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A SEMANTIC CONDITION ON VP ELLIPSIS[*]

1   INTRODUCTION

This paper investigates the influence of verbal morphology on VP ellipsis in English. VP Ellipsis is a well-known process in which a VP constituent is missing under some kind of identity with another VP in the discourse, as illustrated in (1). There is an overt VP (hereafter 'antecedent' VP), which can substitute for a phonologically missing VP. The antecedents in (1) are the underlined VPs, and the missing VPs are indicated by [e].

(1) a. ?? John will read the book, and Mary will [e].   [e]= read the book
    b. * John did <u>examine the proposal</u>, and Mary will [e].

                                            [e]= examine the proposal

Indeed, there are some restrictions on VP ellipsis concerning the kind of identity that must hold between the antecedent and the elided VPs. It is generally noted that VP ellipsis may be degraded or infelicitous when there is imperfect morphological identity between VPs headed by particular auxiliary verbs, mostly auxiliary *be*.

(2) a. * John went to the movie yesterday, and Mary is [e] today.
    b. ?* John may go to the party, but Mary is not [e].
    c. ?* John has cleaned the room, and Mary is [e].
    d. ?* John is looking for the book, and Mary did [e].

On the other hand, a VP can be elided despite morphological mismatch between antecedent and elliptical phrases.

(3) a.   John entered the room, and Mary may [e].
    b.   John hasn't met my friend, but he will [e].
    c.   John is complaining about the noise, but Mary hasn't [e].
    d.   John will get a job and Bill already has [e].

In general, analyses of VP ellipsis have adopted one of two approaches. One is that a VP containing the elliptical site is deleted from a position under some identity between the antecedent and the elided verbs. The other approach, which has recently been proposed, reconstructs the elided VP that serves as its antecedent. Since both of them crucially concern morphosyntactic properties of antecedent verbs, the specific question is what kinds of identity play a role in calculating identity of VPs for the ellipsis possibility.

The goals of this paper are to claim that VP ellipsis does not require any morphological identity between verb forms in the antecedent and the elliptical phrases, and to explore the semantic condition on VP ellipsis within the framework of Head-Driven Phrase Structure Grammar (henceforth HPSG). It should be noted here that this abstract elliptical site [e] does not emerge in surface structure, and that this idea conflicts with the surface-oriented HPSG, but I will use the term 'elliptical' or 'elided' and the sign [e] for convenience. What the possibility of VP ellipsis depends on is syntactic and semantic specifications of an auxiliary verb which precedes the elliptical site. In this paper, my main suggestion goes along semantic constraints, but the relevant syntactic specifications also play a crucial role in constructing ellipsis structure. Furthermore, I do not discuss the ellipsis concerning VP headed by copular *be* and passive *be*.

If some morphosyntactic identity of verbs determines the ellipsis possibility, it is quite hard to account for the morphological mismatch cases because inflectional affixes have no independent syntactic representation. In fact, syntactic accounts in terms of movement (including Feature-movement) and Quantifier Raising have failed to provide fully satisfactory explanations of VP ellipsis. In Minimalist Program, verbal morphology is supplied in the lexicon and verbs are inserted into syntactic structure fully inflected, and it can be said that minimalists have incorporated the lexicalist treatments, such as Lexical Functional Grammar and HPSG, into their approaches. Therefore, the hybrid approaches to verbal morphology which is partly morphosyntactic and partly lexical have been provided. In HPSG, lexical items contain the syntactic as well as semantic feature structure in the lexicon, that is, all verbs are introduced into syntactic structure fully inflected. Therefore, morphological identity is not relevant to the possibilities of VP ellipsis, and it follows that HPSG accounts will reconstruct the missing information of an elided VP straightforwardly.

This paper is organized as follows: section 2 introduces previous analyses of VP ellipsis in terms of PF deletion and LF copy, and presents their empirical problems regarding verbal morphology mismatch in the ellipsis construction. The section then leads to the suggestion that a lexicalist approach of verbal morphology is more compatible with the prediction of VP ellipsis. Section 3 investigates the treatment of the lexical theory, HPSG, with respect to verbal morphology and VP ellipsis, and ensures that this approach to verbal morphology is better suited to capturing the pattern of VP ellipsis. At the same time, the section exposes some difficulties for the original argument. Then, in section 4, I suggest a semantic condition on the ellipsis structure to augment the HPSG's approach and show that the HPSG's proposal augmented by the semantic condition correctly predicts the possibility or impossibility of VP ellipsis. Section 5 summarizes the results.

2   VP Ellipsis And Verbal Morphology

VP Ellipsis involves an anaphoric relation between an antecedent and an empty anaphor, which leads to arguments about what kinds of identity hold and how the elided elements can be recovered at an appropriate position. It is not easy to define the exact property of identity condition and recoverability, and thus there have been previous attempts to account for them in terms of morphosyntactic or semantic identity. In this section I will introduce two approaches for VP Ellipsis, PF deletion and LF copying approaches, and point out some problems with both of them, especially concerning verbal morphological identity.

2.1 PF Deletion Analyses

Missing elements have been mainly analyzed as derived from deletion in the PF component since Sag (1980). A structure containing an elliptical site is removed from a position to permit the interpretation of the elided VP under some identity. This section will present two deletion arguments, Sag (1980) and Lasnik (1995, 1998).

2.1.1 Morphologically Non-Distinctness: Sag (1980)   There are many restrictions on VP ellipsis in English concerning the identity between the antecedent and the elided VP. Sag (1980) claims that the identity condition and recoverability on deletion cannot be stated in terms of formal (morphophonological) identity between the antecedent and the deleted element, but rather it must be investigated in terms of Logical Form identity to explain sloppy identity interpretations. First, he generalizes a formal deletion condition that VP ellipsis in English can only delete elements following the auxiliary,[1] and then proposes that the possibility of VP ellipsis will depend on the identity between Logical Form with lambda operators.[2]

This suggestion successfully explains the interpretation of (4a) which is supposed to be derived from applying VP deletion operation to sentence (4b).

> (4) a.   Someone hit everyone, and then Bill did [e].
>   b.   Someone hit everyone, and then Bill hit everyone.
>
>   (Sag 1980:61)

While the left conjunct in (4b) is ambiguous in meaning, the apparently same clause in (4a) is not ambiguous. In other words, the sentence resulting from VP ellipsis can only have this reading where the existential quantifier *someone* takes wide scope over the universal quantifier *everyone*. It seems that VP deletion prevents the left conjunct

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[1] Sag (1980) formulates the phrase structure rules which involve the subcategory auxiliary:

(i) Aux → tense_ (Modal)_ (*have-en*)

(ii) Aux →*be* {*-ing / -en*}.

[2] Lambda operator is an operator introduced to indicate the relation between predicates and arguments. For example, *John loves Mary* has the following lambda representation; John, λx (x love Mary).

from being associated with the other reading where *someone* is within the scope of *everyone*. That is, quantifier scope in the antecedent and the elliptic sentences must be parallel when VP ellipsis applies. The only interpretation in (4a) is represented like this:

(5) $[(\exists x)[x, \lambda y ((\forall z) [y \text{ hit } z])]] \& [\text{Bill}, \lambda v ((\forall w)[v \text{ hit } w])]$

Boldface indicates that two λ-representations, λy(...) and λv(...), form alphabetic variants where they differ only with regard to variable letters, which is regarded as the identity of Logical Forms.[3] On the other hand, the pairs of λ-representations, λy(...)and λv(...), as shown in (6) corresponding to the other reading of (4b) are not alphabetic variants.

(6) $[(\forall z)(\exists x)[x, \lambda y (y \text{ hit } z)]] \& [\text{Bill}, \lambda v((\forall w)[v \text{ hit } w])]$

Thus in the case of this reading, VP ellipsis cannot apply since there is no identity in Logical Form.

The introduction of Logical Form is, to be sure, profitable in explaining the cases that syntactic deletion conditions cannot solve. However, there remain some problems with Sag's suggestion. First of all, he states that VP ellipsis does not in general require affixal identity, allowing the following morphologically different pairs:

(7) Present-Modal (Infinite)
      John understands the situation and surely Peter should [e]. (Sag 1980:16)
(8) Past-Modal (Infinite)
      Bill entered the competition and Paul may [e].   (*ibid.*)
(9) Progressive-Modal (Infinite)
      Peter is complaining about the noise, but John won't [e].   (*ibid.*)
(10) Perfect-Modal (Infinite)
      John hasn't met my brother yet, but (he) will [e] soon.   (*ibid.*)
(11) Progressive-Perfect
      John may be questioning our motives, but Peter hasn't [e].   (*ibid.*)
(12) Past-Perfect
      Paul saw your parents last week, but he hasn't [e] since.   (*ibid.*)

As you notice, the paradigm in (7)-(12) is insufficient since some other pairs, such as modal-perfect, past-progressive, modal-progressive and so on, are not examined. Furthermore, there are ungrammatical sentences as in (13) where imperfect morphological identity is not allowed.

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[3] For twoλ-expressions, λx(A) andλ y(B), they are alphabetic variants if
   · Every occurrence of x in A must have a corresponding instance of y in B, and vice versa,
   · Any quantifier in A that binds variables (in A) has a corresponding (identical) quantifier in B that binds variables in all the corresponding positions (in B), and
   · Any variable in A that is bound by some quantifier outside of λx(A) is bound by the same operator as the corresponding variable in λy(B).

(13) a. ?* John may not go to the party, but Mary is [e].
    b. * John has done the work, but John is now [e].

That is, verbal morphology is not always ignored when calculating identity of VPs. It is therefore necessary to investigate what role verbal morphology plays in licensing identity of VPs for ellipsis. There are other problems which are concerned with Logical Form, as is pointed out in the literature (Lobeck 1995, Oku 1998). However, I will argue mainly the influences of verbal morphology on the possibility of VP Ellipsis, and the difficulties as for Logical Form will not be discussed here.

2.1.2 A Lexicalist-Morphosyntactic Approach: Lasnik (1995, 1999)   In the lexicalist theory of grammar, it is assumed that the domain of morphology is the lexicon, or at least not the syntax. With respect to a syntactic analysis of identity under ellipsis, a lexicalist treatment of verbal morphology will not require any morphological identity between antecedent and elided VPs because such information is not syntactically represented.

    Lasnik (1995,1999), however, claims that such lexicalist treatment also faces the above-mentioned empirical problems with auxiliary VP ellipsis. Thus he proposes a hybrid approach to verbal morphology that is partly lexical and partly morphosyntactic. While auxiliaries, such as *be* and perfect *have*, are inserted into structures fully inflected, main verbs are inserted into structures uninflected, that is, in bare forms through a narrow syntax and participle morphology is derived by PF affixation. Based on the assumption that VP ellipsis is constructed through PF deletion under the condition of strict morphological identity, this argument will explain the identity requirement on the possibility of VP ellipsis. For a VP headed by an auxiliary, VP Ellipsis is only possible when there is full morphological identity between an antecedent and an elided VP. The structure for the (a) sentence at the point of derivation before PF deletion and Affix Hopping is shown in the (b) sentence, where the antecedent and the deleted VP (FP) are identical.[4]

(14) a.   John will be happy, and Mary will [e], too.
    b.   John will [$_{VP}$ be happy], and Mary will [$_{VP}$ be happy], too.
(15) a.   John was being accused of theft, and Bill was [e], too.
    b.   John was [$_{FP}$ *-ing* [VP be accused of theft]], and Bill was [FP *-ing* [VP be accused of theft]], too.

This suggests an immediate solution to the difficulties of incomplete identity as pointed out above. Consider the similar examples in which a finite form serves as antecedent of a progressive form. If the verb in the second conjunct is elided under the strict identity condition, then the affix *-ing* is left stranded, which violates the Stranded Affix Filter (16): a morphological affix cannot remain unattached in syntax, as shown in (17a) and (18a), which have representations like (17b) and (18b),

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[4] Lasnik (1995) assumes that the VP projection of a main verb is dominated by a functional projection whose head is some morpheme, such as *–ed* or *–ing*.

respectively.

> (16)   The Stranded Affix Filter
>   A morphologically realized affix must be a syntactic dependent of a
>   morphologically realized category, at surface structure.
>
>   (Lasnik 1995:251)
> (17) a. ?* John may not go to the party, but Mary is [e].
>   b.   John may not [VP go to the party] but Mary is –*ing* [VP go to the party].
> (18) a. * John left and Mary was [e], too.
>   b.   John –*ed* [VP leave] but Mary was –*ing* [VP leave].

For a VP headed by a main verb, on the other hand, VP Ellipsis is permitted when strict identity exists as in (19) or when the head of a deleted VP is a bare form. Specifically, a non-bare form of a main verb can antecede a bare form as illustrated in (20) and (21). (As before, (b) represents the structure for (a) that would undergo PF deletion.)

> (19) a.   John wouldn't taste the cake, but Mary did [e].
>   b.   John wouldn't [VP taste the cake], but Mary did [VP taste the cake].
> (20) a.   John left, and Mary will [e], too.
>   b.   John –*ed* [VP leave] and Mary will [VP leave], too.
> (21) a.   John was leaving, but Mary will not [e].
>   b.   John was –*ing* [VP leave] and Mary will not [VP leave].

Lasnik's proposal, however, faces three empirical problems with respect to the (im)possibilities of ellipsis. As he notes in Lasnik (1995: 272), the first difficulty involves stranded –*en* which is accepted in elliptic constructions despite the Stranded Affix Filter violation.[5]

> (22) a.   Peter saw your parents last week, but he hasn't [e] since.
>   (Lasnik 1999:113)
>   b.   Peter –*ed* [VP see your parents] last week, but he hasn't –*en* [VP see your parents] since.

