

Verbal Prefixation as Complex Event Composition

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1. Introduction

This paper attempts to represent the word formation process of verbal prefixation on the level of Event Structure (ES), i.e., a structural representation of aspectual meanings. Postulating that verbal prefixation is formation of a complex event on ES, we propose that the verb frame alternations provoked by prefixation is a reflection of the change in ES, associated with Lexical Conceptual Structure (LCS). It is the change in prominence properties of the verbal event that affects argument linking of prefixed verbs.

On the level of ES in the lexicon, the meaning of a verb is represented as a composite of subevents. Following Pustejovsky (1995), we propose that there is a difference in prominence among these subevents. The most prominent subevent is the head event of the whole event denoted by the verb and the participants of this head event are realized as syntactic arguments of the verb. The change of verbal argument realization provoked by prefixation is therefore regarded as the change of prominence relations among subevents of prefixed verbs.

The following sections will be concerned with the suggestion that ES representations account for the behavior of verbal prefixation including the subcategorization change caused by that. In the next section, we will survey the ES approach proposed by Pustejovsky (1995),

which is a basis of our assumption. This section briefly illustrates the notion of event composition. In the final section, we present our ES representations of verbal prefixation as complex event formation and attempt to account for various verb frame alternations.

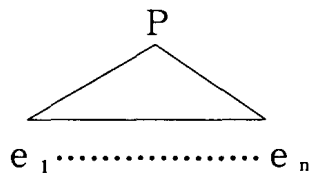
2. Event Structure; A Distinct Level of Events

While numerous preceding analyses have treated events as primitive entities in the semantic theory, Pustejovsky (1991, 1995) proposes that events are structurally composed of subevents and such subeventual structures are organized on a distinct level of events, i.e., ES. Each verb has a lexically assigned event type and Pustejovsky (1991) distinguishes these event types as follows.

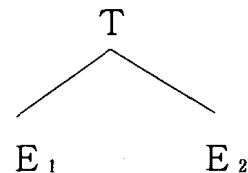
(1) a. State(S)



b. Process (P)



c. Transition(T)



(Pustejovsky 1991:56)

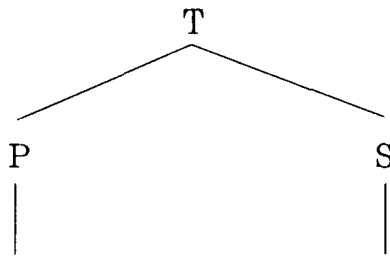
As the structures in (1) suggest, a state denotes a single event as *love* or *know* while a process is a succession of subevents whose example is such a verb as *run*. Pustejovsky (1991:56) states that a transition is an event “evaluated relative to its opposition” and thus represents the change of a situation, which is exemplified in such verbs as *open* and *build*. The variable E in (1c) stands for that any type of event is available. Therefore, Pustejovsky (1991) regulates that the possible event representations are a process, a state, and the

composition of these two event types.

Such event types do not only represent aspectual information lexically assigned to verbs but govern the structural representation of LCS. According to Pustejovsky (1991), each event type is associated with the minimal lexical concept which is referred to as LCS'. He claims that such LCS' is formally organized by ES to construct the full lexical semantic representation of the verbs, i.e., LCS. For instance, consider an example in (2).

(2)a. John closed the door.

b. ES:



LCS':[act(j, the door)&–closed(the door)] [closed(door)]

LCS:cause([act(j, the door)], become([closed(the-door)]))

(Pustejovsky 1991:58)

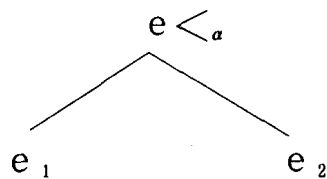
The verb *close* is an accomplishment verb to denote the change of state and thus has an ES representation of a transition, i.e., the composition of a process and a state. Each subevent is associated with the LCS' that conveys the respective conceptual meanings. Here, the process is associated with two simultaneous events of John's action toward the door and the door's state "not closed" while the following subevent represents the state that the door is closed. Since its ES representations denote that the process precedes the state, the LCS' of the process is interpreted as the preceding causing event and the LCS' of the state as the following final state. By such internal temporal information of the subevents determined by ES, their LCS's are

constructed into the full representation of LCS as represented in (2).

