Resultatives: A Joint Operation of Semantic and Syntactic Structures

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One of the most challenging aspects of the analysis of resultative constructions in English is the appearance in some cases of what we might call a "nonthematic object," an object that is not a semantic argument of the verb of the clause. This aspect challenges the claim that the grammatical functions of a clause are determined by the lexical properties of the verb of the clause. We need to abandon this claim, while still capturing the observation that we don't freely get nonthematic objects.

In this paper, I first present the problem posed by resultatives to standard assumptions in LFG and I show that there is no adequate solution to the problem preserving these assumptions. I then explore a solution in which the a-structure of resultatives is derived from the event structure of resultatives, which is compositionally derived from the information in the lexical items that make up the resultative clause. Hence, the a-structure of the clause may be different from the a-structure of the verb of the clause. This solution relates the syntactic alternation in the number of grammatical functions involved to the semantic alternation in the event structure of the construction. I lastly address a potential problem posed by the existence of passive forms based on resultatives with nonthematic objects: if the nonthematic object is not part of the lexical information of the verb, and if passivization is a lexical operation, how can the nonthematic object passivize?

1 The Problem

A theory of argument structure and its mapping to grammatical functions has to address the fact that verbs that are ordinarily used as intransitives are used with an object in resultative constructions. We will call this object a *nonthematic object*, although we will see later that this term is somewhat inappropriate. Resultative constructions with nonthematic objects are illustrated in (1).

(1) a. The dog barked the neighbors awake.

    b. Fred shouted himself hoarse.

    c. Lucy sang her daughter asleep.

It is important to note that the verbs in (1) cannot take an object if the clause does not include a resultative phrase, but must take an object if the clause includes a resultative phrase, as the unacceptability of (2) and (3) indicates. We could say that these verbs are obligatorily transitive in a resultative construction, but obligatorily intransitive elsewhere. (Ignore the depictive reading of (4) and similar examples.)

(2)   *The dog barked the neighbors.

(3)   *The dog barked awake.

It is standard to assume that whether a clause is transitive or not is exclusively dependent on whether the verb of the clause is transitive or not. In earlier days, this idea was captured by having all lexical items include a list of the grammatical functions that they take. So, for example, a verb like *keep* would be assumed to have the lexical specification that it takes a subject and an object, and a verb like *bark* would be lexically specified to take only a subject. In Kaplan and Bresnan 1982, this would be represented as in (4).

(4) a. *keep*:   ($\uparrow$ PRED) = 'KEEP$\langle$($\uparrow$ SUBJ) ($\uparrow$ OBJ)$\rangle$'

   b. *bark*:   ($\uparrow$ PRED) = 'BARK$\langle$($\uparrow$ SUBJ)$\rangle$'

These representations indicate that each of the grammatical functions included in the angled brackets correspond to a semantic argument, or thematic role, of the predicate. In the early days, the correspondence between grammatical functions and argument slots was stipulated for each lexical entry. Later work, such as L. Levin 1986, Bresnan and Kanerva 1989, and others, proposes regularities in the function-argument correspondence. Yet, in this work too, this correspondence is assumed to be specified in the lexicon. Most work in LFG, both past and present, assumes that the transitivity of a clause is determined by the transitivity of its verb and this information is represented as a list of grammatical functions in the lexical entry of the verb in question, essentially as in (4).

Various principles of the theory (e.g., Completeness and Coherence) ensure that an f-structure includes all and only those "governable" functions that its PRED feature specifies, the PRED feature being the feature exemplified in (4). The PRED feature of *bark* in (4b) will enable us to explain the unacceptability of an example like (2), where the verb *bark* takes an object. However, this theory would wrongly lead us to expect example (1a) to be unacceptable, as the same verb takes an object, and example (3) to be acceptable, as this verb appears without an object. The problem is how to require an intransitive verb to take an object only when the same clause includes a resultative phrase. A solution to this problem that is consistent with the assumptions discussed is to assume that, along with a lexical entry like (4b), the verb *bark* has another lexical entry, which includes a subject, an object and a predicative complement that is predicated of the object, represented in (5).

