The purpose of this paper is to argue that the well-formedness of -ing nominal compounds can be explained in terms of event feature checking. Specifically, it is proposed along the lines of Borer (1994), Egerland (1998) and Van Hout (2000) that the non-delimitedness of the event described by an -ing nominal expression must be checked by incorporating a non-delimiter overtly or covertly into the -ing nominal head. It is shown that this proposal enables us to provide a unified account of the well-formedness of not only -ing nominal compounds but also their related nominalizations.*

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Keywords: -ing nominal compound, incorporation, non-delimitedness checking
on a certain parallelism in argument realization between compounds and their related nominalizations, with the aim of providing a unified analysis of -ing nominal expressions in a principled way.

The specific questions to be addressed in this paper are spelled out in (1).

(1) a. Why is it that the arguments of a verb do not occur freely as the first element of an -ing nominal compound?
   b. Why is it that -ing nominal compounds exhibit similar patterns of argument realization to those of -ing forms derived through nominalization?

The latter question in particular deserves serious discussion because it suggests the possibility that the well-formedness of -ing nominal compounds is determined by a general principle that governs -ing nominal expressions as a whole rather than by a rule or principle relevant only to compounding. As far as I know, this question has been addressed only partially without a wide range of empirical investigation in the literature (cf. Selkirk (1982) and Grimshaw (1990), among others).

To answer the questions in (1), I propose, along the lines of Borer (1994), Egerland (1998) and Van Hout (2000), that -ing nominal expressions involve event feature checking. Specifically, it is claimed that the non-delimitedness of the event described by an -ing nominal expression must be checked by incorporating a non-delimiter into the -ing nominal head. It follows that objects which are assumed to be non-delimiters appear within compounds.

This paper is organized as follows. Section 2 presents basic facts about -ing nominal compounds, and then critically discusses previous studies on them. In section 3, pointing out that the semantics of -ing nominals is closely related to argument realization, we introduce the framework of the event feature checking theory, within which a new analysis is proposed. In sections 4 and 5, we show that the proposed analysis can account for the well-formedness of not only compounds but also their related nominalizations in a uniform way. In section 6, some implications of the present analysis for other verbal compounds are discussed. Section 7 concludes this paper.

2. Basic Facts and Previous Studies

It has been observed that -ing nominal compounds cannot be formed freely (cf. Roeper and Siegel (1978), Selkirk (1982), Kageyama (1985),
Itoh (1985), and Itoh and Sugioka (2002), among others). An important observation is that objects can appear within -ing nominal compounds, while subjects cannot, regardless of the types of verbs involved.\(^1\) Consider (2).

(2)  
  a. Flower-arranging (by experts)  
  b. *Expert-arranging (of flowers)

As the grammaticality contrast between (2a) and (2b) shows, the objects of transitive verbs are allowed to be the non-head constituents of -ing nominal compounds, whereas their subjects are not. Similarly, the subjects of intransitive verbs cannot be the non-head constituent, as illustrated in (3) and (4), where the compounds based on unergative and unaccusative verbs are given, respectively.

(3)  
  a. *student-talking  
  b. *girl swimming  
  c. *dog barking  

(4)  
  a. *earth quaking  
  b. *population growing  
  c. *rain falling  

(Itoh and Sugioka (2002: 49))

(5)  
  a. *earth quaking  
  b. *population growing  
  c. *rain falling  

(ibid.: 50)

These basic facts concerning -ing nominal compounds lead some researchers to the postulation of a certain lexical rule or principle, by which a particular element is specified as a candidate for the non-head constituent of the compounds. Thus, Roeper and Siegel (1978) propose the so-called ‘First Sister Principle’ in (5).\(^2\)

(5) All verbal compounds are formed by incorporation of a word in the first sister position of the verb.  
(Roeper and Siegel (1978: 208))

Therefore, the specified element, which is an object in many cases, is required to be incorporated. This kind of approach is taken by Selkirk

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\(^1\) This statement might not be precise, because compounds like church-going and theater-going are attested. However, as Kageyama (1985: 4-5) notes, such compounds are unproductive and irregular, so that they are excluded from our discussion.

\(^2\) Roeper and Siegel (1978) (and studies which will be mentioned below in the text) deal with various verbal compounds, including not only -ing forms but also -er, -ing\(_{\text{Adj}}\), and -en\(_{\text{Adj}}\) forms (e.g. taxi-driver, cop-hating (men), and expert-tested (food)). Therefore, (5) is stated to accommodate all of them. As we mentioned earlier, this paper primarily focuses on -ing nominal compounds, though the other compounds will be touched upon as long as they are relevant to our discussion (see sections 3.1 and 6).
(1982), Lieber (1983), Itoh (1985), and others, though they differ from each other in specification of the element to be incorporated; for instance, Lieber (1983) argues that the internal arguments of verbs must be incorporated.

Van Hout and Roeper (1998) try to explain the facts in (2)–(4) from a configurational viewpoint. Specifically, they argue that -ing nominal compounds are derived in syntax rather than in the lexical component, and that the suffix -ing is attached to the lower VP within a VP-shell structure: compounds contain the lower VP as their underlying structure. If they contain the lower VP where an object is assumed to be base-generated, then a subject is excluded from compounding. That is because it is base-generated in a higher position.

However, these kinds of approach, lexical or configurational, are conceptually and empirically flawed. As for the lexical one, it is difficult to see why objects, rather than subjects, need to be specified as non-head constituents of -ing nominal compounds. To put it differently, this approach lacks a principled motivation for allowing the incorporation of a particular element. The same conceptual problem holds for the configurational approach as well: there is no principled motivation for assuming that the suffix -ing is base-generated at a particular VP level. In other words, the approach merely restates in terms of a syntactic configuration the fact that subjects are excluded from compounding. Furthermore, an empirical problem arises when we consider the fact that all objects cannot be incorporated, as shown in (6).

(6)  a. *parent-resembling
    b. *car-having

This fact cannot be captured by either of the two approaches, and calls for an explanation.

To sum up, we have shown that the previous studies on the formation of -ing nominal compounds face some conceptual and empirical difficulties. What we should emphasize in particular is that they do not provide a principled explanation for why objects must be incorporated.

3. An Alternative Analysis: Non-delimitedness Checking

In this section, within the framework of the event feature checking theory advocated by Borer (1994), Egerland (1998) and Van Hout (2000), we propose an alternative analysis which we believe can lead us to a deeper understanding of what is responsible for the well-formed-
ness of -ing nominal compounds (and their related nominalizations). Before going into the details of the framework to be adopted, it will be necessary and worthwhile to discuss why such a framework should be adopted.