If VP ellipsis applies under the identity with the very same form, the affix –*en* is stranded in the same way as in (17) and (18). The hybrid theory incorrectly predicts that (22) is as bad as (17) and (18) with stranded –*ing*, contrary to the fact. Such a counterexample can be seen in the stranded –*ing*.[6]

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[5] To explain this problem, Lasnik (1995: 272) notes, "descriptively, it is as if stranded *en* is spelled out as zero, much as stranded Infl is spelled out as a form of do." That is, a stranded *en* has the last resort option that it realizes as phonologically zero.

[6] In general, VP ellipsis requires strict identity between verbal morphology in the antecedent and the elliptical phrases when an elided VP is headed by auxiliary *be*.

(i) *John will not leave, but Mary is [e].

(ii) *John went to the museum yesterday, and Mary is [e], too.

(23) "I must see you alone," she said. "You are [e]," his uncle said.

(Potsdam 1997:6)

The second concerns the deletion condition with strict morphological identity. Contrary to Lasnik's proposal that a VP headed by a main verb can be elided when a deleted VP is in a bare form, VP ellipsis, with a progressive form anteceding a bare form, cannot be permitted.

(24) a. ?* John is doing the work now, and Mary did [e] yesterday.
  b. John is -ing [$_{VP}$ do the work], and Mary did [$_{VP}$ do the work] yesterday.

Moreover, the ellipsis of VPs is impossible in some cases even when there is exact morphological identity between antecedent and elided VPs, as shown in (25).

(25) a. * John might have left, and Mary might [e].[7]
  b. John might [$_{VP}$ have left], and Mary might [$_{VP}$ have left].

Finally, his generalization that the ellipsis involving auxiliaries should require strict morphological identities seems to be too strong. Potsdam (1997) points out that a non-finite auxiliary can be the antecedent of a finite auxiliary in ellipsis constructions, which indicates that even imperfect identity undergoes VP ellipsis.

(26) a. He may be questioning our motives but Peter hasn't [e].
  b. He may [$_{VP}$ be questioning our motives] but Peter hasn't [$_{VP}$ been questioning our motives].   (Potsdam 1997:8)

If auxiliaries are introduced into syntax fully inflected, the VP in the second conjunct is already in its inflected form before PF deletion. The hybrid approach prevents such VPs from being elided and there is no way to derive (26).

  Given these difficulties, the hybrid theory to verbal morphology is incompatible with some patterns of ellipsis. In the following I will take a strict lexicalist approach to supply solutions to the above observations. With lexicalist analysis, no morphological identity between antecedent and elided VPs is needed.

It is therefore predicted that (23) is also ungrammatical. However, my informants also accept (i) only in a colloquial style. Clearly, (23) is colloquial, and it seems that this acceptability is mostly relevant to pragmatic requirements. Here I will leave the account of the cases like (23) and (i) to a theory of pragmatics. Note however that the 'last resort' option for stranded –en suggested by Lasnik, as in footnote 5, cannot apply this stranded –ing, which results in Lasnik's empirical difficulty.

[7] Note that, as might be expected, the ellipsis site [e] in (25) is fine when interpreted as *leave*.

2.2 LF Copy Analyses

An alternative argument is LF copy analysis, which takes a phonologically empty VP as being null in the syntax and being reconstructed in LF. This section will investigate such interpretation theory from the viewpoint of the minimalist position.

2.2.1 A Minimalist Approach: Oku (1998)   Oku (1998) points out some problems with PF deletion analysis of VP ellipsis (lexicalists and Lasnik's hybrid approaches) and proposes LF copy of ellipsis. The basic assumption is that LF copy is a syntactic operation constructing a phonologically missing element in ellipsis construction, and that a lexical element is a set of features: phonological features, semantic features and syntactic features.[8] For the explanation of the morphological sloppy identity, he proposes the following subset copy principle:

>   (27)   The Subset Copy Principle
>   LF Copy can copy a subset of the features of the antecedent to construct
>   the contents of the elliptic site.   (Oku 1998:19)

Given that a progressive form consists of the stem and the suffix *ing*, the LF subset copy takes the stem of the antecedent *ing*–form and can construct the contents of the elliptic verb which is a bare form as in (28). A constructed VP through LF copy is illustrated in boldface in (b) sentence.

>   (28) a.   Mary is leaving, but John will not [e].
>   b.   Mary is[leaving], but John will not [**leave**].
>   [leave, –*ing*]   [leave]

In the case of constructing a progressive participle form from a bare form, on the other hand, the LF copy cannot provide the appropriate contents for the elided VP. That is, the features of the elliptic element *going* are not a proper subset of the features of the corresponding antecedent *go*.

>   (29) a. ?* John may not go to the party, but Mary is [e].
>   b.   John may not [go to the party] but Mary is [**going to the party**].
>   [go]   [go, –*ing*]

Suppose that a past participle form consists of the feature of a stem and a perfect affix –*en*, Oku's suggestion may be incompatible with the patterns involving stranded–*en* as well as Lasnik's. Since the feature of the empty site is not a subset of the feature of the antecedent VP, the Subset Copy Principle incorrectly predicts that the following examples are infelicitous.

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[8] Oku (1998:13) notes that "the term 'reconstruction' is misleading in the proposed theory of VP-ellipsis, because the phonologically empty VP is (not reconstructed) for the first time by LF Copy operation." Thus, I will use the term "construct" here.

(30) a.   Peter saw your parents last week, but he hasn't [e] since.
  b.   Peter [saw your parents] last week, but he hasn't [**seen your parents**] since.
   [see, *–ed*]   [see, *–en*]

(31) a.   John will leave and Mary already has [e].
  b.   John will [leave] and Mary already has [**left**].
   [leave]   [leave, *–en*]

For the explanations of such ellipsis under super-subset relations, he distinguishes perfect *–en* from progressive-*ing* and passive *–en*; a perfect participle is a pure inflectional feature, which can be ignored at LF. The reason why inflectional features are irrelevant to the acceptability of ellipsis is that they have no semantics and thus can be ignored at LF.[9] Therefore, when a bare form serves as an antecedent of a perfect form, the stranded *–en* involves no difficulty since it is ignored in LF copying. This claim is supported by the following usages of the perfect *have* in VP-Fronting.

(32) a.   He claimed he would take first place, and take first place he has.
  b.   Mary once predicted that John would pass an exam eventually, and pass one he now has.

                (Oku 1998:23)

A head verb can be a bare form even though the associated auxiliary is the perfect *have*. The observations lead thus to the generalization that the selectional requirement of the perfect auxiliary *have* can be satisfied by a bare form at LF.

This argument is apparently sound, but the LF Subset Copy Principle fails to account for the fact that a progressive form cannot copy a bare form, though the feature of an elided verb is a proper subset of the feature of an antecedent verb.

(33) a. ?*John is doing the work, and Mary did [e] yesterday.
  b.   John is [doing the work], and Mary did [**do the work**].
   [do, *–ing*]   [do]

Moreover, his explanation for the following ungrammaticality is not sufficient, as Oku himself admits. If the features of *has* are a subset of the features of *have*, the Subset Copy Principle allows such VP ellipsis operation.

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[9]Oku (1998:36) states that the progressive and passive participles are not an instance of inflectional features, but rather convey some semantic import and thus cannot be ignored at LF. Then, he suggests that morpheme *–ing* (or *–en*) contributes to the semantics, independently of the progressive auxiliary *be*, showing the following contrast.

(i)   John did his homework, watching TV.

(ii) *John did his homework, watch TV.

                Oku (1998:36)

(34) a. ?* Mary has left, but John shouldn't [e].
     b.   Mary [has left], but John shouldn't [**have left**].
            [have, -es]   [have]

Then Oku proposes the following structure where the verb raises to I.

(35)   Mary [$_I$ has [$_{VP}$ t [leave]] but John [$_I$ shouldn't [$_{VP}$ **have left**]].

This ungrammaticality follows from the structural deformity in which a headless VP
can construct the elliptic site. Furthermore, Oku assumes that verb movement leaves
only the category feature V to permit an apparently headless VP ellipsis.

(36)   You [$_I$ are [$_{VP}$ t$_1$ [a good teacher]], and John [$_I$ is [$_{VP}$ t$_2$ [**a good teacher**]]], too.
                                                              (Oku 1998:40)

The contrast between (34) and (36) can be explained by other introduced explanatory
device, though I do not discuss here, but the possibility of a remnant of category V
has no empirical evidence, as Oku himself notes.[10] Later, I will give clearer
explanations for this ill-formedness.
     As seen above, it is necessary that the morphological identity between antecedent
and elliptical VPs is also relevant to the LF copy analysis. I have shown that such
dependencies are problematic in some cases. In the next section, I will follow a strict
lexicalist approach, which does not rely on verbal morphology in calculating identity,
to elicit the ellipsis paradigms.

3   A LEXICALIST ANALYSIS: SAG & WASOW'S HPSG APPROACH

Contrary to the previous studies, the lexicalist approach to verbal morphology inserts
all verbs into syntactic structures fully inflected, and thus morphological identity on
VP ellipsis does not play a role, which can supply appropriate solutions to the above
problems concerning morphological differences. This section will introduce the
lexicalist theory, HPSG, proposed by Sag and Pollard (1994), and observe the
arguments for VP ellipsis in Sag and Wasow (1999) (henceforth, S&W).

3.1 Head-Driven Phrase Structure Grammar

So far I have suggested that the theories for VP ellipsis, i.e., PF Deletion and LF
Copying analyses cannot account for some inflectional mismatch cases in ellipsis
construction. Here I will introduce an alternative based on HPSG, which allows us to
capture the above problematic patterns of VP ellipsis. Before considering the explicit
arguments for VP ellipsis by S&W, I would like to present some basic ideas of HPSG

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[10] The string-adjacency satisfaction for verbal morphology in PF. See Oku (1998:44-47).

and its devices.

3.1.1 Lexical Entries and Feature Structures HPSG is a kind of unification grammar or constraint-based grammar which includes Generalized Phrase Structure Grammar and Lexical Functional Grammar. Unification involves the merging of information contained in category structures, so long as there is no conflict in them. In HPSG, categories are described by feature-value matrices, i.e., feature structures consist of an array of features with their values. Not only syntactic information but also semantic and phonological information is presented with the same framework. Thus the basic information structure of the theory is 'sign'. As the name shows, lexical heads carry information about the categories that they combine with and project syntactic structures under general principles: The Head Feature Principle (HFP)[11] and the Valence Principle, etc.[12]

Then take the example of *eat*. Its lexical entry is illustrated in (37).

(37)

$$
\left\langle \text{ eat,} \quad
\begin{bmatrix}
\text{SYN} \begin{bmatrix} \text{HEAD [verb]} \\ \text{SPR} \quad <\boxed{1}> \\ \text{COMPS} <\boxed{2}> \end{bmatrix} \\
\text{ARG-ST} \quad <\boxed{1}\text{NP}_i, \boxed{2}\text{NP}_j> \\
\text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad \text{s} \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} & \text{eat} \\ \text{SIT} & \text{s} \\ \text{EATER} & \text{i} \\ \text{EATEN} & \text{j} \end{bmatrix} \right\rangle \end{bmatrix}
\end{bmatrix}
\right\rangle
$$

The lexical information is described in terms of syntactic features (SYN) and semantic features (SEM), where the ARGUMENT-STRUCTURE feature (ARG-ST) contains SYN and SEM in its information. The syntactic feature indicates co-occurrence restriction to its specifier (SPR) and complement (COMPS) and takes the value for HEAD, which determines the category of the phrase (e.g., 'verb'). The meaning of linguistic expression is represented by three feature structures: a semantic mode (MODE[13]), an index (INDEX) corresponding to the situation or individual referred to and a restriction (RESTR) specifying a list of conditions that the situation or individual has to satisfy for the expression to be applicable to it. Given the above lexical description, a proposition ('prop') as the MODE value is true just in case there is some actual situation 's' such that the constraints specified in the RESTR value "'s'

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[11] The HFP is defined in S&W (1999:63) as follows: "In any headed phrases, the HEAD value of the mother and the HEAD value of the head daughter must be unified". The HFP ensures that a mother and its head daughter carry the same value for the HEAD feature which includes information about categories and morphsyntax.

[12] The Valence Principle is as follows: unless the rule says otherwise, the mother's SPR (specifier) and COMP (complement) values are identical to those of the head daughter.

[13] In S&W (1999), the five values of MODE are shown: proposition, question, direction, reference and none.

is a situation wherein *i* eats *j* " are all satisfied. It is then important how individual words contribute to the value of the feature RESTR. In ARG-ST, arguments in a head, such as SPR and COMPS values are listed according to the following generalization (38). To ensure two feature values are identical, the same tag is used ($\boxed{1}$or $\boxed{2}$ in (37)). Each of them is also related with a RESTR value in semantics, as indicated by index (*i* or *j* in (37)).

(38)   Argument Realization Principle (ARP)
       A word's value for ARG-ST is $\boxed{a}\oplus\boxed{b}$, where $\boxed{a}$ is its value for SPR and
       $\boxed{b}$ is its value for COMPS.[14]   (S&W 1999:151)

Since the ARP is a kind of constraints on relation between lexical entries and word structures, lexical entries do not have to specify values for SPR and COMPS. That is, ARG-ST values in lexical entries determine the SPR and COMPS values in word structure via the ARP. Given this, there is no need for the specification of SPR and COMPS values in lexical entries. Thus, the lexical entry as shown above is illustrated in (39).

(39)
$$\left\langle \text{eat}, \begin{bmatrix} \text{SYN} & [\text{HEAD [verb]}] \\ \text{ARG-ST} & <NP_i, NP_j> \\ \text{SEM} & \begin{bmatrix} \text{MODE} & \text{prop} \\ \text{INDEX} & s \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \text{eat} \\ \text{SIT} & s \\ \text{EATER} & i \\ \text{EATEN} & j \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle$$
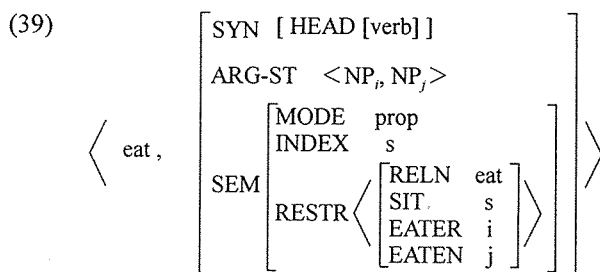
Then in conjunction with the ARP, this licenses word structures only if they satisfy the lexical structure description in (40), which includes a value for SPR and COMPS respectively.