(5)   *bark*:   ($\uparrow$ PRED) = 'BARK$\langle$($\uparrow$ SUBJ) ($\uparrow$ OBJ) ($\uparrow$ XCOMP)$\rangle$'

A lexical rule would relate intransitive lexical forms such as (4b) to transitive lexical forms such as (5). While this solution is one that works formally, it has many problems, some of which we will examine now.

First problem: relating syntactic alternation to semantic alternation. When the verb *bark* is used without a resultative phrase and therefore without an object, as in (6a), the clause it appears in is an activity, using the terminology of event types proposed in Vendler 1967. When it is used with a resultative phrase and therefore also with an object, as in (6b), the clause is an accomplishment.

(6) a.   The dog barked.

   b.   The dog barked the neighbors awake.

Sentence (6b) entails a new state, that of the neighbors being awake, whereas sentence (6a) does not entail a new state. Accomplishments entail a result state, whereas activities don't. In addition, the event expressed in (6a), like all activities, does not include an endpoint; the event expressed in (6b), like most accomplishments includes an endpoint: the event is finished when the result state (e.g., the neighbors being awake) is attained. One of the ways to bring out this difference in aspectual type is by using a temporal frame adverbial such as *in five minutes*, etc., as in (7).

(7) a.^(*)The dog barked in five minutes.

   b.   The dog barked the neighbors awake in five minutes.

Sentence (7b) means that the event of the dog barking the neighbors awake finished within the time span of five minutes. Sentence (7a), on the other hand, cannot mean that the event of the dog barking finished within the time span of five minutes, but is only acceptable, and perhaps marginally so, with the interpretation that the event of the dog barking *started* within the time span of five minutes. This difference is characteristic of the distinction between activities and accomplishments. Several other diagnostics show that the nonresultative (6a) is an activity and the resultative (6b) is an accomplishment.

   An explanatory theory has to relate the syntactic transitivity alternation to the semantic aspectual alternation. It has to explain why a verb that is syntactically intransitive and semantically an activity when used without a resultative phrase can appear in a clause that is syntactically transitive and semantically an accomplishment when used with a resultative phrase.

   Second problem: semantic alternation without syntactic alternation. The presence of a resultative phrase does not always require an object that would otherwise not be allowed. If the verb of the clause in which the resultative phrase appears is transitive independently of this phrase, the clause includes the same number of direct functions as it would without the resultative phrase. Verbs such as *wipe*, *kick*, or *kiss* are all used with an object, whether it is followed by a resultative phrase or not, as illustrated in (8). Yet, the presence of the resultative phrase with these verbs changes the aspectual event type of the sentence from an activity to an accomplishment, as the use of a temporal frame adverbial in the two sentences in (9) reveals:

(8)   The frog kissed the princess (awake).

(9) a.   The frog kissed the princess awake in five minutes.

   b.^(*)The frog kissed the princess in five minutes.

Whereas (9a) means that the event described was completed within the time span of five minutes, (9b), if anything, means that the event described started within the time

span of five minutes. Other tests indicate that example (8) with the resultative phrase is an accomplishment and example (8) without it is an activity. Thus, a resultative phrase makes a clause that would otherwise be an activity an accomplishment without necessarily requiring an additional object. This shows that the semantic alternation can occur without the syntactic alternation in the number of direct functions required.

Third problem: resultatives without an object. We have seen that resultative constructions based on an activity verb must include an object, whether the verb is transitive or not outside of this construction. However, there is a class of intransitive verbs that do not, and cannot, take an object when used in the resultative construction. These are intransitive verbs that denote a change of state, such as *freeze*, *close*, *grow*, etc., whose resultative use is shown in (10).