3.1. The Binding Function of Suffixes

As we discussed in section 2, the subject/object asymmetry exists in -ing nominal compound formation. A question naturally arises as to the origin of the asymmetry. A closer look at other verbal compounds such as -er compounds gives us a clue to answering this question. The same subject/object asymmetry is observed in -er compounds, as illustrated in (7).

(7)  
a. taxi-driver (cf. The man drives a taxi.)
b. *man-driver (cf. The man drives a taxi.)

This might point to the priority of objects over subjects in the selection of the non-head constituents of -er compounds. However, this turns out not to be the case, when we take into consideration the semantic or referential properties of -er compounds. As is well known, a nominalizing suffix binds (or absorbs) an argument of its base verbs to determine the semantics of derived nouns (cf. Lieber and Baayen (1999)). In the case of -er suffixation, the suffix binds the subject argument of its base verbs, with the result that -er nominals generally refer to the agent. Therefore, the independent realization of the bound argument (i.e. the subject argument) is banned by a condition like the Theta-Criterion: in -er compounds, Agent cannot be realized either as the -er nominal head itself or as the non-head constituent.

This indicates that the binding of a subject argument by the suffix -er is closely related to argument realization patterns in -er compounds. If this is correct, the same would hold for -ing nominal compounds as well, since they also contain the nominalizing suffix -ing. What argument, then, is bound by the nominalizing suffix -ing? It is evident that it does not bind thematic arguments, because both subjects and objects can be realized in -ing nominal compounds, as illustrated in (8).

(8)  
a. the book-reading by students
b. John's flower-arranging

3 This is also true of -ing_{Adj} and -en_{Adj} compounds, which will be discussed in section 6.
Sproat (1985) and Krivokapic (2000) instead propose that the nominalizing suffix -ing binds the Event argument (in the sense of Higginbotham (1985)), a non-thematic argument that the base verbs have in their argument structures. This means that -ing nominal compounds are event-denoting. Evidence for this comes from (9), where -ing nominal compounds occur as the subjects of the predicate is taking two hours, which requires an event-denoting nominal as its subject.

(9)  
   a. The book-reading is taking two hours.
   b. The flower-arranging is taking two hours.

Given Sproat’s and Krivokapic’s proposal and the discussion of -er compounds, we are naturally led to assume that the fact that -ing nominal compounds refer to some event plays a key role in determining their argument realization patterns.

Having pointed out the guiding idea that the semantics of -ing nominal compounds has to do with their argument realization patterns, we are now in a position to discuss how this can be implemented. It is implausible to invoke a condition like the Theta-Criterion, since -ing nominal compounds are eventive unlike -er compounds. Rather, it is more plausible to assume that argument realization in eventive -ing nominal compounds should be captured under a certain event-sensitive theory. We propose that the event feature checking theory advocated by Borer (1994), Egerland (1998) and Van Hout (2000) provides a basis for capturing argument realization in -ing nominal compounds. In the remainder of this section, the details of this theory will be discussed, followed by a discussion of how to extend it to an analysis of -ing nominal compounds.

3.2. The Event Feature Checking Theory

It has been often pointed out that the event structure of verbs correlates closely with their syntactic behavior. Thus, according to Tenny (1987, 1994), the formation of nominal passives, auxiliary selection and Case marking, among others, are all governed by whether or not the event described by a verb is delimited (i.e., whether or not it has a terminal point). This indicates that (non-)delimitedness is of great importance in capturing the various patterns of syntactic behavior of verbs and that it must be accommodated somehow in a grammatical theory. Along these lines of reasoning, Borer (1994), Egerland (1998) and Van Hout (2000) claim that (non-)delimitedness must be identified in the syntactic structure through feature checking for event interpretation at
LF, as well as for the licensing of particular syntactic phenomena. Their fundamental assumptions relevant to the present discussion are summarized in (10), putting aside some technical and terminological details for expository purposes.4

(10) Checking of (Non-)delimitedness in Syntax
   a. There is an event feature relevant to (non-)delimitedness, which is introduced in derivation and must be checked.
   b. The checking relation is established by raising a (non-)delimiter to the Spec position of a functional head with an event feature (Aspect in Borer (1994) and Egerland (1998) or AgrO in Van Hout (2000)) projected above a lexical head such as V.
   c. An element base-generated in object position qualifies as a (non-)delimiter.

(11) a. We built a house (in a year/*for a year). = a delimited event
    b. [... [AspP a housei [Asp' ASP/+delimited/ [VP built ti]]]

The sentence we built a house expresses a delimited event, as we can see from its compatibility with the in-phrase rather than the for-phrase: a building event has a terminal point in the sense that the event cannot continue once the house has been built. As shown in (11b), therefore, the Aspect head (or the AgrO head) is specified as [+delimited], and the delimiter a house is required to raise to [Spec, AspP] to check the [+delimited] feature of Asp. As a result, delimitedness checking takes place, ensuring that a delimited event interpretation is obtained at LF.

A comment is in order here as to what counts as a (non-)delimiter. Note that the object argument a house in (11a) plays a crucial role in delimiting a building event (or measuring out a building event in Tenny’s (1987, 1994) terminology): to what extent that event is progressing and whether or not it has finished can only be recognized by

4 Although Van Hout (2000) uses the term ‘telicity’ rather than ‘delimitedness’ with no essential differences between them, the latter term is used in this paper, following Borer (1994) and Egerland (1998).
looking at a house. Notice that the subject argument we has nothing to do with event-measuring, since the temporal progress of a building event cannot be identified by looking at we. The object a house thus functions as a delimiter: it delimits a building event because of its definite quantity.

This difference between subjects and objects with respect to event-measuring is corroborated by two syntactic tests. One is concerned with the count or mass properties of NP, which affect the (non-)delimitedness of the relevant events (cf. Van Voorst (1988), Tenny (1987, 1994) and others). As illustrated in (12), count noun objects yield delimited events, whereas mass noun objects yield non-delimited events.

(12) a. Chuck ate an apple (*for an hour/in an hour).
b. Chuck ate ice cream (for an hour/*in an hour).

(Tenny (1994: 24))

By contrast, the count/mass distinction in subjects does not affect (non-)delimitedness, as shown in (13).