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[14] The symbol $\oplus$ denotes the operation called "sum" appending one list on another.

(40)

$$
\begin{bmatrix}
\text{SYN} \begin{bmatrix} \text{HEAD [verb]} \\ \text{SPR} \quad <\boxed{1}> \\ \text{COMPS}<\boxed{2}> \end{bmatrix} \\[2em]
\text{ARG-ST} \quad <\boxed{1}\text{NP}_i \begin{bmatrix} \text{CASE} & \text{nom} \\ \text{AGR} & \text{3sing} \end{bmatrix}, \boxed{2}\text{NP}_j> \\[2em]
\text{SEM} \begin{bmatrix} \text{MODE} & \text{prop} \\ \text{INDEX} & \text{s} \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} & \text{eat} \\ \text{SIT} & \text{s} \\ \text{EATER} & \text{i} \\ \text{EATEN} & \text{j} \end{bmatrix} \right\rangle \end{bmatrix}
\end{bmatrix}
$$

|
eats

3.1.2 Lexical Rules   Since HPSG relies heavily on rich lexical representations, it is necessary to consider what kind of internal organization the lexicon should have. Unlike the listing of information contained in lexical entries, it is claimed in HPSG that the lexical rule is a mechanism for reducing the redundancy and stipulation in the lexicon by using information in one lexical entry as the basis for generating another lexical entry.[15] The lexical rules are used for verbal and nominal inflection. Note that there is a distinction between *lexeme* and *word* as type. A lexical entry is described as a type of *lexeme* and then applications of lexical rules produce a *word* entry as its output.

Here I will mention the lexical rules for verbal inflection. Note that lexical rules have the general form 'X ⇒ Y', which says that "for any lexical entry that is consistent with the description in X (which we will sometimes refer to as the 'input' to the rule), there is another lexical entry (the 'output' of the rule) that includes the description in Y. The input and the output entries are identical, except in those ways that the rules specifies" (S&W 1999:185). The exceptions are shown as follows (*ibid.*):

(41) If a feature F_1 is given conflicting values in X and Y, the input and output entries must have different values for F_1.

(42) If X specifies a value v_2 for a feature F_2, but Y says nothing about F_2, then the rule applies only to entries whose value for F_2 is v_2; in this case, both input and output entries have the same value for F_2 (namely v_2).

(43) If Y specifies that feature F_3 has value v_3 but X says nothing about F_3, the situation is slightly more complex. In this case, the output's value for F_3 is the unification of v_3 with the input's value for F_3. Thus, if the input's value for F_3 is compatible with v_3 (including where the input does not even mention F_3), the output's value for F_3 consists of both the input's value and v_3 (more precisely, their unification); but if the input's value for F_3 is

---

[15] The other proposed mechanism is "a hierarchy of type". In HPSG, linguistic entities are described by means of feature structures and particular features are appropriate only to certain type of entities. The type hierarchy is a useful mechanism for expressing regularities within the lexicon.

incompatible with v_3, then there is no output (that is, the rule cannot apply).

Consider first lexical rules for verbs in present and past tense forms. There are three lexical rules generating tensed verbs: 3rd-Singular Verb Lexical Rule, Non-3rd-Singular Verb Lexical Rule and Past-Tense Verb Lexical Rule. Here I will take only Past-Tense Verb Lexical Rule that creates lexical entries for verbs in a past tense form.[16]

(44)   Past-Tense Verb Lexical Rule

$$
\left\langle \;\boxed{2}\;,\; \begin{bmatrix} \textit{verb-lxm} \\ \text{SEM} \quad [\text{RESTR } \boxed{a}] \end{bmatrix} \right\rangle \quad \Rightarrow
$$

$$
\left\langle \; F_{\text{PAST}}(\boxed{2})\;,\; \begin{bmatrix} \textit{word} \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} < [\text{CASE nom}]\,,\,...\, > \\ \text{SEM} \begin{bmatrix} \text{INDEX } \boxed{3} \\ \text{RESTR } \boxed{a} \oplus \left\langle \begin{bmatrix} \text{RELN} & \text{t-precede} \\ \text{ARG} & \boxed{3} \\ \text{ARG} & \text{now} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \; \right\rangle
$$

(S&W 1999:406)

---

[16] For reference, here I present other lexical rules that generate present tense forms of verbs: 3rd-Singular Verb Lexical Rule and Non-3rd-Singular Verb Lexical Rule.

(i) 3rd-Singular Verb Lexical Rule

$$
\left\langle \boxed{3}, \begin{bmatrix} \textit{verb-lexeme} \\ \text{SEM} \quad [\text{RESTR } \boxed{a}] \end{bmatrix} \right\rangle \Rightarrow \left\langle F_{3\text{SG}}(\boxed{3}), \begin{bmatrix} \textit{word} \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} < \begin{bmatrix} \text{CASE nom} \\ \text{AGR } 3\text{sing} \end{bmatrix}, ... > \\ \text{SEM} \begin{bmatrix} \text{INDEX } \boxed{2} \\ \text{RESTR } \boxed{a} \odot \left\langle \begin{bmatrix} \text{RELN t-overlap} \\ \text{ARG } \boxed{2} \\ \text{ARG now} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

Contrary to the output of the Past-Tense Lexical Rule, this rule gives its semantic output another specification that the situation introduced by the verb should be located in some temporal interval that overlaps 'now', and its syntactic output the constraints that the verb require a nominative, third-person singular subject. For references, I will show the Non-3rd-Singular Verb Lexical Rule:

(ii) Non-3rd-Singular Verb Lexical Rule

$$
\left\langle \boxed{3}, \begin{bmatrix} \textit{verb-lexeme} \\ \text{SEM} \quad [\text{RESTR } \boxed{a}] \end{bmatrix} \right\rangle \Rightarrow \left\langle \boxed{3}, \begin{bmatrix} \textit{word} \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} < \begin{bmatrix} \text{CASE nom} \\ \text{AGR } \text{non-3sing} \end{bmatrix}, ... > \\ \text{SEM} \begin{bmatrix} \text{INDEX } \boxed{2} \\ \text{RESTR } \boxed{a} \oplus \left\langle \begin{bmatrix} \text{RELN t-overlap} \\ \text{ARG } \boxed{2} \\ \text{ARG now} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

This is almost identical except that the lexical entry of the output should take non-third-person and singular subject.

This rule says that for every verbal lexeme, there is a corresponding lexical entry for a past tense verb. Here, F_{PAST} is a morphological function that applies to verb lexemes, giving their past-tensed forms. For example, F_{PAST} (*walk*)= *walked* and F_{PAST} (*sleep*)= *slept*. The semantic effect of this rule indicates that the semantics of the input is preserved except for the feature RESTR, and that the RESTR feature is augmented to include a further predication, i.e., a RESTR value requiring that the INDEX value as shown in ③ should be in the temporal-precede (t-precede) relation with the time of utterance, 'now'. On the other hand, the syntactic component of this rule specifies that the value for the FORM feature of HEAD feature should be 'fin(ite)'. As mentioned above, the effect of ARG-ST and the ARP guarantees that the first argument in ARG-ST must be realized as the value for SPR. Then, it follows that the SPR value of the output must have a nominative case.

A typical example of this output is illustrated in (45).

(45)

$$
\left\langle \text{ate,} \begin{bmatrix} \text{SYN} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \text{verb} \\ \text{FORM fin} \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} \quad <NP_i[\text{CASE nom}] , \quad NP_j> \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad s \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} & \text{eat} \\ \text{SIT} & s \\ \text{EATER} & i \\ \text{EATEN} & j \end{bmatrix} \begin{bmatrix} \text{RELN} & \text{t-precede} \\ \text{SIT} & t \\ \text{ARG} & s \\ \text{ARG} & \text{now} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

Note that the INDEX value 's' of the output is identical to that of the input. It implies that a proposition described by the verb is true just in case there is an actual situation '*i* eats *j*' and there is a temporal precedent relation with the time of an utterance. I will suggest that this value for INDEX plays an important role in determining the possibility of VP ellipsis.

For the arguments cited below, it is helpful to posit additional explanations for the feature FORM. It enables us to distinguish verbal inflectional categories in various positions, such as non-finite forms after *to* like *to run* and present participle forms after progressive *be* like *be running*. The values for FORM feature can be divided into five types: *inf* for a bare uninflected form, 'fin' for a finite form, 'prp' for a present participle, 'psp' for a past participle and 'pass' for a passive participle.[17] The examples corresponding to these values are shown:

(46) [FORM inf]: Mary will <u>play</u> the piano. / Mary tries to <u>play</u> the piano. / <u>Play</u> the piano!

[FORM fin]: Mary <u>plays</u> the piano. / Mary <u>played</u> the piano.

[FORM prp]: Mary is <u>playing</u> the piano.

[FORM psp]: Mary has <u>played</u> the piano.

---

[17] S&W state in their notes that what they call *inf* here has been called 'base' in general, and distinguish *prp* (present participles) from gerund.

[FORM pass]: The piano was <u>played</u> by Mary.

That is, every verb takes FORM values as its HEAD feature and it follows that their differences are used for identifying its morphology. Later, I will discuss VP Ellipsis in terms of the distribution of FORM values.

Then consider other lexical rules concerning aspect: Present Participle Lexical Rule and Past Participle Lexical Rule.

(47) Present Participle Lexical Rule

$$\left\langle\; \boxed{2}\;,\; \begin{bmatrix} verb\text{-}lxm \\ \text{SYN} \quad [\text{HEAD } [\text{PRED} \;-]] \\ \text{SEM} \quad [\text{RESTR } \boxed{a}] \end{bmatrix} \right\rangle \;\Rightarrow$$

$$\left\langle\; F_{\text{PRP}}(\boxed{2})\;,\; \begin{bmatrix} word \\ \text{SYN} \begin{bmatrix} \text{FORM prp} \\ \text{PRED} \quad + \end{bmatrix} \\ \text{SEM } [\text{RESTR } \boxed{a} \;\oplus\; ...] \end{bmatrix} \right\rangle$$

(S&W 1999:407)

The rule says that for every verb lexeme that takes a [PRED −](where PRED is an abbreviated form of the predicative), there is a corresponding lexical entry for a predicative verb. As you can see, S&W gloss over the additional RESTR values by simply illustrating '···', though it suggests that some feature RESTR describing an ongoing situation will be added to the output. Next, turn to Past Participle Lexical Rule.

(48) Past Participle Lexical Rule

$$\left\langle\; \boxed{2}\;,\; \begin{bmatrix} verb\text{-}lxm \\ \text{SEM} \quad [\text{RESTR } \boxed{a}] \end{bmatrix} \right\rangle \;\Rightarrow$$

$$\left\langle\; F_{\text{PSP}}(\boxed{2})\;,\; \begin{bmatrix} \text{SYN} \quad [\text{HEAD } [\text{FORM psp}]] \\ \text{SEM} \quad [\text{RESTR } \boxed{a}] \end{bmatrix} \right\rangle$$

(*ibid.*)

Like the Present Participle Lexical Rule, there is no RESTR description given to the output. In the next section I will examine and modify these lexical rules, clarifying the glossed over specifications.

To sum up, in the framework of HPSG, verbal inflections are generated through lexical rules in the lexicon and the head feature specification of verbs will successfully be saturated by unification and we can get an appropriate sentence description.

3.1.3 Lexical Rules Revised As noted above, it is necessary to specify the RESTR value of the output in Present Participle and Past Participle Lexical Rules. I will complete the lexical rules that produce present and past participle entries, and then revise them by considering the semantics of verbs.

First of all, let us consider the Past Participle Lexical Rule. Exploring Oku's claim

that the past participle form have no semantic imports in terms of LF Subset Copy analysis, I will change S&W's lexical rule not to add new semantic values.

(49) Past-Participle Lexical Rule (revised)

$$\left\langle\; \boxed{2}\;, [\textit{verb-lxm}] \;\right\rangle \;\; \Rightarrow \;\; \left\langle\; \mathrm{F_{PSP}}(\boxed{2})\;, \begin{bmatrix} \textit{word} \\ \mathrm{SYN\;[HEAD\;[FORM\;psp]]} \end{bmatrix} \right\rangle$$

The rule can be said to be a kind of morphological rules that generate past participle entries for verbs. That is, it does nothing except derive lexical entries in past participle forms so that the resulting entries can give rise to word structure description. It is not unreasonable to propose such a trivial lexical rule that there is no constraint on its lexical entry in terms of both syntactic and semantic information.

Generally, verbs in past participle forms cannot convey meanings of the perfect without the conjunction of the auxiliary *have*. Look at these examples of a participial construction.

(50) a. Having eaten too much, John felt sleepy.
        Lit.: Because he had eaten too much, John felt sleepy.
     b. * Eaten too much, John feels sleepy.

Sentence (50b) without the auxiliary *have* does not provide the intended sense. One might conjecture occasionally the apparent past participle form os allowed in this construction.

(51) Exhausted from my journey, I soon fell asleep.
      Lit.: Because I was exhausted from my journey, I soon fell asleep.

However, as you can see clearly, the verb form in (51) is not a past, but a passive participle.[18]

It is thus plausible to claim that the semantics of the perfect is encoded in the auxiliary *have* rather than the inflectional feature *–en*. The following lexical entry for auxiliary *have* is consistent with this intuition.

---

[18] There is a distinction between past participle and passive forms in HPSG as noted above. This does not mean that the lexical rule for generating the passive form of verbs does not specify syntactic and semantic features. In fact, the Passive Lexical Rule proposed by S&W requires some syntactic and semantic specifications as its output. The analysis of passive is beyond the scope of this paper. Hence, I will not examine passive lexical rules here.