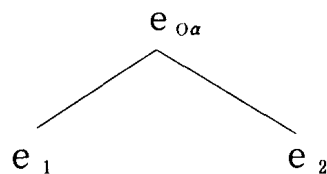
Such ES representation associated with LCS' is further refined by Pustejovsky (1995). Instead of LCS', Pustejovsky (1995) proposes the Qualia Structure, which represents essential properties of verbal meanings. All information except about verbal temporal properties, i.e., such information as the semantic concept of a subevent and the necessary numbers of event participants are specifically described in Qualia Structure. Proposing of Qualia Structure means that Pustejovsky (1995) extracts from ES semantic features such as dynamic/static distinction or causativeness, which have been treated as typical determinants of event classification. Thus, ES representation here is a purely temporal structure of verbal internal aspect.

To describe such internal temporal features of verbs accurately, Pustejovsky (1995) utilizes the notations, $<$, o , and $<o$ that represents the temporal precedence relations between the subevents. The following illustrates ES representations with the temporal annotation.

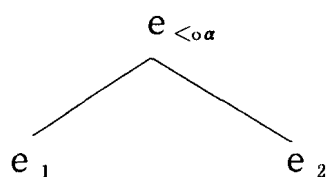
(3) a. e_1 precedes e_2 : build



b. e_1 and e_2 occur simultaneously: accompany



c. simultaneous but e_1 starts before e_2 : walk



(Pustejovsky 1995: 69-71)

As well as the temporal precedence, ES is organized by the prominence relations between the subevents. Pustejovsky (1995) refers to such prominence relations as the headedness of events and assumes that event headedness governs mapping from the lexicon to syntax.¹ The event of a verb is composed of the subevents and the most prominent subevent is defined as the head event. Headedness of the event is represented with a notation * and the event participants represented in the Qualia Structure associated with the *-assigned head event are mapped to S-structure in syntax. Such a model of mapping governed by the prominence relations of events accounts for the difference in argument realization of *kill* and *break* as follows.

The verbs *kill* and *break* are both accomplishment causative verbs but represent in distinct syntactic configurations. While the latter can be an unaccusative verb with the direct internal argument realized as the subject, *kill* disallows such usage as represented in (4).

(4)a. John broke the window. (causative)

a'. The window broke. (unaccusative)

b. John killed Mary. (causative)

b'. *Mary killed. (unaccusative)

Such a difference in the verb frame alternations results from the difference in the lexical ES representation of both verbs, i.e., the difference in the event headedness of verbal events.

The lexical representations of *kill* and *break* proposed by Pustejovsky (1995) are briefly sketched as follows.

(5) a. kill

ES= E₁ = e₁:process
 E₂ = e₂:state
 RESTR = <_a
 HEAD = e₁
 QUALIA = FORMAL = dead(e₂, y)
 AGENTIVE = kill_act(e₁, x, y)

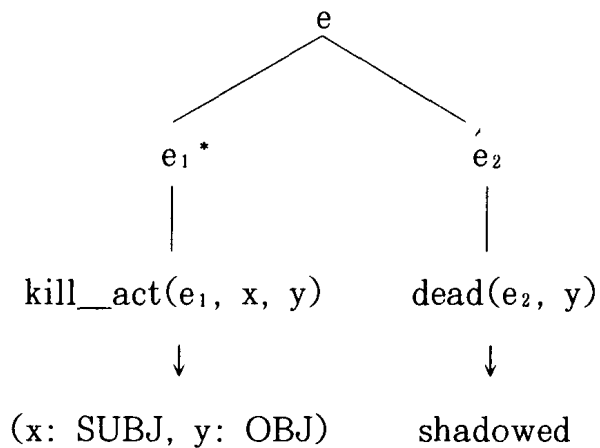
b. break

ES= E₁ = e₁:process
 E₂ = e₂:state
 RESTR = <_a
 QUALIA = FORMAL = broken(e₂, y)
 AGENTIVE = break_act(e₁, x, y)

(Pustejovsky 1995:80, 102)

By the ES representation in (5a), the verb *kill* is interpreted as a transition which is composed of the head process event preceding the final state event. Thus, it is represented as the event structure tree and associated with the qualia as follows.