(13) a. Mary killed the rosebush (by overwatering) in a day/*for a day.
b. Snow killed the rosebush in a day/*for a day. (ibid.: 28)

This indicates that only objects are involved in event-measuring.5 The other test is to examine which argument correlates with adverbs like halfway relevant to event-measuring. Consider (14).

(14) a. Mary ate an apple halfway.
b. Mary ate half an apple. (ibid.: 19)

(14a) has a similar meaning to that of (14b). This shows that the object an apple is closely related to the temporal progress of the eating event. On the other hand, (15a) cannot have the meaning of (15b).

(15) a. Mary ate an apple halfway.
b. *Half of Mary ate an apple. (ibid.)

This indicates that the subject Mary has nothing to do with the temporal progress of the eating event.

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5 This phenomenon is not observed in the case of unaccusative verbs, though their arguments are assumed to be underlying objects (cf. Van Hout (2004)). This means that unaccusatives always describe delimited events regardless of whether mass or count nouns are used. This will be discussed in more detail in section 4.3, where we propose that unaccusatives reject -ing suffixation, which requires its derivatives to have a non-delimited reading. I owe this point to an anonymous reviewer.
To sum up, these two syntactic tests confirm the distinction between subjects and objects with respect to event-measuring.

Another comment is needed here. Borer (1994) claims that non-delimitedness must be checked as well as delimitedness. In this paper, we argue with Borer (1994) that non-delimitedness should be checked. Its necessity and advantage will become clear, as we discuss in detail in the following sections, with some theoretical departure from her analysis. Therefore, we assume that the sentence (16) involves non-delimitedness checking, since it expresses a non-delimited event.

(16) We built houses (for a year/*in a year). = a non-delimited event

Note that as discussed above, the mass property of the object houses leads to a non-delimited event: houses functions as a non-delimiter in the sense that it does not delimit a building event because of its indefinite quantity (i.e., it cannot make a given event delimited).6

3.3. Non-delimitedness Checking in -ing Nominal Expressions

Having illustrated the event feature checking theory adopted here, we are now ready to discuss how it can be extended to an analysis of -ing nominal compounds. A first step will be to examine whether or not -ing nominals, which are deverbal, have an event structure just like their base verbs. Recall that we argued in section 3.1 that -ing nominal compounds refer to some event. This holds for -ing nominalizations as well, as illustrated in (17), where both the -ing nominal compound and its related nominalization are compatible with the predicate is taking two hours.

(17) a. The flower-arranging is taking two hours.
   b. The arranging of flowers is taking two hours.

6 A full discussion of various theoretical consequences of the present proposal that non-delimitedness is checked as well as delimitedness is beyond the scope of this paper. One significant consequence would be that Asp is specified as [+delimited] or [-delimited], depending on the type of event expressed by VP. Specifically, a [+delimited] Asp selects VP like eat an apple, while a [-delimited] Asp selects VP like eat apples. One of its advantages would be to facilitate the mapping from syntax to semantic interpretation through checking; it would be unclear how a non-delimited event interpretation is ensured without non-delimitedness checking. Similar proposals are made by Felser (1998) and Ritter and Rosen (1997) in analyzing the clause structures of perception and causative verbs.
However, the fact that -ing nominals are event-denoting regardless of whether their argument is realized morphologically or syntactically is not enough to guarantee that they have an event structure. Grimshaw (1990) convincingly argues that deverbal nominals are classified mainly into two types: complex event nominals which have an event structure and an argument structure just like their base verbs, and simple event or result nominals which do not. Therefore, what is important here is whether or not -ing nominals can be regarded as complex event nominals. There is every reason to assume that they are complex event nominals. (18) and (19) indicate that they exhibit the syntactic properties typical of complex event nominals: they must take their arguments obligatorily and they do not allow determiners other than the definite article the, among others (cf. Grimshaw (1990)).

(18)  a. (Relentless) *(whale-)hunting will endanger our own future (Oshita (1995: 185))  
    b. The/*/a/*/one/*/that taxi-driving John did exhausted him.  
       (Di Sciullo (1992: 75))

(19)  a. (Relentless) hunting *(of whales) will endanger our own future (Oshita (1995: 184))  
    b. The *A/*/one/*/that shooting of rabbits is illegal.  
       (Grimshaw (1990: 56))

Given these facts, it would be plausible to conclude that -ing nominals are complex event nominals. It is important to note, however, that the event types described by -ing nominals are not the same as those described by their base verbs. Brinton (1998) and Hayase (1996) observe that -ing nominals always bear process readings rather than the same event readings as their base verbs. This event type change can be highlighted when accomplishment verbs are involved whose event structure is composed of process and result state.

Let us begin by noting that adverbs such as completely and absolutely which imply result state modify accomplishment verbs such as withdraw and eliminate, as illustrated in (20).

(20)  a. We withdrew Belgian troops completely.  
    b. We eliminated foreign dependencies absolutely.

With this in mind, consider the compatibility of the corresponding -ing nominalizations with adjectives such as complete and absolute which require eventive nominals implying result state.

(21)  a.*?the complete withdrawing of Belgian troops  
    b. *the absolute eliminating of foreign dependencies
As (21) show, withdrawing and eliminating are not compatible with complete and absolute, respectively. This indicates that -ing nominalization yields a process construal.

The incompatibility with adjectives denoting result state is also observed in the case of -ing nominal compounds, as shown in (22).

(22) a. *the complete bridge-constructing
    b. *the complete troop-withdrawing

Furthermore, the in/for-adjunct test that we saw in (11) can also be used for corroboration of our argument. Compare (23) with (24).

(23) a. We constructed a bridge in a year.
    b. I ate an apple in ten minutes.

(24) a. the bridge-constructing for a year/*in a year
    b. the apple-eating for ten minutes/*in ten minutes

Given the discussion above, we are led to conclude that the events described by -ing nominal expressions (i.e. compounds and nominalizations) are always process.7 To put it in terms of (10), -ing nominal expressions always describe non-delimited events, and their object arguments serve as non-delimiters.8 This generalization seems to be the

7 This should not be understood to indicate that -ing nominals are not complex event nominals. Note that Grimshaw’s definition of complex event nominals is that they are nominals with event and argument structures, but not necessarily ones describing complex events divided into their subparts.