(52)

$$\left\langle \text{ have}, \begin{bmatrix} auxv\text{-}lxm \\ \text{ARG-ST} \quad <[\ ], \begin{bmatrix} \text{SYN [HEAD [FORM psp]]} \\ \text{SEM [INDEX } \boxed{4}] \end{bmatrix} > \\ \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad prop \\ \text{INDEX} \quad s \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} \quad perfect \\ \text{SIT} \quad s \\ \text{ARG} \quad \boxed{4} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

It follows from the value for RELN, 'perfect', that auxiliary *have* has its own semantic components.[19] The rule and the lexical entry will produce the following phrasal structural description as shown in (53).[20]

(53)

The semantic principles guarantee that the INDEX value of the mother is identified with that of the head daughter, and that the RESTR value of the mother is the sum of those of the daughters.[21] Therefore, the identity of the semantic index allows the production of 'perfect' semantics for a VP. Later, I will compare this structure with that of the present participle.

---

[19] Though S&W give the RELN value 'have', I will use 'perfect' as the relation name here.
[20] For clearer understandings, information irrelevant to this discussion is omitted.
[21] The semantic principles are: Semantic Inheritance Principle and Semantic Compositionality.

  (i) Semantic Inheritance Principle
      In any headed phrase, the mother's MODE and INDEX values are identical to those of the head daughter.   (S&W 1999:116)

  (ii) Semantic Compositionality Principle
      In any well-formed phrase structure, the mother's RESTR value is the sum of the RESTR values of the daughters.   (*ibid.*)

Before investigating the Present Participle Lexical Rule, I would like to revisit a feature PRED, which has been introduced by S&W to distinguish the following distribution of *be*:

(54) a. John is playing tennis.
   b. *John is plays tennis.
   c. John is happy.
   d. *John is mere.

Certainly the different grammaticality is produced by the predicative feature of the complements, but I disagree about the specification that the feature PRED belongs to syntactic head features. Rather, my intuition is that it is relevant to semantic restriction. Evidence for this will be given in the distributions of *be* in ellipsis construction later. Here given that a PRED feature is encoded in semantics, I give the following lexical entry for *be*.

(55)
$$\left\langle \text{be}, \begin{bmatrix} \textit{auxv-lxm} \\ \text{ARG-ST} \quad <[\quad], [\text{INDEX} \boxed{4}]> \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad \text{s} \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} \quad \text{pred} \\ \text{SIT} \quad \text{s} \\ \text{ARG} \quad \boxed{4} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

The entry *be* is different from other auxiliaries (i.e., modals and *have*) in that it does not specify the syntactic feature of complement arguments. Thus, it allows the following variety.

(56) a. John is singing songs.
   b. John is on the roof.
   c. John is the member of this team.
   d. John is happy.

These examples show that the possible complements of the auxiliary *be* include, at least, VP [FORM prp], PP, NP and AP.[22] Note that their situational indices are not incompatible with the 'predicative' relation of *be*, that is, they all are predicative predicates, which is sufficiently satisfied with the semantic requirement. On the other hand, the predicates in (54b, d) are not , which is incoherent with the 'predicative' relation.

Given this lexical entry, let us turn to the Present Participle Lexical Rule. Unlike past participle forms, the present participle form *–ing* seems to indicate some semantic information; an 'ongoing' situation is implied.

---

[22] Here I will not discuss passive *be* which selects passive VP [FORM *pass*] as its complement.

(57) a.   Walking in the street, I met my friend.
           Lit.: When I was walking in the street, I met my friend.
     b.   I saw my friend walking along the street.

This fact seems to indicate that present participles contribute to the semantics of verbs, independently of the auxiliary *be*. Moreover, the same prediction is derived from semantic information in *be*, which only requires its complement arguments to denote predicative situations and nothing more. That is, without any complements, we cannot distinguish whether it is progressive *be*, passive *be* or copular *be*. This naturally leads to the conclusion that information relevant to progressive, passive and copular should be encoded in other materials, i.e., complements following *be*.
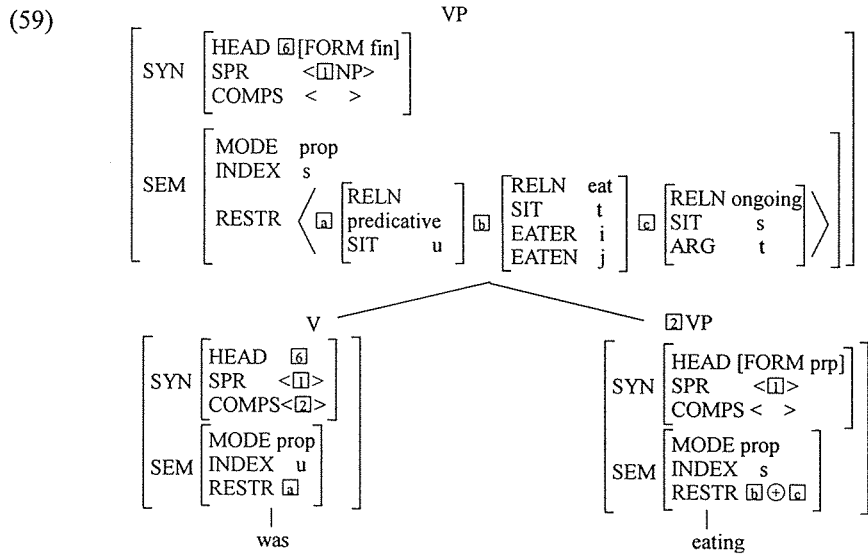
Considering the above entry for *be* and the potential semantics of a present participle, I will propose the following lexical rule where semantic restriction is added to lexical entries of the output.

(58)   Present-Participle Lexical Rule (revised)

$$\left\langle\;\boxed{2}\;,\;\begin{bmatrix} \textit{verb-lxm} \\ \text{SEM}\begin{bmatrix} \text{INDEX } \boxed{4} \\ \text{RESTR } \boxed{a} \end{bmatrix} \end{bmatrix}\right\rangle \quad \Rightarrow$$

$$\left\langle\; F_{\text{PRP}}(\boxed{2})\;,\;\begin{bmatrix} \textit{word} \\ \text{SYN [HEAD [FORM prp]]} \\ \text{SEM}\begin{bmatrix} \text{INDEX } \boxed{5} \\ \text{RESTR } \boxed{a}\oplus\begin{bmatrix} \text{RELN ongoing} \\ \text{SIT} \quad s \\ \text{ARG} \quad \boxed{4} \end{bmatrix} \end{bmatrix} \end{bmatrix}\right\rangle$$

A new RELN value given by this rule posits the constraint that the situation introduced by verbs takes aspectual imports, i.e., ongoing senses. It should be noted here that the INDEX of 'ongoing' relation ($\boxed{5}$) is that of output words, and that the semantic index of the rule input ($\boxed{4}$) is the argument of the 'ongoing' relation. That is, the output entry is located in the 'ongoing' relation.

The effect of this rule can be seen in the following structure:

(59)

$$
\text{VP}\quad
\begin{bmatrix}
\text{SYN} & \begin{bmatrix} \text{HEAD} & \boxed{6}[\text{FORM fin}] \\ \text{SPR} & <\boxed{1}\text{NP}> \\ \text{COMPS} & < \ > \end{bmatrix} \\[3em]
\text{SEM} & \begin{bmatrix} \text{MODE} & \text{prop} \\ \text{INDEX} & s \\ \text{RESTR} & \left\langle \boxed{a}\begin{bmatrix}\text{RELN} & \\ \text{predicative} \\ \text{SIT} & u\end{bmatrix} \boxed{b}\begin{bmatrix}\text{RELN} & \text{eat} \\ \text{SIT} & t \\ \text{EATER} & i \\ \text{EATEN} & j\end{bmatrix} \boxed{c}\begin{bmatrix}\text{RELN ongoing} \\ \text{SIT} & s \\ \text{ARG} & t\end{bmatrix} \right\rangle \end{bmatrix}
\end{bmatrix}
$$

$$
\text{V}\quad
\begin{bmatrix}
\text{SYN} & \begin{bmatrix} \text{HEAD} & \boxed{6} \\ \text{SPR} & <\boxed{1}> \\ \text{COMPS} & <\boxed{2}> \end{bmatrix} \\
\text{SEM} & \begin{bmatrix} \text{MODE prop} \\ \text{INDEX} & u \\ \text{RESTR} & \boxed{a} \end{bmatrix}
\end{bmatrix}
\qquad
\boxed{2}\text{VP}\quad
\begin{bmatrix}
\text{SYN} & \begin{bmatrix} \text{HEAD} & [\text{FORM prp}] \\ \text{SPR} & <\boxed{1}> \\ \text{COMPS} & < \ > \end{bmatrix} \\
\text{SEM} & \begin{bmatrix} \text{MODE prop} \\ \text{INDEX} & s \\ \text{RESTR} & \boxed{b}\oplus\boxed{c} \end{bmatrix}
\end{bmatrix}
$$

was   eating

Given the revised Present Participle Lexical Rule, the INDEX value of the head complement VP ($\boxed{2}$) will be specified 's', which denotes an 'ongoing' relation. Then, as the above lexical entry for auxiliary *be* shows, *be* can take an 'ongoing' situation indicated by 's' as a semantic 'pred(icative)' argument. If it is assumed that no change in INDEX values is introduced by the Present Participle Lexical Rule, then the following structure description will be generated, where an 'eat' situation serves as a semantic argument of a 'predicative' relation. Here I illustrate only the semantic feature descriptions.

(60)

$$
\text{*VP}\quad
\begin{bmatrix}
\text{SEM} & \begin{bmatrix} \text{MODE} & \text{prop} \\ \text{INDEX} & t \\ \text{RESTR} & \left\langle \boxed{a}\begin{bmatrix}\text{RELN} & \text{pred} \\ \text{SIT} & u \\ \text{ARG} & t\end{bmatrix} \boxed{b}\begin{bmatrix}\text{RELN} & \text{eat} \\ \text{SIT} & t \\ \text{EATER} & i \\ \text{EATEN} & j\end{bmatrix} \boxed{c}\begin{bmatrix}\text{RELN ongoing} \\ \text{SIT} & s \\ \text{ARG} & t\end{bmatrix} \right\rangle \end{bmatrix}
\end{bmatrix}
$$
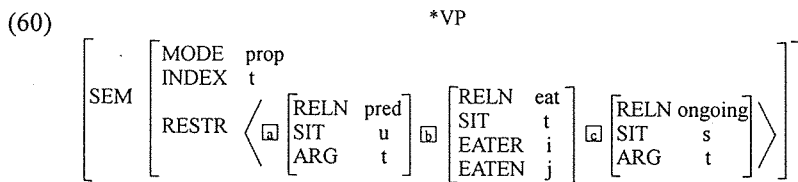
Since the situation in 't' states only the 'eat' relation with no predicative meaning, this structure description contains contradiction that the predicative relation of *be* (i.e., 'predicative' relation) takes non-predicative argument (i.e., 'eat' relation), which will be ruled out.

So far, exploring the lexical entries for auxiliary *have* and *be*, I have modified S&W's lexical rules mainly in terms of semantic specification. In the next section, I will examine the possibility of VP ellipsis, which supports these revised lexical rules.

3.1 HPSG Approach to VP Ellipsis

In section 2, I have investigated the influence of verbal morphology on the possibility of VP ellipsis and stated that the morphological identity cannot be ignored in some cases for the purpose of ellipsis. However, the framework of HPSG I have just introduced does not make use of verbal morphology in calculating identity, and thus allows ellipsis in a more unrestricted way. I will now introduce the arguments for VP ellipsis in S&W (1999).

3.2.1 The NICE Properties   S&W state that VP ellipsis is one of the properties of auxiliary verbs. The elements called auxiliary tend to "share the following semantic and syntactic characteristics; (1) they express notions of time (past, present, future, continuation, completion), necessity, possibility, obligation, permission, negation, or questioning; and (2) they occur in fixed positions in sentences, usually at or near the beginning or end" (S&W 1999:295). Auxiliaries involve modals (such as *will, can* and *might*) and so-called helping verbs i.e., *be, do, have*.

The properties relevant to auxiliaries are often called 'NICE' and are classified into four: negation, inversion, contraction, and ellipsis.

    (61) a.   Pat should not leave.
         b. * Pat raked not leaves.
    (62) a.   Has Pat left town?
         b. * Left Pat town?
    (63) a.   They haven't cut the price.
         b. * They cutn't the price.
    (64) a.   If anybody is spoiling the children, Pat is.
         b. * If anybody keeps spoiling the children, Pat keeps.
                                                              (S&W 1999:303)

To handle the NICE properties, S&W formulate the lexical rules per the property: Negation Lexical Rule, Inversion Lexical Rule, Contraction Lexical Rule and Ellipsis Lexical Rule. Since all of the rules specify that its input must be [AUX +], which distinguishes auxiliaries from other main verbs, this will prevent them from applying to the main verbs and the above contrasts can be explained straightforwardly.

3.2.2 Ellipsis Lexical Rule   Now consider VP ellipsis structures generated from Ellipsis Lexical Rule. S&W state that "ellipsis is a discourse phenomenon, in the sense that the interpretation of the missing constituent sometimes depends on something in an earlier sentence" (S&W 1999:313). This is seen in the following dialogue where the ellipsis is allowed between different speakers:

    (65)   Speaker A: I haven't been reading the newspapers.
           Speaker B: Well, I have [e].   (S&W 1999:314)

They propose the following lexical rule without referring to semantic constraints on ellipsis:

(66)   Ellipsis Lexical Rule

$$\left\langle\; \boxed{3},\; \begin{bmatrix} \mathit{lexeme} \\ \text{SYN} \left[\text{HEAD} \begin{bmatrix} \text{AUX}+ \\ \text{NEG}- \end{bmatrix}\right] \\ \text{ARG-ST} <\boxed{1}>\oplus\boxed{a} \end{bmatrix} \;\Rightarrow\; \left\langle\; \boxed{3},\, [\text{ARG-ST} <\boxed{1}>] \;\right\rangle\right.$$

(S&W 1999:314)

This formulation requires the inputs to be [AUX +] and [NEG −].[23] It entails that any auxiliary can precede an elided site. Moreover, it is specified that its outputs are entries whose ARG-ST no longer contains any of its arguments except the first one. Thus, the following sentences can be correctly generated:

(67) a.   John has finished his homework, and Mary has [e].
     b.   John ran yesterday, and Mary will [e], too.
     c.   John is playing tennis, and Mary is [e], too.
     d.   John passed the exam, and Mary did [e], too.