(6)

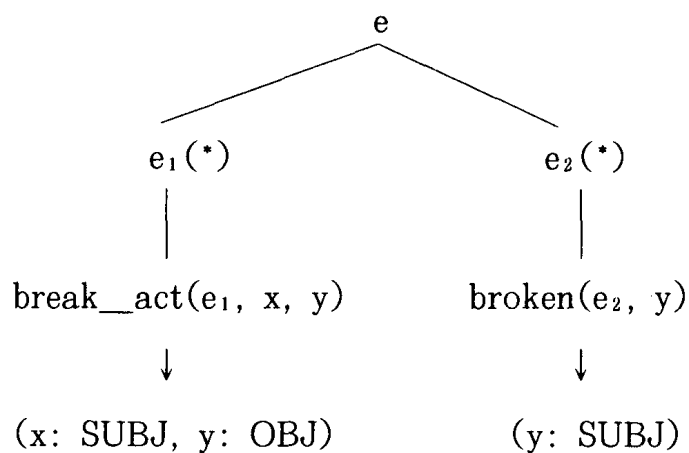


(Pustejovsky 1995: 102)

Since the qualia template that is associated with the head event e^* is projected onto syntax, the participants of the preceding event x and y are realized in syntax while the qualia associated with the following subevent is syntactically shadowed.

The lexical ES representation of the verb *break* also denotes that it is a transition composed of the process preceding the state but the head event is not lexically specified. Such headless ES suggests that both subevents are “potential heads” (Pustejovsky 1995:74) and it leads to two possible mappings from the qualia as represented in (7).

(7)



The ES representation in (7) suggests that *break* is syntactically configured with two arguments when the preceding action of breaking is focused. If the focus is in the final state, it is realized as an unaccusative verb. In the case of *kill*, such ambiguousness is impossible because its head event is lexically specified.

Assuming that argument mapping is governed by event headedness, i.e., event prominence as represented above, it seems that we can apply such a notion of the event headedness to the analysis of verb frame alternations caused by prefixation and in fact it seems to give a unitary account for the behavior of some verbal prefixes. In the next section, we will discuss such verbal prefixation associated with event representation on the basis of ES representation proposed by Pustejovsky (1991, 1995). As an illustration, we use *over*-prefixation, which causes verb frame alternations.

3 . Verbal Prefixation as Complex Event Composition

3 . 1 . The basic Ideas

Before attempting to propose a specific model of ES representation for *over*-prefixation, we would like to state the general assumption underlying our ES analysis.

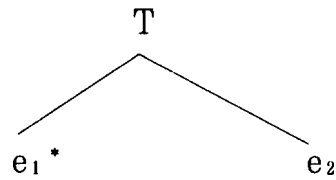
Prefixation to verbs semantically forms new verbal concepts. The concepts of verbs consist of lexical properties which represent internal temporal features of verbs. To derive a prefixed verb, then, means that the semantic function of a prefix affects the lexical and aspectual properties of the base verb.

To represent such a semantic effect of a prefix on both the lexical and aspectual properties of the base structurally, we suppose that there is a level of representation which associates verbal lexical primitives with verbal aspectual features, i.e., ES. Following Pustejovsky (1995), let us assume that ES is a subeventual structure with temporal precedence and relative prominence. Each verb has its own lexical ES associated with lexical primitives. The aspectual structure, ES, formally organizes these primitives to represent the whole lexical representation to syntax is determined by relative prominence between subevents. The arguments of the lexical primitive associated with the prominent subevent are realized in syntax.

On such a level of lexical semantic representation, verbal prefixation is described as complex event composition. As well as verbs, each prefix has its own ES and the lexical primitive. The lexical ES of the base verb is added by another subevent of the prefix, which is also associated with its own lexical primitive. Such complex lexical representation is also mapped to syntax according to prominence relations among the subevents. That is, the prominence of events is a central notion to govern lexical mapping to syntax because it is more prominent than the other subevents. The following roughly illustrates a schema of verbal prefixation as examples of such complex event composition.

(8) a. base-V

Event Structure (ES):



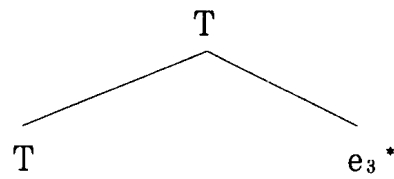
Lexical Primitive (LP):



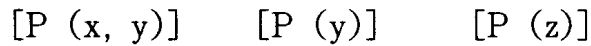
syntax

b. prefixed V

ES



LP:



syntax



syntax

Based on the assumption presented here, in the following subsections we tentatively analyze *over-prefixation*.

3.2. ES Representation for *Over-prefixation*

According to Yumoto (1997), over-prefixed verbs have various subcategorizations as follows.