8 Of course, we are not arguing that this is true of all -ing nominals. What is claimed here is that this holds for -ing nominals which are classified as verb-like complex event nominals. Therefore, -ing nominals which are regarded as simple event or result nominals are out of the scope of this generalization, since they are lexicalized and undergo a semantic drift (cf. Grimshaw (1990)). Some clear examples of such nominals are given below:

(i) building, finding, writing, saving, making...
In fact, these nominals exhibit a distinct behavior with respect to compounding, as shown in (ii), where the subjects are incorporated.

(ii) government-building, scientist-finding, student-writing
In this paper, we will not deal with -ing nominals like (i), since the examples in (ii) are best analyzed as root compounds, that is, pure [N+N] compounds.

Furthermore, a reading of -ing nominals is also sensitive to syntactic environments where they are used. An anonymous reviewer points out that sentences like those in (iii) are acceptable with a delimited reading.

(iii) a. We were surprised at John’s eating of ten apples in a minute.
    b. The felling of all these trees in a day was hard work.
It seems that two factors are responsible for the delimited reading of these examples.
case, regardless of the types of verbs; see a relevant discussion of sta-
tive, process (unergative) and achievement (unaccusative) verbs in sec-
tions 4 and 5, where it will be shown that they lack their corresponding
-ing nominal expressions because of their own event properties. Therefore, let us assume that -ing nominal expressions involve non-
delimitedness checking. However, it is implausible to assume that
checking takes place through Spec-Head agreement in the case of com-
pounds, since the non-head constituents which are X^0 categories cannot
move to Spec position of XP, if we adopt any version of the Structure
Preserving Constraint, which will require X^0 to move to head position.
Rather, it is natural to propose that checking takes place through Head-
Head agreement in compounds, namely incorporation of a non-delimiter
into an -ing nominal head, and that this holds for nominalizations as
well, given that a single checking configuration is desirable for theoreti-
cal reasons.

This proposal receives an additional piece of theoretical support when
we take into account the event type change in -ing nominalization
observed above. (Empirical evidence for this proposal will be present-
ed in discussing concrete examples in the following sections.) Smith
(1991) and Snyder (1998) present an incorporation analysis of event
type changes. Specifically, they argue that in (25b), the object cake
must be incorporated into the accomplishment verb ate (cf. (25a)) to
form a ‘single’ verb with a process interpretation at LF.

(25)  a. John ate the cake in five minutes.
    b. John ate cake for five minutes.   (Snyder (1998: 136))
An intuitive motivation for this incorporation analysis is that event type
changes related to Aktionsart must be captured at the level of lexical
projections, rather than functional projections above them. Notice that
this intuition can be naturally recast under our proposal that event fea-

One is the existence of the quantized or definite objects, which serve to make a
delimited reading available. However, as we will discuss in section 5, such objects
in general are not allowed in -ing nominals (see (45)). In fact, informant data sug-
gests that the use of definite objects tends to depend on their immediate contexts.
Another factor might be the well-known coercing nature of adverbials like infor-
phrases, which can cancel an unmarked reading and force a marked reading which is
required for contextual reasons (cf. Smith (1991)). For instance, the sentence John
ate the ice cream for one minute can mean that John ate a particular ice cream for a
period of time and then abandoned it—he did not finish eating the ice cream.
ture checking takes place in the domain of -ing nominal projections which are lexical. Therefore, I propose (26) for the well-formedness of -ing nominal expressions.

(26) A non-delimiter must be incorporated overtly or covertly into an -ing nominal head to enter into a checking relation with a [-delimited] feature of the head at LF.

(26) makes a rather strong prediction that if non-delimitedness checking does not take place in a given -ing nominal expression for some reasons, that expression is not allowed. In the following sections, it will be shown that this prediction is borne out.

4. Explaining the Well-formedness of -ing Nominal Compounds

4.1. Compounds Based on Transitive Verbs

In this section, we present an account of the well-formedness of -ing nominal compounds derived from transitive verbs.

Relevant examples are given in (27) and (28), where the subjects cannot be incorporated.

(27) a. Flower-arranging (by experts)
    b. *Expert-arranging (of flowers)

(28) a. Book-reading by students
    b. *Student-reading of books (Grimshaw (1990:17))

Objects are also selected as the non-head constituents of -ing compounds when they compete with adjuncts. This is shown in (29), where the adjunct vase cannot be incorporated instead of the object flower.

9 This might lead to a potential problem; namely X0 categories such as compounds are too ‘small’ to accommodate aspectual properties, given the well-known fact that they are normally determined by predicates (e.g. verb + object) rather than verbs alone. It is indeed true that compounds like book-reading are X0 categories, but they have complex structures internally, containing the information about objects which would be projected within the lexical domain in the syntactic structure. Therefore, such a potential problem can be circumvented in the case of compounds. Note that it does not arise for nominalizations such as the reading of books, since they are XP categories.

10 We assume that checking takes place at LF rather than in overt syntax, since it is evident that objects in nominalizations such as the destroying of cities do not undergo overt movement. This means that a [-delimited] feature is weak in the sense of Chomsky (1995).
(29)  a. Flower-arranging in vases  
    b. *Vase-arranging of flowers (ibid.: 15)

These facts can be explained under the analysis presented in section 3.3 by appealing to the establishment of an appropriate checking relation between an -ing nominal head and a non-delimiter. Before going into concrete discussion, let us first introduce our fundamental assumptions concerning compounding, which seem to be standard (cf. Selkirk (1982), Grimshaw (1990) and Oshita (1995) among others). Suppose that -ing nominal compounds are formed in the lexical component and that compounding takes place after -ing nominalization. This means that compounds like flower-arranging have an internal structure like (30).

(30) \[[[\text{flower}]_N [[[\text{arrange}]_V \text{-ing}]_N]]_N\]

Moreover, given the aspectual property of -ing nominalization (cf. (21)-(24)), we are naturally led to assume that the suffix -ing intrinsically bears a [-delimited] feature, which is percolated into an -ing nominal head (e.g. arranging in (30)).

We are now ready to discuss (27)-(29) in detail. Consider first (27) and (28), taking the former as examples. The relevant LF representations for the compounds in (27) are given in (31).