Since perfect *have*, modal *will*, *be* and *do* are naturally classified into auxiliary verbs specified [AUX +], there arise no problems in applying the lexical rule.

As S&W note, this lexical rule says nothing about discourse properties of ellipsis. In this sense, it can be said to be incomplete. Now let us consider (67b). The input of auxiliary *will* exhibits the following lexical structure as in (68), and its output of the Ellipsis Lexical Rule is illustrated in (69), where some semantic constraints are mentioned.

(68)

$$\left\langle\; \text{will},\; \begin{bmatrix} \mathit{auxv\text{-}lxm} \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} \quad <[\;\;],[\text{INDEX } \boxed{4}]> \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad s \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} \quad \text{will} \\ \text{SIT} \qquad s \\ \text{ARG} \qquad \boxed{4} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \;\right\rangle$$

(69)

$$\left\langle\; \text{will},\; \begin{bmatrix} \mathit{auxv\text{-}lxm} \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} \quad <[\;\;]> \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad s \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} \quad \text{will} \\ \text{SIT} \qquad s \\ \text{ARG} \qquad t \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \;\right\rangle$$

---

[23] The specification of NEG values will play a role in producing a negated sentence.

They provide the ARG value in RESTER list with the index 't'. The comment for 't'
is that "t—the argument of the 'will' relation—is not associated with any predication".
Consequently, lexical or phrasal structures that satisfy the above lexical entry will be
semantically incomplete. In the subsequent section, I will augment the constraints on
semantics to ensure the understood meanings of an elided VP.

It should be noted that ellipsis is also possible where the elliptical sites follow other
than auxiliary verbs; ellipsis in infinitives is possible.

> (70) a. We asked them to open the window, and they tried to.
>   b. We hoped that the wine would improve with age, but it didn't seem to.
>   (S&W 1999:314)

S&W postulate that infinitival *to* is [AUX +] for this rule to take *to* as its input, which
leads to a rule that does not specify a part of speech of the input, as illustrated above.

Certainly it is useful for the possibility of ellipsis in infinitives, but there is no
evidence that infinitival *to* exhibits a kind of an auxiliary property e.g., NICE property.
Therefore, it is necessary to clarify what the feature of AUX is. In this paper, I do not
treat this topic.

To summarize, the Ellipsis Lexical Rule allows the generation of elliptical
sentences in more unrestricted ways because it does not put restriction on the
antecedent elements, and freely elides its argument except the first one. It follows that
the morphological identity between the antecedent and the elided elements does not
play a role in this approach, contrary to the above-mentioned previous studies.

3.2.3 The Interaction of Lexical Rules   Though there remain some problems in
the semantic content of the Ellipsis Lexical Rule, I will show here how well this
lexical rule works in considering the interaction between the Ellipsis Lexical Rule and
other rules.

What should be noted is that the lexical rules for the NICE properties can interact
with each other in an apparently complex way.

> (71) a. We wanted to taste the salad, but we could not.
>   b. You thought you were clearing the table, but you were not.
>   (S&W 1999:316)
> (72) a. [They will become famous.] Will they?
>   b. You thought you were helping them out. Were you?
>   (*ibid.*)

These examples indicate that they exhibit at least two of the NICE properties: in (71),
negation and ellipsis, and in (72), inversion and ellipsis. S&W's proposals correctly
predict that the examples are felicitous. The point is the type constraint on Ellipsis
Lexical Rule, that is, it is the rule that creates new lexemes from lexemes, where both
the input and the output are *lexeme* type. On the other hand, Negation and Inversion

Lexical Rules are the rules that map *word* into *word*, which will prevent the Ellipsis Lexical Rule from applying to their outputs.[24] Therefore, this ensures, in any cases, that Ellipsis Lexical Rule first applies to auxiliary lexemes and next to the other rules, not vice versa. If you change the application order, then ill-formed sentences are generated.

(73) a. # We wanted to taste the salad, but we could ~~not taste the salad~~.
  b. # You thought you were clearing the table, but you were ~~not clearing the table~~.
(74) a. [They will become famous.] *Will ~~they become famous~~?
  b. You thought you were helping them out. *Were ~~you helping them out~~?

Suppose that Ellipsis Lexical Rule can be applied after Negation Lexical Rule, all of the arguments after *could* or *were* in (73) will be elided and we fail to get the intended meaning indicated by striking through the unpronounced material. In the same way, the subsequences of Inversion Lexical Rule and Ellipsis Lexical Rule will generate unacceptable sentences.

Now these observations sufficiently support the type specifications from *lexeme* to *lexeme* in Ellipsis Lexical Rule. Therefore, the next section will investigate VP ellipsis in favor of the specifications with additional constraints.

3.3 Empirical Problems

In the above sections, I have shown how the Ellipsis Lexical Rule works to generate elliptical sentences and how useful the type specification is. However, in addition to its incomplete semantics, there are still empirical difficulties with S&W's suggestion.

The first difficulty concerns the over-generating possibility. The Ellipsis Lexical Rule implies that ellipsis will be always possible if the elided site is in a post-auxiliary position. To put it simply, any lexemes whose HEAD feature AUX is '+' can be the input of the rule, which allows the following ungrammatical examples.

---

[24] Negation Lexical Rule is like the following:

(i) Negation Lexical Rule

(S&W 1999:306)

First of all, it should be noted here that this rule generates *word* from *word* type. This rule specifies that its input must be [NEG−], and the output is [NEG+], which correctly prevents any clause from having multiple sentential negation. The specification [FORM fin] in the input disallows the following examples:

(ii) a. *John not ate the cake.

   b. *John not has eaten the cake.

(75) a. ?* Mary has left, but John shouldn't [e].   [e] =have left
     b. * Mary left yesterday, and John is [e] now.   [e] =leaving
     c. * Mary will leave, and John is [e], too.   [e]=leaving

Even though the semantic constraints are supposed to be like the following; "their complements can be omitted when the meaning of the missing complement can be reconstructed from the surrounding linguistic context" (S&W 1999:303), the examples in (75) at first glance seem to satisfy this semantic requirements, and the question why (75) is unacceptable still remains. Therefore, it is necessary to reconsider what kinds of constraints are related to the impossibility of the ellipsis in terms of syntax or semantics.

The second is concerned with semantic restrictions, as S&W state. Now let us return to the output entry of *will* in (69), where the semantic argument of 'will' ('t') is not associated with any predication. In other words, this output (69) does not guarantee that the elided VP can be correctly interpreted, and then a question arises; how can we reconstruct the missing elements without any support? Unfortunately, S&W's idea is also incompatible with the spirit of HPSG framework. Since feature structures are feature specifications, such features that specify unidentifiable values will not be permitted. Note however that underspecified features are not trivial information and different from such features. Accordingly, the value of ARG in (69) ('t') cannot be identified, and the result is that the output lexical entry is excluded, which prevents it from projecting its information to the larger structure description. In S&W's term, the structure that is generated from (69) will be 'lexically unsatisfied' word structure because of unidentifiable values.[25] In the next section, I will identify the ARG value, 't', which provides the appropriate semantic condition.

Finally, the analyses concerning the auxiliary *do* are possibly confusing and some notes should be added. Consider the lexical entry for auxiliary *do*.

---

[25] Lexical Satisfaction (S&W 1999:402) is defined as follows:
   A word structure:
                F
                |
                ω
   satisfies a lexical entry $< \omega , \delta ,>$ just in case:
   I   F is of type word and F satisfies δ,
   II   Argument Realization Principle
   III F satisfies the following feature structure description:

$$\begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{SPR} & \boxed{a} \\ \text{COMPS} & \boxed{b} \ominus \boxed{c} \\ \text{GAP} & \boxed{c} \end{bmatrix} \\ \text{ARG-ST} & \boxed{a} \oplus \boxed{b} \end{bmatrix} \quad \text{and}$$

   IV   Case Constraint
        Any NP in a noninitial position of F's ARG-ST list is [CASE acc].

(76)

$$\left\langle \ do, \ \begin{bmatrix} \textit{auxv-lxm} \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} \quad \langle [\ \ ], \begin{bmatrix} \text{SYN [HEAD [FORM inf]]} \\ \text{SEM [INDEX⁴]} \end{bmatrix} \rangle \\ \text{SEM} \begin{bmatrix} \text{INDEX ④} \\ \text{RESTR} \langle \ \ \rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

It is specified that the complement of *do* must be the verbs whose FORM values are 'inf', and then it ensures that the following examples are generated.

(77) a.   John **did** pass the exam.
     b.   John **does** get over the wall.

Generally, auxiliary *do* combined with appropriate verbs [FORM fin] like (77) tends to be stressed, as illustrated by boldface, which exhibits the emphasis effects. Now one might object that *do* in these examples contributes something to semantics. However, the additional meanings seem to be mostly relevant to pragmatic requirements, rather than semantic constraints. Despite the fact that head verbs in (77) can be *pass* or *get*, it is for pragmatic reasons that the auxiliary *do* is purposely selected. Then, these contrastive examples do not suffice as evidence that *do* specifies something in semantics. To avoid such confusion, here the assumption that auxiliary *do* adds nothing to the meaning is on the right track, and I will leave the account of examples like (77) to a theory of pragmatics.

   Apparently, the Ellipsis Lexical Rule specified only in terms of syntax works well, but as shown above, we no longer ignore defective semantic specifications. As well as the latter mentioned problem, the former may arise from this imperfection in semantics, which will be explained by appropriate semantic specifications. Therefore it is important to discuss its semantics so that VP ellipsis possibilities are correctly predicted. In the next section, I will give solutions to these problems.

4   SOLUTIONS TO S&W'S PROBLEMS

The preceding section has indicated that only the Ellipsis Lexical Rule does not suffice to predict the impossibility of VP ellipsis, because it does not specify that ellipsis is possible only in contexts where there is an antecedent phrase that provides the interpretation of the elided complement. Then the question is; how can phonologically empty materials be properly reconstructed? The further constraint should be given to ensure recoverable meanings of the missing VPs. Under the framework of HPSG, this section will focus on the semantic constraints on ellipsis and account for the various patterns of ellipsis.

4.1 INDEX Identity

This section will observe semantically recoverable environment of the absent materials. Let us examine what kind of identity between antecedent and elided VPs is formed, comparing ellipsis sentences with non-ellipsis sentences.[26]

    (78) a.   John slept, and soon Mary will [e].
        b.   John slept, and soon Mary will sleep.

It is supposed that some identity between *slept* in the first conjunct and *sleep* in the second plays a role in allowing the above ellipsis sentence (78a). Consider the lexical entries for *slept* and *sleep*.

(79)

$$
\left\langle \text{ slept, } \begin{bmatrix} \text{SYN} \begin{bmatrix} \text{HEAD} \begin{bmatrix} verb \\ \text{FORM fin} \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} \ < [\ ] > \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad s \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN sleep} \\ \text{SIT} \quad s \\ \text{SLEEPER } i \end{bmatrix} \begin{bmatrix} \text{RELN} \quad \text{t-precede} \\ \text{SIT} \quad t \\ \text{ARG} \quad s \\ \text{ARG} \quad \text{now} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

(80)

$$
\left\langle \text{ sleep, } \begin{bmatrix} \text{SYN} \begin{bmatrix} \text{HEAD} \begin{bmatrix} verb \\ \text{FORM inf} \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} \ < [\ ] > \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad s \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN sleep} \\ \text{SIT} \quad s \\ \text{SLEEPER } i \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

We can find only two identical feature values: MODE and INDEX values. This means that morphosyntactic identity across the two VPs is no longer required for VP ellipsis, except that they must be *verb*-type. Note that the possibility of VP ellipsis does not depend on MODE values as shown in (81):

    (81) A: Can you play the piano?
         B: Yes, I can [e].

The value for MODE in the first sentence must be 'question' ('ques' for short), while the second must be 'prop', which bears out the independency of MODE values in VP

---

[26] The corresponding non-ellipsis sentences are often de-accented.

ellipsis.

Therefore, it is quite reasonable to assume that the identity in question should be INDEX values. The following general claim will be given.

(82)   A Condition on VP Ellipsis
        A VP can be elided only if there is identity between antecedent and elided VPs in their INDEX values which form alphabetic variants.

This explicit condition clarifies S&W's ambiguous statement on the possibilities of VP ellipsis to the effect that some kind of semantic identity licenses the ellipsis, and confirms that the influence of verbal morphology on the ellipsis does not play a role in calculating the identity of VPs.

Considering the problems in this light, it is necessary to propose the Ellipsis Lexical Rule incorporating this semantic requirement. Note that HPSG is surface-oriented and I should encode information of phonologically empty elements in a remaining non-empty argument, rather than put further constraints on them. Recall that the Ellipsis Lexical Rule elides the complements of head auxiliary verb lexemes, and thus it can never specify features of such elided elements because they no longer exist in the feature structures.

4.2 A Semantic Condition on VP Ellipsis

Now it is clear that there is INDEX value identity between the antecedent and the elided VPs. Given the Ellipsis Lexical Rule, the crucial question is how the elided elements can be correctly understood despite the fact that their specifications are not given. Here I will claim that this situational index feature can be encoded in remaining auxiliary verbs even after the Ellipsis Lexical Rule, providing a semantic condition on well-formed ellipsis structures.