(10)   The river froze solid.

The adjective phrase following the verb expresses a state resulting from the event described by the rest of the clause: (10) means that the river became solid as a result of its freezing. Unlike what happens when a resultative phrase is used with an intransitive activity verb like *bark*, the resultative phrase is not predicated of an object in (10), but of the subject. In fact, a nonthematic object cannot appear with an intransitive change of state verb in a resultative construction. In cases such as (10), the presence or absence of the resultative phrase does not affect either the aspectual properties of the sentence, which is a change of state or achievement in either case, or the direct functions required, which is only one in both cases.

These three problems indicate that an explanatory account of the appearance of nonthematic objects in resultative constructions cannot confine itself to the syntactic aspects of the phenomenon: it must take into account the semantic aspects of the construction. The analysis must explain why (a) the inclusion of a resultative phrase in a clause with an activity verb makes the clause an accomplishment, whereas (b) the inclusion of a resultative phrase in a clause with an achievement verb does not affect the aspectual type; and why (c) a resultative phrase requires an object with an activity verb that is otherwise intransitive, but not with an achievement verb.

The analysis of the resultative construction cannot be a lexical one, because it would fail to capture the idea that the aspectual alternation arises in the syntax, through the semantic composition of the various syntactic units. In essence, the syntactic and semantic properties of a resultative construction come not only from the verb of the construction, but also from the resultative phrase. In the next section, I propose an analysis of resultative constructions along these lines developing ideas in Levin and Rappaport Hovav 1995 and in Pustejovsky 1991.

2   The Analysis

One of the ideas that I will assume in this analysis is that the syntactic structure of a clause in terms of its grammatical functions is constrained by its argument structure (a-structure), which in turn is constrained by the semantic structure of the clause. There are many aspects of meaning in a linguistic expression; some of them,

but not all, are grammatically relevant, that is, relevant for other aspects of linguistic structure. Following Mohanan and Mohanan 1996, I will call the semantic information that is grammatically relevant *grammatical semantics*, or GS for short. As argued in Alsina in preparation, I assume that the representation of event structure is an important component of GS. In the analysis that follows, the representation of event structure plays an important role in explaining the facts of resultative constructions. I start out by presenting a system of representations for the different aspectual event types. Then I show how these representations constrain the a-structure, which in turn constrains the f-structure and c-structure, these constraints being expressed as mapping principles. Finally, I show how these representations and mapping principles explain the facts of resultative constructions.
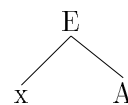
2.1 The Representation of Event Structure

There is considerable evidence indicating that the four aspectual event types proposed by Vendler 1967 are grammatically significant. Therefore, the distinction between activities, states, achievements, and accomplishments should be part of GS, given the hypothesis that all and only the semantic information that is grammatically relevant is represented at GS. The linguistic evidence that supports this four-way distinction is presented in Dowty 1979, also discussed in Pustejovsky 1991, Alsina in preparation, among others. Here, I merely present the representations of event structure proposed in Alsina in preparation, based on the proposals in Pustejovsky 1991.

The fundamental assumptions about event structure are (a) that there is a primitive distinction between activities and states, (b) that these two event types are simple in that they are not composed of other event types, (c) that achievements and accomplishments are complex in that they are composed of two events temporally ordered the second one of which is a state, and (d) that they are distinguished because the first subevent in an accomplishment is an activity, whereas the first subevent in an achievement is unspecified. Thus, we can represent a one-argument state, with predicates such as *hard*, *soft*, *black*, or *white*, as in (11a), and we can represent a one-argument activity, with predicates such as *laugh*, *smile*, or *bark*, as in (11b).
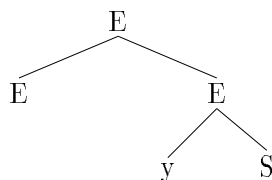
(11) a. State:
           E
       x   S
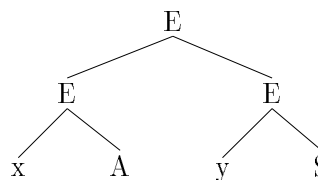   b. Activity:
           E
       x   A
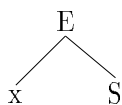
These representations show that both states and activities are event structures, labelled "E," which consist of an argument (or more), represented by any letter of the alphabet such as "x," and a predicate. An event whose predicate is an S is a state, and an event whose predicate is an A is an activity.