(9) $\langle Vi \text{ (with a terminal event)} \rightarrow Vt \rangle$

a. overrun the line

a' . *run the line

<Vi (without a terminal event)→Vt>

b. oversleep the fixed time

b' . *sleep the time

<Vt→Vt(with the change in selectional features)>

c. overshoot {*the gun/the target}

c' . shoot the gun over the target

<Vt(a change of state)→Vt>

d. overheat the room

d' . heat the room

<Vt→Vi>

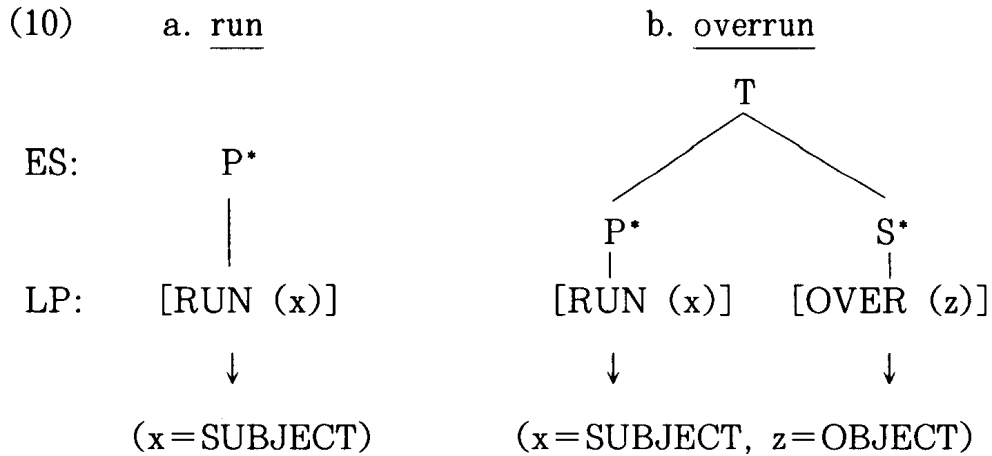
e. overeat (*apples)

e' . eat apples

By its meaning in the derived verbs and its syntactic behavior as an adverb, an adjective, or a preposition, we postulate that *over-* is lexically assigned a resultant event of state. The lexical primitive of *over-* is [OVER (z)], which denotes a state of being above the standard argument z. To attach the prefix *over-* to the base verb, i.e., to add the lexical primitive [OVER (z)] has to be added to the whole lexical concept of the base verb. Such addition of the lexical primitive is governed by the ES representation, which itself is organized by temporal precedence and relative prominence as mentioned above. The state event of *over-* is thus combined with the base ES as a final subevent, assigned with the marker *by its prominence. According to such an assumption, we will discuss each verb in (9) in the following.

We assume that the verbs *run* and *sleep* in (9a) and (9b) respectively are verbs of process and thus both of them lexically have ES representation as a single process. *Over-*prefixation to such verbs of

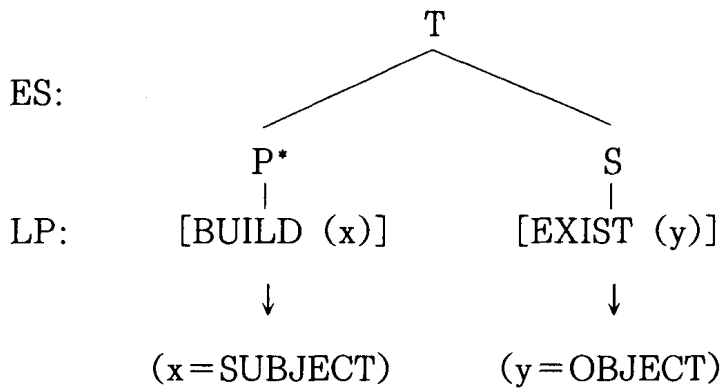
process is therefore described as follows. Here, we use *run* and *overrun* as an illustration.