(31)  a. \[\text{NP} \left[ \text{N' [N [N flower][N arranging]] (by experts)} \right] \]  
      \[\text{Non-delimitedness checking}\]

    b. *\[\text{N [N expert][N arranging]]} \]  
      \[\text{*Non-delimitedness checking}\]

    c. *\[\text{NP [N' [N [N expert][N arranging]] of flowers]} \]  
      \[\text{*Incorporation}\]

In (31a), which is an LF representation of (27a), the object flower is within the compound: it is overtly incorporated into the -ing nominal head arranging in the lexical component. Therefore, the [-delimited] feature of arranging is successfully checked against flower through Head-Head agreement at LF, since flower is an object and qualifies as a non-delimiter (see (10c)).\textsuperscript{11,12} Consequently, (27a) is licensed as a well-

\textsuperscript{11} This should not be taken to indicate that a mechanism like checking 'sees' a grammatical relation like objecthood. Rather, more technically, checking 'sees' the [-delimited] feature of an argument which would be mapped into the object position
formed compound, regardless of whether by experts is projected or not.

Let us next turn to (27b), where the subject is selected as a non-head constituent. As (31b) shows, the subject expert is overtly incorporated. However, it is not a non-delimiter. Recall that a subject has nothing to do with event-measuring, as pointed out in section 3.2. Hence, *expert-arranging is not licensed as a well-formed compound, since the checking requirement of arranging is not satisfied.

Consider next a more complicated version, where the object is projected as PP. (We tentatively assume of-phrases to be PP; see note 21 for a brief discussion on the status of of.) In (31c), expert cannot enter into a checking relation with arranging, either. It might be possible for flowers in (31c) to be incorporated covertly into arranging for checking. Unfortunately, however, the covert incorporation of flowers cannot apply, since expert has been incorporated into arranging overtly. There is no room for flowers, if Keyser and Roeper (1992) are correct in arguing that only one element can occupy an incorporated position.13 Consequently, since the checking requirement of arranging is not satisfied, (27b) becomes an ill-formed expression, even if the object is projected.

Let us next consider the contrast between (29a) and (29b), which is also accounted for in a similar fashion. In (29a), a Head-Head relation for non-delimitedness checking can be established between the non-

in the syntactic structure. We assume that a [-delimited] feature is assigned to the relevant argument at the level of argument structure of either a verb or its -ing nominal, depending on how to characterize inheritance of argument structure in nominalization. For an extensive discussion of inheritance in nominalization, see Randall (1988), Grimshaw (1990) and Lieber and Baayen (1999), among others, though the explanation in the text remains unchanged if either option is taken.

12 A question might arise as to whether or not a Head-Head relation which has been established in the lexical component is visible at LF. Of particular relevance to this question is the Principle of Lexical Integrity, which bans syntactic rules such as extraction from referring to elements within X0 (cf. Lapointe (1979)). If the essence of this principle is that parts of X0 are invisible, our arguments in the text would collapse. However, Ackema (1999) argues that parts of X0 are visible in syntax, and that the actual effects of the principle can be explained from different perspectives. Give this, it can be assumed that a Head-Head relation established before syntax is still visible for checking at LF. Note also that a mechanism like checking is outside the scope of what has been captured by the principle.

13 In this paper, a position occupied by an incorporated element will be referred to as an incorporated position.
delimiter flower and the head arranging. Checking takes place without any problem, and (29a) is grammatical. In (29b), on the other hand, the adjunct vase cannot enter into a checking relation with arranging, since it is not a non-delimiter. Furthermore, the required covert incorporation of flowers is not possible, as in the case of (31c). Hence, the ungrammaticality of (29b).

As is clear from the discussion above, our account of the well-formedness of -ing nominal compounds depends crucially on the possibility of non-delimitedness checking at LF rather than some particular compounding rule which directly specifies particular elements like objects as non-head constituents. This suggests that general economy considerations favor our checking analysis, since event feature checking is assumed to be required, by its nature, in all eventive expressions.

However, one might point out that since an object in fact is incorporated, our analysis merely restates object incorporation in compounding in terms of checking, just as Van Hout and Roeper (1998) do in terms of a syntactic configuration (see section 2). Notice, however, that we propose that a non-delimiter must be incorporated for checking. It will be predicted that objects cannot be candidates for incorporation, unless they are non-delimiters. Among such objects will be those of stative verbs. As discussed in section 3.2, event-measuring concerns the temporal progress of a given event. This presupposes that a measurable event must be actualized or instigated, for example, by the relevant agent. However, Bouchard (1995) and Van Voorst (1988) note that statives have neither beginning nor end; more specifically, they are not actualized or instigated. Hence, statives are not compatible with the notion of event-measuring; their objects are characterized as neither delimiters nor non-delimiters. Given this, we expect that -ing nominal compounds derived from stative verbs are not acceptable. This is the case, as observed in (6), repeated here as (32).

(32) a. *parent-resembling
    b. *car-having

14 I am grateful to an anonymous reviewer for bringing Bouchard’s (1995) book to my attention. In the present analysis, arguments verbs take are classified into three: delimiting objects, non-delimiting objects and others. The last class involves such arguments as subjects, adjuncts, and objects of stative verbs, none of which has anything to do with event-measuring.
Therefore, the examples in (32), which we argued above count as counterexamples to the previous analyses, not only serve as evidence for the present analysis, but also suggest that the above-mentioned problem can be avoided.

Before concluding this section, we should address the adequacy of the assumption that only one element can occupy the incorporated position of an -ing nominal head. If this assumption is correct, it will be predicted that -ing nominal compounds are not compatible with elements which are claimed to be incorporated into verbs in the literature, assuming that such elements must be incorporated into deverbal nominals in the case of nominal expressions. Thus, particles and resultative phrases are taken to be such elements (cf. Snyder (1995)). Therefore, they can be used for testing our prediction. Now consider (33) and (34).

(33)  a. *the article-looking over  
      b. *the problem-thinking through  
      c. *the apple-eating up

(34)  a. *the house-painting red  
      b. *the corn-grounding fine  
      c. *the stone-crushing into pieces

(33) show that particle constructions lack their corresponding compounds; (34) show that resultative phrases are not allowed in compounds. Hence, particles and resultative phrases cannot be incorporated into the relevant nominal heads, suggesting that only one element can occupy an incorporated position.

4.2. Compounds Based on Ditransitive Verbs

Let us now turn our attention to -ing nominal compounds derived from ditransitive verbs. There are two argument realization patterns in -ing nominal compounds based on ditransitive verbs. One is observed in compounds based on verbs like give. When verbs such as give are bases for compounding, nouns corresponding to their direct objects appear in -ing compounds. As illustrated in (35), the direct object gift can appear within the compound, whereas the indirect object child cannot.