Before plunging into the lexical rule, I would like to look briefly at the lexical entries for auxiliary verbs, which can be more precise about how information of the complements (i.e., VPs to be elided after the Ellipsis Lexical Rule) is associated with head auxiliary entries. The point here is that their respective semantic relations correlate with the INDEX value ($\boxed{4}$) of the second argument in its ARG-ST. In the case of modal *will*, auxiliary *have* and *be*, the INDEX value $\boxed{4}$ is specified as the argument of the semantic relation ('will', 'perfect', or 'predicative').

(83)

$$\left\langle \text{ will}, \begin{bmatrix} \textit{auxv-lxm} \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} \quad <[\ \ ], \begin{bmatrix} \text{SYN [HEAD [FORM inf]]} \\ \text{SEM [INDEX } \boxed{4}] \end{bmatrix} > \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad \text{s} \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} \quad \text{will} \\ \text{SIT} \quad \quad \text{s} \\ \text{ARG} \quad \quad \boxed{4} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

(84)

$$
\left\langle \text{ have}, \begin{bmatrix} auxv\text{-}lxm \\ \text{ARG-ST} \quad <[\quad], \begin{bmatrix} \text{SYN [HEAD [FORM psp]]} \\ \text{SEM [INDEX } ④] \end{bmatrix} > \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad s \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} \quad \text{perfect} \\ \text{SIT} \quad s \\ \text{ARG} \quad ④ \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

(85)

$$
\left\langle \text{ be}, \begin{bmatrix} auxv\text{-}lxm \\ \text{ARG-ST} \quad <[\quad], [\text{INDEX } ④]> \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad s \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} \quad \text{pred} \\ \text{SIT} \quad s \\ \text{ARG} \quad ④ \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

This means that a situational index of the complement VP is the argument of their relations in the same restriction. On the other hand, an entry for auxiliary *do* specifies that the complement's INDEX value ④ is its own semantic index.

(86)

$$
\left\langle \text{ do}, \begin{bmatrix} auxv\text{-}lxm \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} \quad <[\quad], \begin{bmatrix} \text{SYN [HEAD [FORM inf]]} \\ \text{SEM [INDEX④]} \end{bmatrix} > \\ \text{SEM} \begin{bmatrix} \text{INDEX} \quad ④ \\ \text{RESTR} < \quad > \end{bmatrix} \end{bmatrix} \right\rangle
$$

This lexical entry says that the situation of the complement VPs can be incorporated into its semantic relation.

Considering this semantic relationship between the auxiliary's own semantic relation and the complement VP's INDEX value, it is assumed that the semantics of the elided VP can be specified even after the application of the Ellipsis Lexical Rule. This is because this rule does nothing except elide a complement in its ARG-ST, which allows a situation of the complement to remain as a semantic argument within its semantic restrictions. That is, the situational indices of the complement VP (④) can remain in auxiliary verbs, as illustrated in [ARG ④], except for auxiliary *do*. Note however that auxiliary *do* also will be shown to be the case later. Since these left semantic arguments cannot be identified in its argument structure, such specification will be meaningless if not identified. For 'lexical satisfaction', I will put further restriction on the well-formedness of a structure that the output of the lexical rule gives rise to.[27]

---

[27] See footnote 25.

(87)   A Well-Formed Condition on VP Ellipsis Structure
A VP ellipsis structure is well-formed only if there is at least one predication whose situational index value is coherent with a semantic relation of the output lexical entry of Ellipsis Lexical Rule.

Contrary to S&W's analysis, this condition entails that the output entries are allowed to take a situation argument corresponding to other VP's situation in the surrounding context. That is, (87) prevents elliptical structure from being generated from the lexical entry whose semantics contain unidentifiable values. Given this, S&W's second difficulty of incomplete semantics cannot arise.
Let us consider a typical ellipsis sentence as an example:

(88)   John will sleep, and soon Mary will [e], too.

As you can see, the output of the Ellipsis Lexical Rule cannot combine with any complements in the surface structure.

(89)

$$
\left\langle \; will, \;
\begin{bmatrix}
auxv\text{-}lxm \\
\text{SYN [HEAD [FORM fin]]} \\
\text{ARG-ST} \; <[\;\;]> \\
\text{SEM}
\begin{bmatrix}
\text{MODE} & \text{prop} \\
\text{INDEX} & \text{s} \\
\text{RESTR} \left\langle
\begin{bmatrix}
\text{RELN} & \text{will} \\
\text{SIT} & \text{s} \\
\text{ARG} & \text{t}
\end{bmatrix}
\right\rangle
\end{bmatrix}
\end{bmatrix}
\right\rangle
$$

If there is supposed to be a VP whose index value is compatible with the semantic relation of *will*, the output is lexically satisfied and can provide semantic information of missing complements by association with other predications. To show that the argument of 'will' relation in (89) can be the situation of the antecedent VP, the semantic feature of *sleep* in the first conjunct is given in (90).

(90)

$$
\left\langle \; sleep, \;
\begin{bmatrix}
\text{SYN}
\begin{bmatrix}
\text{HEAD}
\begin{bmatrix}
verb \\
\text{FORM inf}
\end{bmatrix}
\end{bmatrix} \\
\text{ARG-ST} \; <[\;\;]> \\
\text{SEM}
\begin{bmatrix}
\text{MODE} & \text{prop} \\
\text{INDEX} & \text{s} \\
\text{RESTR} \left\langle
\begin{bmatrix}
\text{RELN sleep} \\
\text{SIT} \quad \text{s} \\
\text{SLEEPER i}
\end{bmatrix}
\right\rangle
\end{bmatrix}
\end{bmatrix}
\right\rangle
$$

The semantic index value in (90), where a 'sleep' situation is formed, can be a candidate for the argument of *will*, and then sufficiently identify the semantic argument 't' of *will*. Consequently, the identification ensures that the second conjunct

in (88) can correctly say that there is a 'will' situation wherein another situation 't' predicating a 'sleep' situation is located. Roughly speaking, the lexical entry supplemented by semantics of *sleep* gives rise to the structure like *will sleep*.

To sum up, output lexical entries of the Ellipsis Lexical Rule are specified to combine certain arguments semantically, not syntactically. Hence, the Ellipsis Lexical Rule and the condition interact so as to license the structure description as well-formed. In the next subsection, I will return to S&W's first problem of over-generating possibilities and show the advantage of the constraint on the output of the lexical rule.

4.3 A Constraint-Based Analysis

Since the Ellipsis Lexical Rule elides complements of auxiliary entries, it is no longer necessary to take inaudible verb forms into account. However, as pointed out above, some morphological mismatch sometimes seems to affect the grammaticality of ellipsis sentences. My proposal in terms of HPSG, i.e., a constraint-based analysis will provide a straightforward way of capturing different acceptability. To see relevancy or irrelevancy to verbal morphology, I will divide the following sections into four types according to FORM values of the antecedents.

4.3.1 Finite Forms   First, consider the sets of sentences where the antecedent VP is [FORM fin]. Except the examples where auxiliary *be* precedes the elliptic site like (91d), VP ellipsis is permitted regardless of auxiliary classification such as modal, *have* and *do*.

(91) a.   John slept, and soon Mary will [e].
     b.   Unfortunately, I solved the problem after John already had [e].
     c.   This new medicine had a lasting effect, but that one didn't [e].
     d.   * John studies Spanish, but his brother isn't [e].

Recall here that the Past-Tense Lexical Rule does not change INDEX value of head verbs, and the lexical structures after application of this rule thus hold its situation index. Therefore, the lexical structure description for *slept* in (91a) is specified as follows:

(92)

$$
\left\langle \text{slept}, \begin{bmatrix} \text{SYN} \begin{bmatrix} \text{HEAD} \begin{bmatrix} verb \\ \text{FORM fin} \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} \ <[\ ]> \\ \text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad s \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN sleep} \\ \text{SIT} \quad s \\ \text{SLEEPER} \ i \end{bmatrix} \begin{bmatrix} \text{RELN t-precede} \\ \text{SIT} \quad t \\ \text{ARG} \quad s \\ \text{ARG} \quad \text{now} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

Though the situation denoted by the index of the verb temporally precedes the time of utterance, the word INDEX value is still 's', that is, this situational index indicates only 'sleep' situation and does not contain the temporal meaning.

First, given this, let us apply the Ellipsis Lexical Rule to modal *will*. An output of the rule, as illustrated in (89), does not combine with any complement VP, but requires taking a semantic argument. Generally, modals are classified roughly into two types: epistemic and root modals. Epistemic modality involves a statement of the speaker's attitude towards the status of the truth of a proposition; the proposition is necessarily true, probably true, etc. Root modality, on the other hands, is concerned with the occurrence of events or the existence of states of affairs, and involves permission or obligation for them. It follows that the semantics of modals take propositions describing events or the state of affairs as their complement. Therefore, since the 'sleep' situation, indicated by 's' in (92) exhibits the event involving a single entity (i.e., the subject equivalent to 'sleeper'), it is not inconsistent with the 'will' relation of the output. Both semantic and syntactic constraints are thus fully satisfied, which results in the felicitous clause. So far, I have not mentioned syntactic specifications of auxiliary verbs, but note that all the lexical structures presented above of course involve the specifications for their syntactic features. In the case of (91a), the output entry for *will* syntactically specifies that it should take a NP whose case value is nominative as the specifier. It is in this sense that (91a) is a well-formed structure.

Secondly, let us investigate the ellipsis of VPs headed by auxiliary *have*.

(93)   John saw Mary yesterday, but Bill hasn't [e] since last week.[28]

The same sorts of arguments can be made about auxiliary *have*. Recall that it takes a semantic argument within its 'perfect' relation like modals, and then the lexical entry after the application of the Ellipsis Lexical Rule is like the following.

(94)

$$
\left\langle \text{has,} \begin{bmatrix} auxv\text{-}lxm \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} \ \ <[\ \ ]> \\ \text{SEM} \begin{bmatrix} \text{MODE} & \text{prop} \\ \text{INDEX} & \text{v} \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN perfect} \\ \text{SIT} & \text{v} \\ \text{ARG} & \text{w} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

This specification also requires the taking of a semantic argument indicated by some verb in the linguistic context. When the situations indicated by verbs describe events or the existence of a state of affairs, there arises no difficulty in supplementing the

---

[28] Note that the second ellipsis sentence involves negative *not*. Since the Negation Lexical Rule creates new *words* from *words* after formed via the Ellipsis Lexical Rule, it is not relevant to this discussion about the word before the application of the negation rule.

specified semantic argument within a 'perfect' relation, which allows the INDEX values of the first predication presenting a 'see' relation to serve as the semantic argument of *have*.[29] The missing VP is thus correctly reconstructed from the antecedent through the INDEX value identity between the antecedent and the elided VP and the sentence (93) is well-formed.

The third example involves the auxiliary *do*.

(95)   John attended the meeting, and Mary did [e], too.

The case seems to be a little more complex than those of the two auxiliaries just discussed since the INDEX value, as noted above, depends on the situational index of its complement VP. If we apply the Ellipsis Lexical Rule to auxiliary *do*, one may conjecture that the result involves an unidentifiable value in its INDEX feature specification. However, the auxiliary *do* does not take FORM values except for [FORM *fin*], which follows that it always contains semantic constraints via lexical rules concerning tense, such as Past-Tense Lexical Rule.[30] The Ellipsis and the subsequent Past-Tensed Lexical Rule produce the entry like the following, where there is a semantic requirement for a situational argument:

(96)

$$
\left\langle \; did, \; \begin{bmatrix} auxv\text{-}lxm \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} \; <[\;\;]> \\ \text{SEM} \begin{bmatrix} \text{MODE} & prop \\ \text{INDEX} & v \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} & t\text{-}precede \\ \text{SIT} & v \\ \text{ARG} & w \\ \text{ARG} & now \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \; \right\rangle
$$

Considering *do*'s finiteness, the same arguments as modals and perfect *have* will hold for auxiliary *do*. That is, this output entry should specify its semantic argument. What *do* can take a situation of some verb as its argument should not conflict with the specification [ARG now]. The semantic effect is clear; the situation to be identified with the semantic argument of 't-precede' relation must establish a rapport with the time of utterance (i.e., 'now'). Therefore, auxiliary *do* in a finite form is not allowed to be followed by modals which is generally assumed not to involve tense, though I will refer to this later. In (95), the antecedent situation indicating an 'attend' situation

---

[29] Though the word *yesterday* takes arguments of the situation denoted by verbs, no changes in INDEX values are introduced and thus we can take only the situation as arguments of the output entry *has*.

[30] The evidence for this lies in the following ill-formedness:

(i)   *John will do love you.

(ii)   *Mary has done shuffle the cards.

(iii) *Mary's doing leave early is quite a shame.

These examples show that auxiliary *do* does not have any entries with [FORM *inf*], [FORM *psp*] or [FORM *prp*].

can serve as the appropriate argument of the output, and the entry for *did* is fully satisfied and projects a well-formed structure.

Finally, consider an unacceptable example that involves the auxiliary *be*.

(97) *John went to the movie yesterday, and Mary is [e] today.

As I have offered in 3.1.3, suppose that auxiliary *be* has semantic information denoting 'predicative' relation, the following output will be generated:

$$(98) \quad \left\langle \text{ is}, \begin{bmatrix} auxv\text{-}lxm \\ \text{SYN [HEAD [FORM fin]]} \\ \text{ARG-ST} \quad <[\quad]> \\ \text{SEM} \begin{bmatrix} \text{MODE} & \text{prop} \\ \text{INDEX} & \text{v} \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN} & \text{pred} \\ \text{SIT} & \text{v} \\ \text{ARG} & \text{w} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

As with the above discussion, the situational argument 'w' of the output should be satisfied. However, there is no appropriate candidate as arguments for the 'predicative' relation in the surrounding linguistic context since the INDEX value of the VP in first conjunct only states that the 'go' event involves two participants; the subject ('goer') and the goal, and it is not predicative. Therefore, such a structure that is generated from this output lexical entry (98) is not lexically satisfied, which results in the ungrammatical structure.