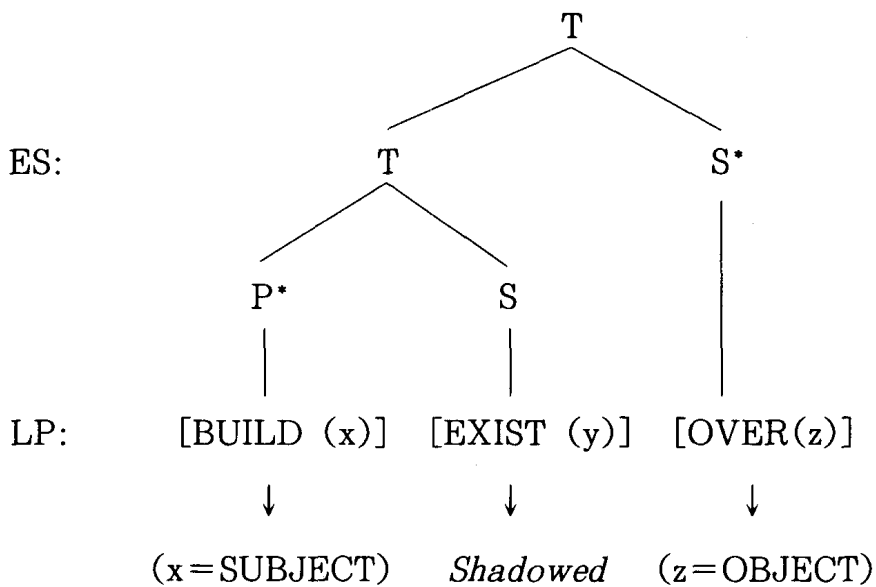
The verb *run* fundamentally denotes a process event and thus it lexically has ES representation associated with the lexical primitive as described in (10a). Because it is a single event and thus itself is the prominent event, the argument *x* in the associated lexical primitive is realized in syntax. When *over-* is attached to *run* as in (10b), the state event follows the process event of the base and thus the ES of the derived verb becomes a transition. The newly added subevent gets prominence and the argument *z* in the primitive of *over-* also appears in syntax. In this way, *overrun* takes a direct object as its subcategorization though the base verb *run* cannot.

As for *shoot* in (9c) and *eat* in (9e), we basically assume that they are represented identically in ES representation as a transition with the head process preceding the state subevent like the ES in (8a). With such an initial headed transition event, we propose that the state event of the prefix is situated as a sister to T in ES configuration.² The following shows such ES composition with a typical initial event-headed *build*.

(11) a. build



b. overbuild



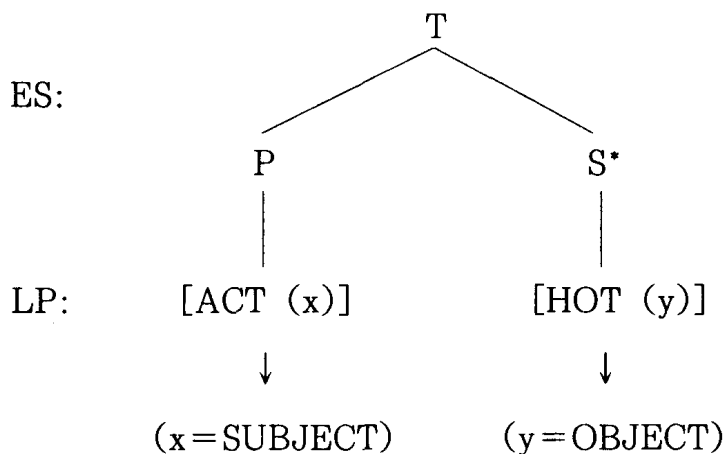
The base verb *build* in (11a) is represented as a simple transition whose head process and subsequent state are associated with the lexical primitive [BUILD (x)] and [EXIST (y)] respectively. According to the temporal precedence relation between the subevents, which is organized by ES configuration, it is construed from these lexical primitives that *x*'s act of building brings about the existence of *y* and the prominent argument *x* is realized as a subject while *y* becomes a direct object.

When *over-* is prefixed to such an initial headed transition event, the state event of the prefix [OVER (z)] is added to represent a

recursive transition as illustrated in (11b). Based on the primitives in the ES representation, the prefixed verb is interpreted as meaning that *x*'s act of building brings about the existence of *y* and this event of 'bringing about' exceeds *z*. Within the higher transition event, the state event of the prefix gets more prominence than the preceding transition event of the base verb because it is new lexical information attached to the verb. Thus, the argument *z* of the head event is mapped to syntax instead of *y*, which leads to a difference in acceptability of *overbuild the city* and **overbuild houses* (Yumoto 1997: 186).

Of all the verbs represented in (9), *overheat* is rather exceptional in that it does not change its subcategorization from that of the base verb. Such a difference can also be drawn from its ES representation. The verb *heat* is a verb which denotes the change of state and thus assumed to have ES with the final subevent as its head. Thus its lexical representation is considered to be the following.