(35)  a. Gift-giving to children  
      b. *Child-giving of gifts  

(Grinshaw (1990: 14))

The other pattern of argument realization is observed in -ing nominal compounds based on verbs such as spray and load. The direct
object/indirect object asymmetry is not observed, as illustrated in (36),
though the (a) example is slightly degraded.

(36)  a. ?wall-spraying with paint
      b. paint-spraying on the wall
      c. truck-loading with hay
      d. hay-loading onto the truck

The facts in (35) and (36) can be given a natural explanation under
the present analysis. Tenny (1994) argues that indirect objects are not
involved in event-measuring. If Tenny’s argument is correct, the gram-
matical contrast between (35a) and (35b) is explained straightforwar-
dly. The checking requirement of giving is satisfied only in the former.
On the other hand, it is a well-known fact that the verbs in (36) exhibit
the Locative Alternation as in (37).

(37)  a. We sprayed the wall with paint.
      b. We sprayed paint on the wall.
      c. We loaded the truck with hay.
      d. We loaded hay onto the truck.

This means that both locatum arguments such as paint and hay and
location arguments such as the wall and the truck may occupy the
direct object position. This in turn suggests that both arguments can
serve as non-delimiters, and hence all the examples in (36) are gram-
matical, with the checking requirement of the -ing nominal heads satis-
fied.

4.3. Compounds Based on Intransitive Verbs

This section discusses how our analysis accounts for the behavior of
-ing nominal compounds derived from intransitive verbs. Let us start
our discussion by reviewing the fact that such compounds are unaccept-
able. Some examples are repeated here as (38) and (39), in which
unergatives and unaccusatives are used, respectively.

(38)  a. *student-talking
      b. *girl swimming

(39)  a. *earth quaking
      b. *population growing

Consider first (38). Our analysis requires a non-delimiter to enter
into a checking relation with an -ing nominal head. This requirement,
however, cannot be satisfied in (38), because the subject of unergative
verbs is not a non-delimiter like that of transitive verbs (see (10c)).
Hence, the examples in (38) are ruled out.\textsuperscript{15}

Consider next (39). One might argue that (39) cannot be explained under the present analysis, since the argument of an unaccusative verb is generally assumed to have the same status as the object of a transitive verb in underlying structure. Examples like those in (39) might be predicted to be grammatical. A solution to this potential problem, however, lies in the aspectual property of the suffix \textit{-ing} itself. Alexiadou (2001) and Itoh and Sugioka (2002) claim that the suffix \textit{-ing}, which requires its derivatives to bear process readings, cannot be attached to unaccusative verbs, which generally describe achievement events whose internal structure does not contain a process component. Their examples in (40) and (41) illustrate this.

\begin{align*}
\text{(40)} & \quad \text{*the arriving of John} \\
& \quad \text{(cf. the arrival of John)} \quad \text{(Alexiadou (2001: 51))}
\end{align*}

\begin{align*}
\text{(41)} & \quad \text{a. *The growing of the third world population is a serious problem. (cf. The growth of ...)} \\
& \quad \text{b. *A changing of this dreadful weather would be nice. (cf. The change of ...)} \quad \text{(Itoh and Sugioka (2002: 51))}
\end{align*}

Given their claim, it can be assumed under the present analysis that unaccusatives cannot express non-delimited events and their arguments cannot be non-delimiters but always delimiters. In fact, Van Hout (2004) notes that unaccusatives cannot express non-delimited events even if mass nouns are used as their arguments (see the discussion of the mass/count properties of arguments in section 3.2). Therefore, the unacceptability of (39) can be attributed to the failure of non-delimitedness checking because of the absence of non-delimiters.\textsuperscript{16, 17}

\textsuperscript{15} An anonymous reviewer poses the question how the fact that sentences with unergative verbs like \textit{John swam (for an hour)} are well formed with a non-delimited reading can be captured under the present analysis, in which non-delimiters are required for non-delimitedness checking. One possibility is that unergative verbs have implicit non-delimiters expressing a path, as suggested by Tenny (1994: 75–78). If this is the case, the non-delimited events of unergatives would be ensured through non-delimitedness checking. The existence of such implicit elements might be supported by the fact that compounds such as \textit{distance-walking} and \textit{distance-swimming} are well-formed, where the overt path elements are incorporated.

\textsuperscript{16} As an anonymous reviewer points out, some unaccusative examples like (i) are acceptable.

\begin{align*}
\text{(i) a. the melting of the ice} & \quad \text{(Grimshaw (1990: 122))} \\
& \quad \text{b. the burning of wood} \quad \text{(Pustejovsky (1995: 165))}
\end{align*}
5. Consequences: Syntactic Realization of Arguments in \textit{-ing} Nominalizations

We have shown that the present checking analysis provides a natural explanation for the well-formedness of \textit{-ing} nominal compounds. It should be emphasized, however, that it is a general analysis that covers all \textit{-ing} nominal expressions, as stated in (26). Therefore, it is necessary to show that our analysis makes correct predictions about argument realization patterns in \textit{-ing} nominalizations. An important prediction is that compounds and their related nominalizations behave symmetrically with respect to the possibility of argument realization, since non-delimitedness checking would be basically the same in both cases, apart from the overt/covert distinction of incorporation of non-delimiters. Of particular relevance here is \textit{-ing} nominalizations related to unergatives, statives, transitives, give-type ditransitives, spray/load type ditransitives, particle constructions, and resultative constructions (if the facts concerning unaccusatives are excluded, which were already discussed in section 4.3).

Let us now examine whether or not our prediction is borne out.

We do not have a full explanation of why (i) are acceptable in contrast to (40) and (41). Notice that melting and burning lack their corresponding derived nominals and zero-derivatives, unlike the nominals in (40) and (41) (e.g. arrival, growth, and change\textit{N}). This suggests the possibility that they fill the lexical gaps. More specifically, they exceptionally have a delimited meaning which the missing derived nominals or zero-derivatives would have (see Brinton (1998) and Hayase (1996) for a detailed discussion of the delimited reading of the latter). If this is correct, they may be listed as such in the lexicon, just as derived nominals are (cf. Itoh and Sugio (2002)). Therefore, (i) would be exceptionally allowed, exempt from non-delimitenedness checking.