4.3.2 *Infinitives*   When an antecedent VP is headed by a modal, the same grammaticality of the ellipsis as the finite verb's cases can be seen.

Consider first the following example where a modal precedes an elliptical site.

(99)   John will find the answer, and Mary will [e], too.

There are two VP candidates that can identify the situation of outputs, which is illustrated in (100): a VP headed by a modal *will find the answer* and a VP headed by a main verb *find the answer*.[31]

---

[31] Of course, the feature structure of the *VP will find the answer* contains the specification concerning *the answer*, but, for clarification, I exclude such information here.

(100)   VP

$$
\left[
\begin{array}{l}
\text{SYN} \left[\begin{array}{ll} \text{HEAD} & [\text{FORM fin}] \\ \text{SPR} & <\text{NP}_i> \\ \text{COMPS} & < > \end{array}\right] \\[2em]
\text{SEM} \left[\begin{array}{ll} \text{MODE} & \text{prop} \\ \text{INDEX} & v \\ \text{RESTR} \left\langle \left[\begin{array}{ll}\text{RELN} & \text{will} \\ \text{SIT} & v \\ \text{ARG} & t\end{array}\right] \left[\begin{array}{ll}\text{RELN} & \text{find} \\ \text{SIT} & t \\ \text{FINDER} & i \\ \text{FOUND} & j\end{array}\right] \right\rangle \end{array}\right]
\end{array}
\right]
$$

                                          |
                            will find the answer
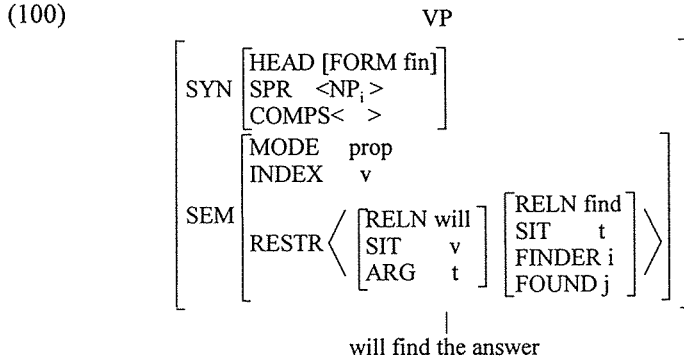
As noted above, the output entry for *will* must take an argument of the 'will' relation.
One possibility is that the situation 'v' is identical to the situational index of *will find
the answer*, which is naturally excluded because of semantic redundancy. If the
semantic argument of the output takes a 'will' situation in the first conjunct, it follows
that a 'will' relation is embedded within a 'will' relation. That is, it is quite strange to
merge two relations that mean the same thing in terms of not only semantics but also
pragmatics. Indeed, the ellipsis cases of different modals are not possible since
modals indicate the speaker's attitude to the status of the truth of a proposition, and it
is unnatural to exhibit the different attitudes simultaneously. The following is a clear
example:[32]

(101)   *John will must find the answer by tomorrow.

The other is to take situation 't' as the argument identifier. Since there are no
incompatible semantic features, the structure is acceptable, where the relationship is
formed that the 'find' situation is located in the 'will' situation.
    Now, consider the ellipsis involving a VP headed by an auxiliary *have* and *do*.

(102) a.   John will get a job, and Bill already has [e].
      b.   John will not pass the exam, but Mary did [e].

Given just discussed arguments, these examples are explained straightforwardly. Two
possibilities also lie in (102a) and one is ruled out for semantic incoherency.
Generally, epistemic modals tend to convey an aspect of the speaker's subjective
comment to the proposition, and root modals evaluate the occurrence of events or the
existence of a state of affairs as possible, necessary, advisable, etc. It seems to be
difficult that situations expressing subjective attitudes are placed in the aspectual
relation of perfect *have*, as shown in (103).

(103)   *John has could set up a subsidiary abroad.

---

[32] Note that syntactic constraint as well as semantics plays a crucial role in the acceptability of (101).

It thus follows that the situation of modals (e.g., 'will' situation) cannot serve as other predication's arguments. In other words, the modal's situation cannot be embedded within other VPs, which prevents the situational argument of these outputs (i.e., auxiliary *have*) from taking such a situation denoted by *will*. Only possible situation to be taken is thus the one introduced by a verb phrase *get a job*. Then (102a) will convey an intended meaning with no difficulty. Likewise, in (102b), the possibility is ruled out that the situation index of the larger VP identifies the output's argument. Because the semantic information that *do* in a finite form has is a temporal meaning to the effect that events are temporally placed on other time in relationship to the time of utterance (i.e., temporal-preceding or temporal-overlap relation), the 'will' situation lacking in tense is not located in such a temporal position. There remains only one interpretative possibility; the elliptical site is reconstructed from the VP *pass the exam*, which successfully identifies the semantic argument of *do*.

Examine how the following ill-formedness arises, where the output entry of the rule is auxiliary *be*.

(104)   ?*John may go to the party but Mary is not [e].

This unacceptability will follow from the fact that neither of the possible situational arguments is predicative. The result is that the semantic requirement of the auxiliary *be* is not satisfied and generates the lexical unsatisfied structure inherently.

4.3.3 Past Participle Forms   Now let us consider the patterns of a VP headed by auxiliary *have*, which serves as the antecedent of the elided VP. Recall here that the revised Past Participle Lexical Rule adds nothing to the semantics of its outputs. The advantage of this treatment is that the outputs of the rule hold their own situational INDEX values. Consequently, the VP description *met my brother* in the first conjunct in (105), as illustrated in (106), will exhibit a 'meet' situation even after the Past-Participle Lexical Rule applies.

(105)   John hasn't met my father, but he may [e].
(106)

$$
\begin{bmatrix}
\text{SYN} & \begin{bmatrix} \text{HEAD} & [\text{FORM fin}] \\ \text{SPR} & <\text{NP}_i> \\ \text{COMPS} & < \ > \end{bmatrix} \\
\text{SEM} & \begin{bmatrix} \text{MODE} & \text{prop} \\ \text{INDEX} & s \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \text{meet} \\ \text{SIT} & t \\ \text{MEETER} & i \\ \text{MET} & j \end{bmatrix} \right\rangle \end{bmatrix}
\end{bmatrix}
$$

met my father
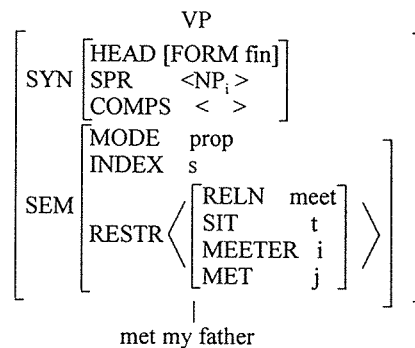
One important advantage of leaving verbal morphology out of the formulation of the Ellipsis Lexical Rule is seen in this well-formedness in (105). The output lexical entry

for *may*, as mentioned above, says nothing about elided morphosyntactic complements, but specifies its missing semantic argument, and thus there arise no problems if the missing situation is supplemented. Despite its specification [FORM *psp*], the INDEX value 't' in (106) involves no semantics concerning perfect senses, and it can serve as an appropriate situation to identify the semantic argument of *may*. The other candidate is the situation of the VP including auxiliary *have*, which exhibits a situational index in conflict with the output's semantic requirements.[33]

(107)   VP

$$
\begin{bmatrix}
\text{SYN} & \begin{bmatrix} \text{HEAD} & [\text{FORM fin}] \\ \text{SPR} & <\text{NP}_i> \\ \text{COMPS} & < \ > \end{bmatrix} \\
\text{SEM} & \begin{bmatrix} \text{MODE} & \text{prop} \\ \text{INDEX} & v \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \text{perfect} \\ \text{SIT} & v \\ \text{ARG} & t \end{bmatrix} \begin{bmatrix} \text{RELN} & \text{meet} \\ \text{SIT} & t \\ \text{MEETER} & i \\ \text{MET} & j \end{bmatrix} \right\rangle \end{bmatrix}
\end{bmatrix}
$$

                                   |
                            has met my father
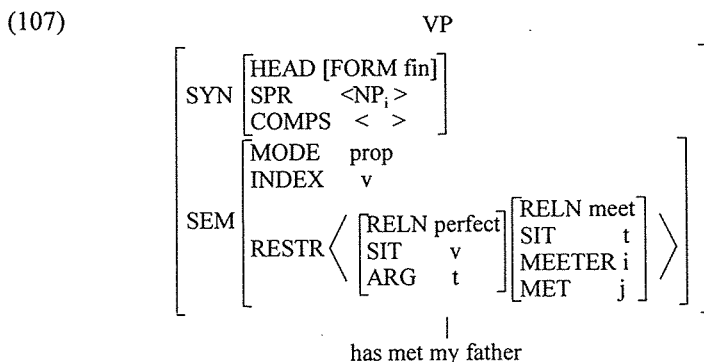
Since it is unnatural that events or states of affair that have already been completed are located in a 'may' relation (permission or possibility) as shown in (108), the 'may' relation in the output cannot contain 'perfect' relation.

(108) a. *He is allowed to have met my father.
      b. *It is possible that he has met my brother.

This does not mean that perfect *have* cannot follow a modal. Indeed such sentences are permissible. I will discuss this issue in 4.3.5.

Next consider the following sets of sentences. These can be explained in the same way just argued.

(109) a.   John hasn't eaten lunch, but Mary has [e].
      b.   John has finished the homework, and Mary did [e].
      c. ?*John has cleaned the room, and Mary is [e].

In (109a), the above-mentioned semantic redundancy prohibits the output from taking 'perfect' relation of the antecedent, and the situational argument of the output is correctly identified with the situation denoted by *eaten lunch*. In (109b), the mismatch between the aspectual property of perfect and temporal property has narrowed the range of appropriate identifiers. Moreover, in (109c), predications representing events

---

[33] Indeed it seems that another candidate is possible. It is the situation index of a VP including *not*, that is, the phrase *hasn't met my brother*. However, this possibility will be correctly ruled out since the Negation Lexical Rule specifies that its INDEX of the output auxiliary should be the index of *not*.

and the perfect do not go with a 'predicative' relation and the resulting structure is ungrammatical. This semantic coherency between auxiliary *have* and the antecedent verb may also be relevant to its aspectual property. If auxiliary *have* occurs after progressive *be*, such sentences will be unacceptable.

(110)   *John is having slept.

This ungrammaticality has been explained form the viewpoint of the general absence of the progressive stative, or the general impossibility of using a perfective complement after a verb of temporal aspect.[34]

(111)   *John began (continued, quit) having read *LSLT* in 1964.

(Akmajian, Steel and Wasow 1979:19)

It is shown that there is semantic conflict between perfect *have* and a verb of temporal aspect. Therefore, the elided site in (109c) is understood as *clean the room*.

4.3.4 Present Participle Forms   There are different ellipsis possibilities from the above three when an antecedent VP is headed by auxiliary *be*; the clauses in which auxiliary *do* precedes the ellipsis site are not allowed. The Present Participle Lexical Rule revised in 3.1.3 will be useful for the explanation of the following differences of grammaticality. The crucial point of this rule is that the output's semantic index value denotes an 'ongoing' situation. Hence, the structure description that the output entry for *be* gives rise to, is as the following in (113).

(112)   John is coming here, and Mary will [e], too.
(113)

$$
\begin{bmatrix}
& \begin{bmatrix} \text{HEAD} & [\text{FORM fin}] \\ \text{SPR} & <\text{NP}_i> \\ \text{COMPS} & <\ > \end{bmatrix} \\
\text{SYN} & \\
& \\
\text{SEM} & \begin{bmatrix} \text{MODE} & \text{prop} \\ \text{INDEX} & s \\ \text{RESTR} \Big\langle \begin{bmatrix} \text{RELN pred} \\ \text{SIT} \quad v \\ \text{ARG} \quad s \end{bmatrix} \begin{bmatrix} \text{RELN come} \\ \text{SIT} \quad t \\ \text{COMER i} \end{bmatrix} \begin{bmatrix} \text{RELN ongoing} \\ \text{SIT} \quad s \\ \text{ARG} \quad t \end{bmatrix} \Big\rangle \end{bmatrix}
\end{bmatrix}
$$

VP

|
is coming here
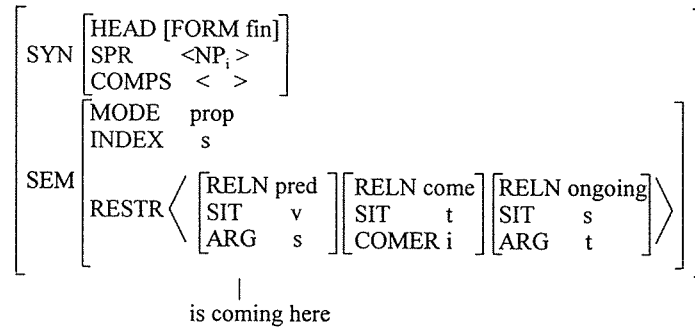
Recall that the lexical entry for auxiliary *be* specifies that its semantic index value is the same as that of its complements. That is, the semantic index of the verb phrase in (113) denotes an 'ongoing' situation. Here there are two possible situations in (113):

---

[34] There are numerous arguments about the categorization of progressive *be* as verbs of temporal aspect. Akmajian, Steel and Wasow (1979) have rejected such semantic constraints on the ordering problems; *progressive *be*-perfect *have*.

an 'ongoing' situation ('s') and its argument, i.e., a 'come' situation ('t'). Unlike the above three, both of them can serve as an appropriate candidate because no semantic conflict arises; a 'will' relation can contain both 'ongoing' and 'come' relations. If the situational argument of *will* is identified with the 'ongoing' situation 's', then the interpretation is (114a). On the other hand, if it is identified with the 'come' relation 't', the interpretation is (114b).