(12) heat



To attach the lexical primitive of *over-* [OVER (*z*)] to the lexical concept of *heat*, the base should be associated with its own state event

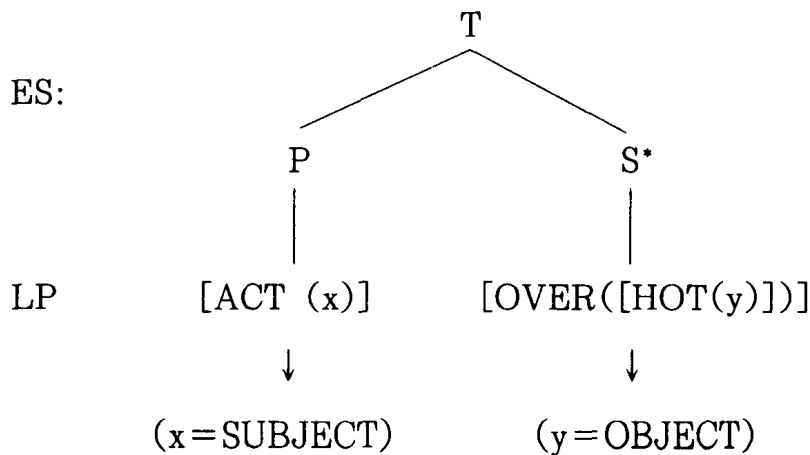
as in the case of *overbuild*, which is illustrated in (11b). However, the event representation, which eventually provoke the subcategorization change, contradicts the fact in (9d) and (9d'). We have to propose a different event composition from that of (11b).

Here, we tentatively assume that the sequence of the prominent state shown in (13) is disallowed.

(13) [...P...& S*] S*]

That is, it is impossible for one lexical item to denote the event which refers to both the previous state and the present state. To avoid such a sequence of the prominent states, we assume that the primitive [OVER(z)] is associated with the prominent state subevent of the base verb as represented in (14).

(14) overheat



Such lexical representations lead to the same argument realization as the base and yet adequately interpret the lexical conceptual meaning of *overheat*, i.e., *x*'s acting causes the state of exceeding in hotness.

In this section, we have attempted to describe verbal prefixation relating to the verbal aspectual meaning level ES. The representations suggested here are merely rough sketches which suggest a possible way to represent verb frame alternations and thus need much refinement and elaboration, for instance, how arguments in the lexical primitives are realized in syntactic categories. However, the possibility of decomposing the internal aspectual properties of verbs seems to suggest that they are highly structuralized and play an essential part in determining the argument realization of the verbs.

4 . Conclusion

In this paper, we have considered verbal prefixation as complex event formation and represented a general idea of describing prefixation as event formation on the level of ES, i.e., a distinct level of lexical representation, associated with lexical semantic concepts.

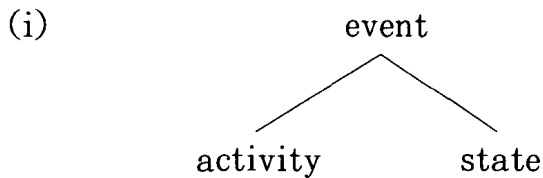
Though we are not able to show the validity of our tentative proposals, verbal prefixes in English definitely require explanation which is related to their aspectual properties since most prefixes affect their aspectual features of the base verbs. Those prefixed which have effects on verbs are not limited to English. It is pointed out that German prefixes often denote the Aktionsart, i.e., the lexical aspect of verbs. For instance, the German prefix *auf-* denotes that the prefixed verb is inchoative and *ver-*prefixation adds the resultative reading to the bases.

Thus, although our proposals here leaves unsolved a great number of particular problems, we believe that aspectual considerations on the lexicon-syntax interface themselves will explain the behavior of verbal

prefixes in the near future.

Notes

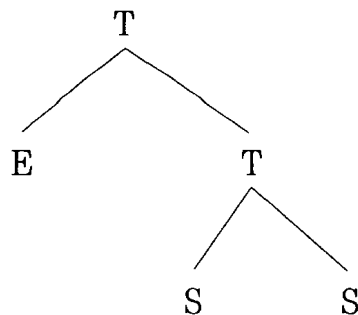
¹Such an idea that prominence relations determine the argument realization of verbs is also proposed by Grimshaw (1990). Postulating the following ES, Grimshaw (1990) generalizes that an argument which participates in the first subevent in an event structure is more prominent than an argument which participates in the second subevent.



Partly depending on a thematic hierarchy, Grimshaw (1990) assumes that the most prominent event of the verb becomes an external argument to be realized as the subject in D-structure.

²Van Hout (1998: 106) proposes a similar recursive transition to represent Dutch periphrastic causatives as follows.

(i) laten breken 'let break'



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