\textsuperscript{17} Kageyama (1985) notes that in Old English and Middle English, it was possible to create \textit{-ing} (or \textit{-ung}) nominal compounds based especially on unaccusative verbs. As an anonymous reviewer suggests, it might be the case that in earlier stages of English, the arguments of unaccusatives could be non-delimiters. Alternatively, as mentioned in note 16, the non-existence of competing nominals with Latinate suffixes such as \textit{-ion} may have been relevant, since they were introduced into English in the Middle English period and their status as deverbal nominals was established in the Early Modern English period (cf. Nakao (1972)). Although a full discussion of this historical change would lead to our deeper understanding of the present issues, it is outside the scope of this paper and will be left for future research.
First, consider nominalizations based on unergatives and statives. It was proposed in section 4 that both the subject of unergatives and the object of statives cannot be non-delimiters. Therefore, it is predicted that the relevant -ing nominalizations are not acceptable because of the failure of non-delimitedness checking. This prediction is correct, as demonstrated in (42) and (43).\textsuperscript{18}

(42) \begin{enumerate}
\item a. the acting of John
\item b. the walking of John \hfill (Sproat (1985: 247))
\end{enumerate}

(43) \begin{enumerate}
\item a. the resembling of parents
\item b. the having of cars
\end{enumerate}

Secondly, consider whether or not the subject/object asymmetry is observed with nominalizations derived from transitive verbs. The following examples indicate that this is the case.

(44) \begin{enumerate}
\item a. the destroying of cities
\item b. the destroying by the enemy
\end{enumerate}

In (44a), the object cities can be realized syntactically, whereas in (44b), the subject the enemy cannot. This is explained, if we assume with Snyder (1995, 1998) that compounding, or incorporation can apply at LF. Specifically, in (44a), the non-delimiter cities can be covertly incorporated into destroying for checking reasons, thereby leading to successful non-delimitedness checking.\textsuperscript{19} On the other hand, there is no non-delimiter in (44b), and thus the checking requirement of destroying

\textsuperscript{18} An anonymous reviewer points out that the expression the roaring of lions is acceptable, contrary to the prediction of our analysis. However, it seems that roaring is regarded as a simple event or result nominal, because it can take the demonstrative that (e.g. that roaring) and can be pluralized (e.g. roarings) (see (18) and (19)). Therefore, the expression in question would not count as a counterexample to our analysis.

\textsuperscript{19} Note that covert incorporation creates ‘invisible’ compounds such as cities-destroying. Such compounds at first glance might not fit in with the generalization that plural forms do not appear within normal compounds such as *taxies-driving and *taxies-driver.

However, it is necessary to examine exactly where this generalization is derived from. One possibility is that it is derived from the order of inflectional suffixation and compounding; within the framework of Lexical Morphology, the former is assumed to take place after the latter in the stratified lexicon (cf. Kiparsky (1982) and Katamba (1993)). If this is correct, ‘invisible’ compounds such as cities-destroying would not be excluded, because ‘covert’ compounding is assumed to take place at LF (clearly after inflectional suffixation).
The availability of covert incorporation in (44a) will lead to a further important prediction: if covert incorporation really takes place in examples like (44a), it obeys a general constraint on head movement. Hayase (1996) makes an interesting observation that the objects of -ing nominals tend to be bare plural forms rather than definite forms, as shown in (45).

(45) a. the destroying of churches
b. ??the destroying of {the/one/the last} church
c. the establishing of branches
d. ??the establishing of the newest branch in the capital

(Hayase (1996:257))

If the bare plural forms in (45a, c) are taken as NP without D projections and the definite forms in (45b, d) as DP, (45) can be explained by appealing to the condition on head movement in (46).

(46) The Proper Head Movement Generalization (PHMG)
A lexical category cannot move into a functional category and then back into a lexical category. (Baker (1996:284))

In (45a, c), there is no functional category between destroying and establishing and churches and branches, respectively. Therefore, churches and branches can raise to destroying and establishing, respectively, without violating (46). In (45b, d), on the other hand, the head D exists between the -ing nominal heads and the nominal heads of the objects. Therefore, church and branch cannot raise to destroying and establishing, respectively, without violating (46). Note that the head D cannot be skipped because of strict cyclicity of head movement.21

If the discussion above is on the right track, it also counts as empirical evidence for our proposal that a Head-Head relation is important for non-delimitedness checking in -ing nominal expressions rather than a

20 Although the unacceptability of (44b) is not against what our analysis predicts, the issue of what is really responsible for the unacceptability might arise, if the different status of subjects and objects in argument-taking nominals is taken into consideration: the former are projected optionally, whereas the latter are projected obligatorily (cf. Grimshaw (1990)). This means that the argument requirement as well as the checking requirement of destroying is not satisfied in (44b). The same complexity would arise for the unacceptability of compounds like *expert-arranging.

21 A comment needs to be made as to the existence of of between -ing nominal heads and nominal heads of objects. Note that (46) does not apply here, if the syn-
Spec-Head relation as suggested in the previous analyses. If a Spec-
Head relation is required for checking here, the contrasts in (45) would
remain unexplained, since both NP and DP objects would be allowed to
raise to the Spec positions of -ing nominal heads or those of functional
heads above them.

Related to this discussion of covert movement of objects is the fact
that the passive form of -ing nominalizations is impossible, as illustrated
in (47) and (48).

(47)  a. *The tree’s felling
      b. *The city’s destroying  (Grimshaw (1990: 83))

(48)  a. *Trees’ felling
      b. *Cities’ destroying

Given the general condition that lowering of elements is banned, the
unacceptability of these examples is also accounted for: for instance, in
(47), tree and city cannot lower to felling and destroying for covert
incorporation, respectively.

Let us turn to the discussion of the argument realization patterns in
- ing forms of ditransitive verbs which are derived through nominaliza-
tion. It was shown in section 4.2 that give-type verbs and spray/load-
type verbs exhibit different patterns of argument realization in com-
pounding. Therefore, the same kind of difference is predicted to be
observed in nominalization as well.

(49)  a. the giving of presents to children
      b. *the giving of children of presents

(50)  a. the spraying of walls with paint.
      b. the spraying of paint on the wall.
      c. the loading of trucks with hay.
      d. the loading of hay onto the truck.