Achievements and accomplishments are distinguished because in accomplishments the temporally first subevent is specified as an activity, whereas in achievements it is unspecified (a semantically empty event). The event structure representation of a one-argument achievement is given in (12a) and that of a two-argument accomplishment is given in (12b). The temporal relation between the two subevents in these representations gives the interpretation that the second subevent, the state, is

(12) a. Achievement: b. Accomplishment:

```
          E                                              E
         / \                                            / \
        E   E                                          E   E
           / \                                        / \ / \
          y   S                                      x  A y  S
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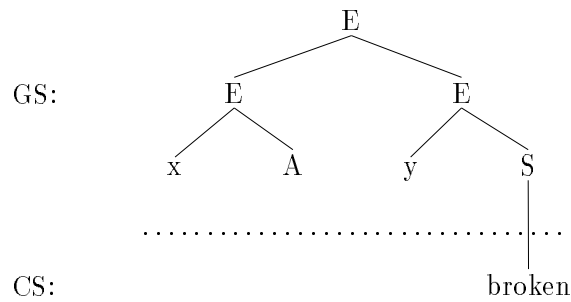
the result of the first subevent. If the first subevent is unspecified, as in (12a), the
interpretation is simply the coming about of the state corresponding to the second
subevent. If the first subevent is specified as an activity, as in (12b), the interpretation
is that the first subevent causes the second subevent.

It is important to note that the distinction between *hard* and *soft* or between
laugh and *smile* is not grammatically relevant and therefore is not represented at GS
(grammatical semantics). It is represented at the level of conceptual structure (CS for
short), which is the linguistic level of representation that interfaces with nonlinguistic
cognitive modules and can be thought of essentially as Jackendoff's 1990 conceptual
structure. Notice that the notions of "coming about" or "causation" are not directly
represented in (12), but can be read off these representations. We can assume that
these notions are represented at CS. As we shall see shortly, in the mapping from GS
to CS, the achievement configuration in (12a) requires the inclusion of the predicate
become at CS introducing the conceptual structure corresponding to the state, and
the accomplishment configuration in (12b) requires the inclusion of the predicate
cause instead. An important feature of these representations is that they allow us to
capture the relationship between the transitive and intransitive members of verbs that
exhibit the causative alternation, to use Levin and Rappaport Hovav's 1995 term, in
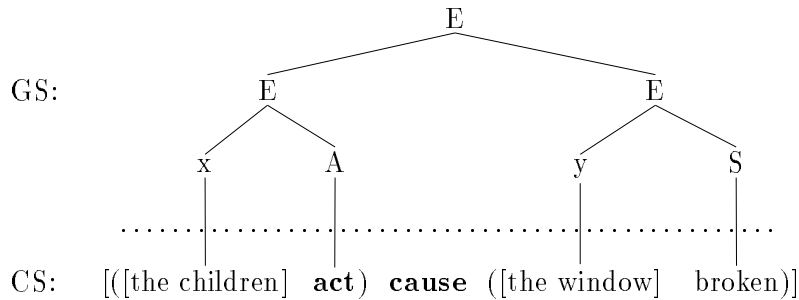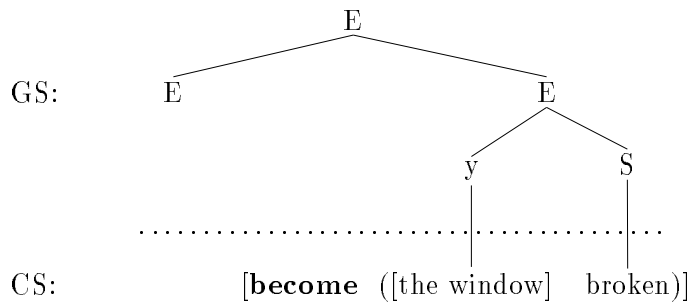a very direct way. The following sentences illustrate the causative alternation:

(13) a. The children broke the window.

b. The window broke.

Both the transitive and the intransitive member entail the emergence of a new state:
the window being broken. The difference between the two examples is that the
transitive example (13a) entails the cause of this new state, whereas the intransitive
example (13b) does not. For example, in (13a), the semantic role of the subject *the
children* is that of doing something (intentionally or not) bringing about the state
of the window being broken; in (13b), this semantic role is not expressed and, in
fact, is not even entailed. We can assume that the verbs that undergo the causative
alternation are lexically underspecified as to whether they are accomplishments or
achievements and, for example, *break* would have the lexical representation of its
meaning in (14). Given this underspecification, a choice arises: the A predicate at
GS may either link to the all-purpose activity predicate **act** at CS or have no link to
CS. In the former case, we have an accomplishment; in the latter, an achievement.
If the A predicate and its argument are not linked to conceptual structure, they
have no interpretation and are not represented at GS. From that choice, we derive
the two variants of the causative alternation. (15a) is the representation of the

(14) *break*:

```
                            E
                       ┌────┴────┐
   GS:                 E         E
                     ┌─┴─┐     ┌─┴─┐
                     x   A     y   S
                                   │
        ............................│...
                                   │
   CS:                           broken
```

accomplishment sentence (13a), and (15b) is the representation of the achievement example (13b).

(15) a. Accomplishment use of *break*, example (13a):

```
                            E
                   ┌────────┴────────┐
   GS:             E                 E
                 ┌─┴─┐             ┌─┴─┐
                 x   A             y   S
                 │   │             │   │
        .........│...│.............│...│....
   CS:    [([the children]  act) cause  ([the window]   broken)]
```

b. Achievement use of *break*, example (13b):

```
                            E
                     ┌──────┴──────┐
   GS:               E             E
                                 ┌─┴─┐
                                 y   S
                                 │   │
        ..........................│...│...
   CS:                  [become  ([the window]   broken)]
```

The two variants of a causative alternation verb have in common the result state, the state that emerges as a result of the event. In this way, the object of the causative form, (13a), and the subject of the noncausative form, (13b), are semantically identical, represented as the *y* argument in both (15a) and (15b).

2.2   The Mapping of Semantics to Syntactic Levels

Among the levels of syntactic representation, the one that GS interfaces most closely with is a-structure, which expresses the information relevant for the assignment of grammatical functions. A-structure, in turn, maps onto f-structure, in which grammatical functions are represented, and f-structure maps onto c-structure, which is the representation of overt syntax.

Among the information encoded at a-structure is the set of arguments that a predicate takes and a distinction between external argument, internal argument, and arguments that are neither internal nor external. An external argument is the kind of argument that, in accusative languages like English, must map to the subject function. An internal argument is the kind of argument that can be alternatively assigned to an object or to a subject function. Arguments that are neither internal nor external, which we can call *indirect arguments*, can only be expressed as oblique functions. We shall distinguish these three types of arguments notationally as "Ext.θ" for external argument, "Int.θ" for internal argument, and plain "θ" for indirect arguments.