> (114) a. John is coming here, and Mary will be coming here.
>   b. John is coming here, and Mary will come.

Similarly, auxiliary *have* can take an 'ongoing' situation as its semantic argument without semantic incoherency and then the same analysis holds for *have*.

> (115)   John is complaining about the noise, but Bill hasn't [e].

That is, the situation argument of the output entry for *has* can be identical to both the 'ongoing' and the 'complain' relation, and the structure that the output entry gives rise to is fully accepted in any cases, and then two readings like (114) are possible.

Let us next consider an ungrammatical case headed by auxiliary *do*.

> (116)   ?*John is looking for the book, and Mary did [e].

To see what prevents this structure from being well-formed, I will illustrate the structure in the first conjunct.

(117)   VP

$$
\left[
\begin{array}{l}
\text{SYN} \begin{bmatrix} \text{HEAD [FORM fin]} \\ \text{SPR} \quad \langle \text{NP}_i \rangle \\ \text{COMPS} \langle \ \rangle \end{bmatrix} \\[6pt]
\text{SEM} \begin{bmatrix} \text{MODE} \quad \text{prop} \\ \text{INDEX} \quad s \\ \text{RESTR} \left\langle \begin{bmatrix} \text{RELN pred} \\ \text{SIT} \quad v \\ \text{ARG} \quad s \end{bmatrix} \begin{bmatrix} \text{RELN look-for} \\ \text{SIT} \qquad t \\ \text{LOOKER-FOR} \ i \\ \text{FOUND} \qquad j \end{bmatrix} \begin{bmatrix} \text{RELN ongoing} \\ \text{SIT} \quad s \\ \text{ARG} \quad t \end{bmatrix} \right\rangle \end{bmatrix}
\end{array}
\right]
$$

|
is looking for the book

Apparently, a 'look for' relation can identify the situational argument of the output entry for *do*. However, a careful examination of the above structure will correctly rule out such identification. First of all, the output entry for *did* requires its semantic argument in relation to temporal meaning via the lexical rule concerning tense and its semantics do not go with 'ongoing' relations, as shown in (118).[35]

----

[35] It seems that this is because lexical rules concerning tense and aspect (e.g., Past Tense Lexical Rule and Present Participle Lexical Rule) cannot apply to one lexeme simultaneously. That is, both rules create

(118) a. *John does be waiting for Mary.
     b. *John does waiting for Mary.

The remaining possibility is that the 'look-for' situation serves as the semantic identifier of *did*. Note however that the 'look-for' situation is an argument of the 'ongoing' situation. Since the situation argument of *did* cannot take the 'ongoing' relation, it is not allowed to go further into the 'ongoing' situation to find another appropriate situation, i.e., a 'look-for' situation. Therefore, the situational argument of the output *did* is not identified, which results in an ill-formed structure.

Contrary to the above examples, auxiliary *be* can precede an ellipsis site when the antecedent VP is headed by *be*.

(119)   John is getting up at seven and Mary is [e], too.

The antecedent semantic index indicates an 'ongoing' relation, which is coherent with the 'predicative' relation. Hence, the situation argument in the 'predicative' relation can be correctly identified with the antecedent 'ongoing' relation and the satisfied lexical entry will give rise to a well-formed structure.

4.3.5 Tensed-Perfect   Let us now return to the semantic relationship between modals and auxiliary *have* in 4.3.3. Consider the interpretations in (105), repeated here for convenience as (120).

(120)   John hasn't met my father, but he may [e].

As mentioned above, the only possible reading of [e] in (120) is *meet my father*, not *have met my brother*. Note that such sequences, i.e., modal+*have*, are generally possible.

(121)   John may have met my father.

Then, what prevents (120) from being understood as *may have met my father*? It seems that there is a semantic incoherency between the 'may' and 'perfect' relations. Here consider the interpretation of (120), which can be paraphrased as in (122). Compare (120) with (108b), repeated here as (123).

(122)   It is possible that John met my father.
(123)   *It is possible that John has met my father.

It follows from this that the situation that *may* takes is not a perfect situation, but a past situation. That is, it can be said that auxiliary *have* in (120) does not specify a 'perfect' relation in its semantics. Here I call such relations 'tensed-perfect' relations ('t-perfect' for short), which means that a perfect form in disguise denotes a preterite

---

word from *lexeme* and neither of the rules can apply to the output.

situation. Then, the 'may' relation can take as its semantic argument the situation where the proposition of events or states of affairs is located in the relation temporally preceding 'now' and the modal's relation presents the speaker's attitude to that situation. This analysis is illustrated in the following well-formed structure description of (124).

(124)   VP

$$
\left[
\begin{array}{l}
\text{SYN} \left[\begin{array}{ll} \text{HEAD} & [\text{FORM fin}] \\ \text{SPR} & <\text{NP}_i> \\ \text{COMPS} & <\ > \end{array}\right] \\[3em]
\text{SEM} \left[\begin{array}{ll} \text{MODE} & \text{prop} \\ \text{INDEX} & s \\ \text{RESTR} \left\langle \left[\begin{array}{ll}\text{RELN} & \text{may} \\ \text{SIT} & s \\ \text{ARG} & t\end{array}\right] \left[\begin{array}{ll}\text{RELN} & \text{t-perfect} \\ \text{SIT} & v \\ \text{ARG} & t \\ \text{ARG} & \text{now}\end{array}\right] \left[\begin{array}{ll}\text{RELN} & \text{meet} \\ \text{SIT} & t \\ \text{MEETER} & i \\ \text{MET} & j\end{array}\right] \right\rangle \end{array}\right]
\end{array}
\right]
$$

|
may have met my father
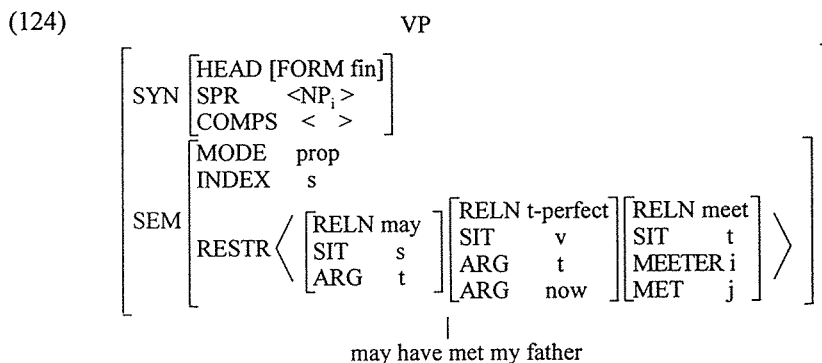
It should be noted here that this suggestion is not so unreasonable. Indeed, these 'tensed-perfect' semantics can be seen in the different distributions of auxiliary *have*.[36]

(125) a.   He regretted not having taken my advice.
      b.   He told me that he had bought a new digital camera.
      c.   He was said to have been honest.

Here the auxiliary *have* also behaves like a past tense, i.e., the events or states described by verbs including *have* are preterit ones.

Given this 'tensed-perfect' relation, the ellipsis possibilities in (126) may be explained straightforwardly.

(126)   John couldn't have been studying Spanish, but Bill could have been studying Spanish.
                                    (Akmajian, Steel and Wasow 1979:15)
(127) a.   John couldn't have been studying Spanish, but Bill could have been [e].
      b.   John couldn't have been studying Spanish, but Bill could have [e].
      c.   John couldn't have been studying Spanish, but Bill could [e].

As for (127a, b), the above discussion applies. Here I account for the acceptability of (127c). Because the semantics of the VP headed by *have* in the first conjunct involves 'tensed-perfect' relations, the output entry of the ellipsis rule for *could* can take it as

---

[36] The observation leads to the question: what is a perfect tense? This topic has been widely discussed. Though I cannot justify them, I want here to adapt that there are some aspectual meanings in auxiliary *have* and to use a 'perfect' relation in *have*'s semantics.

its semantic argument, and the lexical entry is thus fully satisfied, which projects a well-formed structure like (126c).

5   CONCLUSION

This section summarizes the three main claims that have been made and points out remaining problems in my proposal.

First, I have suggested which lexical items exhibit the perfect or progressive semantic imports and how the perfect and the progressive semantics are specified into the lexical items: the semantic perfect information is fully encoded in auxiliary *have* and a past participle has a purely morphological feature specification, while the semantics of progressive is specified in a present participle. It follows that auxiliary *be* combined with present participles does not contribute to the meanings with respect to the progressive. Then, on the basis of HPSG, I reconsidered S&W's lexical rules (Past Participle Lexical Rule and Present Participle Lexical Rule) and revised the respective lexical rules that are coherent with these observations.

Second, I claimed that VP ellipsis does not require any morphosyntactic identity between verb forms in the antecedent and the elliptical clauses. If the possibilities of VP ellipsis are actually immune to morphosyntactic identity, the analyses in terms of morphosyntax cannot account for the ellipsis that ignores inflectional morphology. The two analyses (Lasnik 1999, Oku 1998) that tried to overcome this difficulty fail to capture various patterns of VP ellipsis since they depend on the inflectional property of antecedent VPs. Then, a lexicalist approach to verbal morphology was shown to be better suited to dealing with the ellipsis construction. Moreover, S&W's Ellipsis Lexical Rule specifies that the lexicon includes lexical entries that have no complement specification and thus ellipsis structure can be generated without reference to the antecedent syntactic features.

Thirdly, I suggested that the grammaticality of VP ellipsis results from the satisfaction of semantic constraints. S&W's Ellipsis Lexical Rule faces the difficulty of an over-generating possibility and cannot predict ungrammatical ellipsis sentences because of its defective semantic feature specification. Therefore, I proposed a semantic condition on the output of the rule to supplement the incomplete semantics. An output of the rule specifies a situational argument in its relation feature. If the argument is properly identified, the ellipsis structure that the output projects is well-formed. If not identified, such a structure is ruled out in terms of lexical or phrasal satisfaction. It is semantic incoherency that blocks the identification. The observations in section 4 lead to the following generalization:

(128) A. The modal's relation cannot take a 'perfect' situation argument.
      B. The modal's situation cannot be any semantic argument of the predication's relation.
      C. The 'predicative' relation can only take a predicative situation.
      D. The temporal relation cannot take a 'perfect' situation argument.

The discussion here was confined to auxiliary *be* following present participles. It is not certain that my proposal cannot apply to copular *be* and passive *be*. The ill-formedness in (129) and (130) will be ruled out as semantic incoherency with the 'will' relation.

(129) a. *John is happy and Mary will [e].
     b. John is happy and Mary will be [e]
(130) a. *John is happy today, and he often has in the past [e].
     b. John is happy today, and he often has been in the past [e].
(Warner 1993:52)

However, the cases involving further 'ongoing' relation are still unexplained.

(131) a. *Paula was being really wilful this evening. I do wish she wouldn't [e].
     b. * John was being naughty when I arrived, and they told me that Paul had [e] earlier in the morning.   (Warner 1993:54)

Therefore, further studies are needed for copular *be*. The central issues are how it combines with the predicate AP and what semantic specification it has after Present Participle Lexical Rule. Similarly, I should observe the behaviors of passive *be* in the ellipsis construction.

REFERENCES

Akmajian, Adrian, Susan M. Steele, Thomas Wasow (1979) "The Category AUX in Universal Grammar," *Linguistic Inquiry* 10,1-64.
Imanishi, Noriko and Asano Ichiro (1990) *Shouou to Sakujo [Anaphora and Deletion]*, Taishukanshoten, Tokyo.
Kuno, Susumu (1975) "Conditions for Verb Phrase Deletion", *Foundation of Language* 13, 161-175.
Lasnik, Howard (1995) "Verbal Morphology: *Syntactic Structures* Meets the Minimalist Program," in Kempchinsky, Paula and Héctor Campos, eds., *Evolution and Revolution in Linguistic Theory: Essay in Honor of Carlos Otero*, Georgetown University Press, Georgetown.
Lasnik, Howard (1999) *Minimalist Analysis*, Blackwell Publishers, Massachusetts.
Lobeck, Ann (1995) *Ellipsis: Functional Heads, Licensing, and Identification*, Oxford University Press, New York.
Martin, Roger (1992) "On the Distribution of PRO and Control," ms., University of Connecticut.
Martin, Roger (2001) "Null Case and the Distribution of PRO," *Linguistic Inquiry* 32, 141-166.
Oku, Satoshi (1998) *A Theory of Selection and Reconstruction in the Minimalist Perspective*, Doctoral dissertation, University of Connecticut.
Okuno, Tadanori (1999) "VP Ellipsis in English," *English Linguistics* 16, 152-183.

Pollard, Carl and Ivan A. Sag (1994) *Head-Driven Phrase Structure Grammar*, University of Chicago Press, Chicago.

Potsdam Eric (1997) "English Verbal Morphology and VP Ellipsis," in *Proceedings of NELS* 27, 353-368.

Quirk, Randolph, Sidney Greenbaum, Geoffrey Leech, and Jan Svartvik (1985) *A Comprehensive Grammar of Contemporary English*, Longman Press, London.

Sag, Ivan A. (1980) *Deletion and Logical Form*, Garland Publishing, Inc., New York.

Sag, Ivan A. and Thomas Wasow (1999) *Syntactic Theory; A Formal Introduction*, CSLI Publications, Stanford.

Shumaker, Linda and Kuno Susumu (1980) 'VP Deletion in Verb Phrases Headed by *Be*,' in Kuno Sususmu, eds., *Harvard Studies in Syntax and Semantics* 3, Harvard University, Cambridge, 317-367.

Warner, Anthony R. (1993) *English Auxiliaries: Structure and History*, Cambridge University Press, Cambridge.

Zagona, Karen (1988) *Verb Phrase Syntax: A Parametric Study of English and Spanish*, Kluwer Academic Publishers, Dordrecht.

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