The examples in (49) with give-type verbs indicate that the nominaliza-
tion of the ‘dative’ form is acceptable, whereas that of the ‘double
tactic category of of is taken to be P. However, if this is correct, another problem
might arise, since cyclic head movement requires N to move first to P and then the
[N-P] complex to move to -ing nominal heads, thereby leading to a complicated
Head-Head configuration. This problem might be solved by assuming that of is
inserted at PF or that it is a genitive marker (Alexiadou (2001)). Another possibili-
ty is that N excorporates without carrying P along, in accord with the economy prin-
ciple of Watanabe (1993), which favors movement of N alone over movement of a
[N-P] complex, unless P has some feature(s) relevant for checking.
FORMATION OF -ING NOMINAL COMPOUNDS AND EVENT FEATURE CHECKING

object' form is not, a phenomenon which reminds us of the direct/indirect object asymmetry as observed in compounding. By contrast, as shown in (50) with spray/load type verbs, there is no acceptability difference between the two alternating expressions.

These facts are explained as follows. In (49a), covert incorporation of the direct object presents into giving can establish a proper checking relation. This might be true of (49b), since presents is realized. However, the indirect object children intervenes between presents and giving: it is located in a closer position to giving than presents. If closeness plays a crucial role in deciding the possibility of movement for checking (the Minimal Link Condition (cf. Chomsky (1995: 294–297)), presents cannot undergo covert incorporation into giving across children. In (50), on the other hand, the locatums paint and hay in (50b, d), respectively, and the locations walls and trucks in (50a, c), respectively, are all direct objects and therefore non-delimiters. They can all undergo covert incorporation into the relevant -ing nominal heads.

Finally, let us consider particle and resultative constructions. We showed in section 4.1 that both constructions lack their corresponding -ing nominal compounds, which we argued points to the competition between non-delimiters and particles or resultative phrases for incorporated positions. As illustrated in (51) and (52), basically the same situations hold for nominalizations as well, though the acceptability judgments vary in (52).22

22 As for the acceptability of examples like (52), there are discrepancies in the literature too: Abney (1987) judges them to be unacceptable; Carrier and Randall (1992) give the opposite judgments. My informants' judgments are close to Abney's except for (52c), to which a full explanation cannot be given here.

It should also be noted that the judgments on (51) tend to be sensitive to the positions of the particles: (51) sound good to some extent if the -ing nominal heads are immediately followed by the particles. However, it is not clear that this undermines the present analysis, since it might be the case that this is a reflection of the close relationship between base verbs and particles. Thus, Tenny (1994:180) suggests the possibility that verbs and particles are lexicalized as single words when the former are immediately followed by the latter. Given this possibility, it would follow that particles do not need to be incorporated in such cases. Note that the -ing nominals and the particles are not lexicalized as single words in (51), in which they are not adjacent to each other. Therefore, we believe that (51) can be used for testing our prediction.
(51) a. *the looking of articles over
b. *the thinking of problems through
c. *the eating of apples up
(52) a. *the painting of houses red
b. *the grounding of corn fine
c. the crushing of stones into pieces

Therefore, this would be taken to show that incorporating two elements into \textit{-ing} nominal heads covertly is not possible and lend support to the present analysis.

6. Implications for Other Verbal Compounds

So far, we have argued that the present checking analysis can explain in a uniform way the behavior of both \textit{-ing} nominal compounds and their related nominalizations. Before concluding this paper, we will briefly discuss some implications of our analysis for \textit{-er}, \textit{-ing}\textsubscript{Adj}, and \textit{-en}\textsubscript{Adj} compounds, which are classified as verbal compounds (cf. Roeper and Siegel (1978)). Specifically, our analysis implies that all verbal compounds are not governed by a single rule or principle, contrary to the previous studies (cf. Roeper and Siegel (1978), Selkirk (1982), and Lieber (1983), among others).

The present analysis of \textit{-ing} nominal expressions is based on the idea that argument realization in deverbal nominals is closely related to the semantic or referential property of the relevant nominalizing suffix, as discussed briefly in section 3.1. Recall that in the case of \textit{-er} compounds, unlike objects, subjects cannot be incorporated, because the latter are bound by the suffix \textit{-er}, and therefore they are already 'realized' by \textit{-er} nominals themselves. This is illustrated in (7), repeated here as (53).

(53) a. taxi-driver
b. *man-driver

A similar observation holds for \textit{-ing}\textsubscript{Adj} and \textit{-en}\textsubscript{Adj} compounds. Grimshaw (1990) and Oshita (1995) suggest that adjective-forming suffixes also have a binding function, which specifies the external argument of newly formed adjectives. Consider (54) and (55).

(54) a. exam-hating (man)
b. *man-hating (exam)
(55) a. expert-tested (food)
b. *food-tested (expert)
In (54), the suffix \(-ing_{\text{Adj}}\) specifies \text{man}, the subject of the base verb \text{hate}, as the external argument of the adjective \text{hating}. Therefore, \text{man} cannot be incorporated, since it must be projected independently for modification. Similarly, in (55), the suffix \(-en_{\text{Adj}}\) specifies the object \text{food} of the base verb \text{test} as the external argument of the adjective \text{tested}. Therefore, \text{food} cannot be incorporated, because it needs to be modified by \text{tested}.

Given the discussion above, it would not be implausible to suppose that the well-formedness of each verbal compound is explained by the relation between the binding function of each suffix and the relevant mechanism in grammar (for example, the Theta-Criterion in (53) and some modification rule in (54) and (55)). Of course, a number of questions remain to be answered. Among them is why objects are incorporated instead of adjuncts in \(-er\) compounds (e.g. *\text{city-driver of taxis}). Oshita (1995) provides some suggestions based on the prominence of event participants. However, if the above lines of argument are on the right track, it will provide an additional theoretical motivation for the present analysis of \(-ing\) nominal compounds.

7. Concluding Remarks

In this paper, we have discussed what governs the well-formedness of \(-ing\) nominal compounds, with special reference to the parallel behavior in argument realization between them and their related nominalizations. It was argued that non-delimitedness checking plays a crucial role in accounting for the argument realization patterns in a wide range of \(-ing\) nominal expressions and the parallelism between compounds and nominalizations.

The checking analysis proposed here involves as its part covert incorporation at LF, or ‘invisible’ compounding in the syntactic component. It presupposes the view that morphological operations are not restricted to the lexical component, but are available in both the lexical and syntactic components (see Yoon (1996) for zero derivation, or conversion, Alexiadou (2001) for suffixation, and Snyder (1995, 1998) for compounding, among others). Therefore, to the extent that our analysis succeeds in treating the present issues, it will be taken to lend empirical support to this view of interaction between morphology and syntax.
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