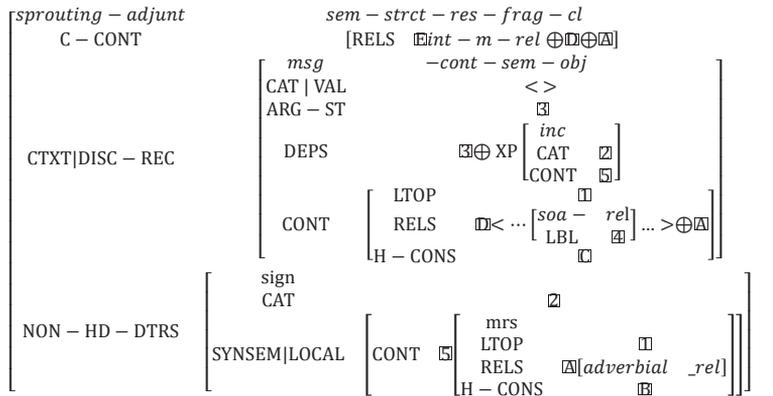
(43) Argument structure extension (Bouma et al 2001:12)

$$verb \Rightarrow \left[\begin{array}{l} \text{ARG-ST } \boxed{1} \\ \text{DEPS } \boxed{1} \oplus \text{list}('adverbial') \end{array} \right]$$

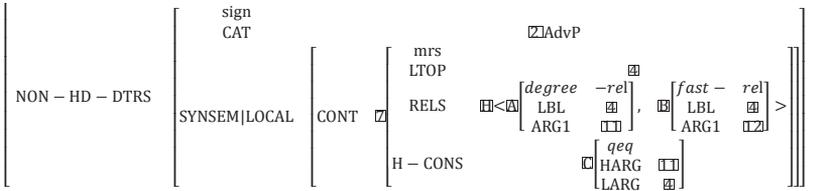
(43) is a kind of extended argument structure, where the relationship between selected arguments and local dependents is represented. In the *argument structure extension*, the new feature DEPS (dependency structure) is introduced and it specifies list of dependents of a lexical head which consists of selected arguments ($\boxed{1}$) and an underspecified list of adverbial *synsems*. Thus, adopting the *argument structure extension* mechanism, I will propose *sprouting-adjunct-sem-struct-res-frag-cl*.

The *sprouting-adjunct-sem-struct-res-frag-cl* is a subtype of the *sluicing-sem-struct-res-frag-cl*, so it inherits all the features and constraints of the supertype.

(44)



In (44), NON-HD-DTR, corresponding to a sprouted fragment, carries *adverbial-rel* in its CONT because the sprouted fragment is an adjunct. Also, the CONT and the CAT value of the NON-HD-DTR are coindexed to those of XP of DEPS in DISC-REC. As discussed in the previous chapter, DEPS list involves selected arguments ($\boxed{3}$) and a list of adverbial *synsems* (XP). Ac-



In (45), NON-HD-DTR corresponds to the adjunct sprout, *how fast*, and the CONT and the CAT value of the NON-HD-DTR are coindexed to those of XP of DEPS in DISC-REC. Since the XP of DEPS is of the type *inc*, it represents that the XP was an unrealized element in the overt syntax. Moreover, RELS \boxed{H} of the NON-HD-DTR is added to the RELS list of the DISC-REC, and *fast-rel* in the RELS \boxed{H} takes scope over the *run-rel* as indicated in HCONS $\boxed{1}$, by this qeq relationship, *how fast* can outscope *John is running*. Finally, by *int-m-rel* type in the C-CONT, the questioning illocutionary force outscopes the other scopal elements, and then the sprouted fragment *how fast* can function as an interrogative clause.

6. Conclusion

In this paper, I investigated characteristics of the English sprouting and proposed new constructions on the argument and the adjunct sprouting as well as sluicing. Because of the challenging property of the sprouting that the isolated *wh*-fragment does not have a corresponding antecedent, the sprouting phenomenon has not been widely discussed. However, in this paper, by adopting Fillmore (1986)'s *indefinite null complement*, the sprouted fragment and its unrealized antecedent became syntactically connected. Also, by means of the MRS framework, the semantic correlation between the sprouted fragment and its unrealized antecedent was explained. Moreover, in the adjunct sprouting, implicit adjuncts antecedent could be realized in the construction through *adjuncts-as-complements* approach of Bouma et al (2001). Finally, by adopting Bertomeu and Koredoni (2005)'s resolution approach, I could analyze the sprouting from the whole picture of the fragment phenomena, which encompass not only the fragments which resolved via identity but also the fragments resolved via inference.

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ABSTRACT

English Sprouting: A Construction-Based Approach

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The purpose of this paper is to investigate the syntactic and semantic characteristics of the *English sprouting* within a Head-Driven Phrase Structure Grammar (HPSG) and Minimal Recursion Semantics (MRS). The sprouting phenomenon is closely related to a sluicing phenomenon in that both phenomena have the isolated *wh*-fragment. However there is a distinct difference between the two – the sprouting phenomenon has no linguistic source of the isolated *wh*-fragment although the isolated *wh*-fragment is connected to its antecedent clause syntactically and semantically. In addition, there are some restrictions of the sprouting; it does not license the prepositional stranding, sprouting of subjects and indirect objects.

In order to explain the idiosyncratic characteristics of the sprouting, I propose a new construction on the argument sprouting (*sprouting-arg-sem-struct-res-frag-cl*) and on the adjunct sprouting (*sprouting-adjunct-sem-struct-res-frag-cl*) as well as a new construction on their supertype, sluicing (*sluicing-sem-struct-res-frag-cl*).

In the sprouting constructions, the sprouted fragment is connected to its unrealized implicit antecedent by adopting Fillmore (1986)'s concept of an indefinite null complement. In the case of the argument sprouting, *soa-rel* of the DISC-REC (Discourse record) involves IARG (Implicit argument) and the ARG-ST of the DISC-REC carries *inc* (indefinite null complements) type XP argument. By coindexing a sprouted fragment (NON-HD-DTR) with the implicit argument, the syntactic and semantic connection between the sprouted fragment and the implicit antecedent can be captured. In the case of the adjunct sprouting, implicit adjuncts antecedent is realized in the construction by

adopting Bouma et al (2001)'s *adjuncts-as-complements* approach. According to this approach, adjuncts are regarded as optional complement, selected by verbal lexicons and the adjuncts (an underspecified list of adverbial *synsems*) as well as arguments are involved in the feature DEPS. By coindexing a sprouted fragment (NON-HD-DTR) with the implicit adjunct in DEPS of DISC-REC, the sprouted fragment can be connected to its implicit antecedent.

Moreover, the restrictions of the sprouting can be explained within the sprouting constructions. The P-stranding restriction can be solved by making CAT value of the sprouted fragment correspond to that of the implicit antecedent. Moreover, the restrictions on the sprouting of subjects and indirect objects can be solved by allowing only the rightmost argument to serve as an implicit antecedent of the sprouted element.

Key Words English sprouting, English sluicing, Argument sprouting, Adjunct sprouting, HPSG