The mapping of GS to a-structure is subject to the following principles: (1) every argument at GS maps onto a single argument at a-structure and every argument at a-structure maps onto at least one argument at GS; (2) the first argument of an activity event maps onto an external argument at a-structure; (3) the first argument of a state event maps onto an internal argument at a-structure; (4) an argument that is causally affected (the second argument of an **act upon** predicate) maps onto an internal argument at a-structure; (5) other GS arguments map onto indirect arguments.

Consider the representation of a stative event in (11a) and that of an activity event in (11b). The principles just stated predict that there will be only one argument at a-structure corresponding to the single argument in these event structures. In the case of the stative event, the argument maps onto an internal argument, and in the case of the activity event, the argument maps onto an external argument, as shown in (16a) and (16b) respectively.

(16) a.   A-structure corresponding to stative event (11a): $< \text{Int}.\theta >$

   b.   A-structure corresponding to activity event (11b): $< \text{Ext}.\theta >$

The mapping of GS to a-structure with accomplishments and achievements is illustrated in (17). The single GS argument of the achievement in (17a) is the first argument of a state structure and, therefore, maps onto an internal argument at a-structure. As for the accomplishment structure in (17b), its "x" argument, being the first argument of an activity event, must map onto an external argument, and its "y" argument, as the first argument of a stative structure, must map onto an internal argument. The mapping relation between units at different levels of representation is notated by means of coindexation, using subscripted Arabic numerals.
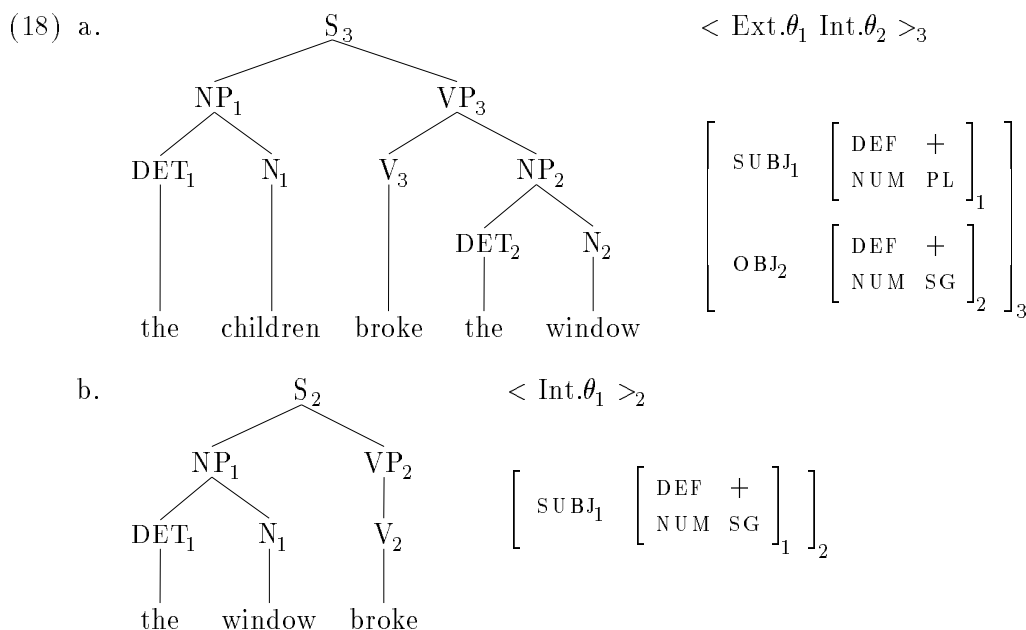
(17) a.

a-structure: $< \text{Int}.\theta_1 >$

   b.

a-structure: $< \text{Ext}.\theta_1 \ \text{Int}.\theta_2 >$
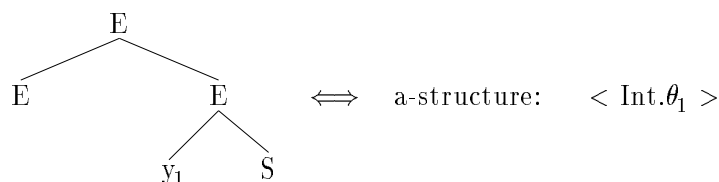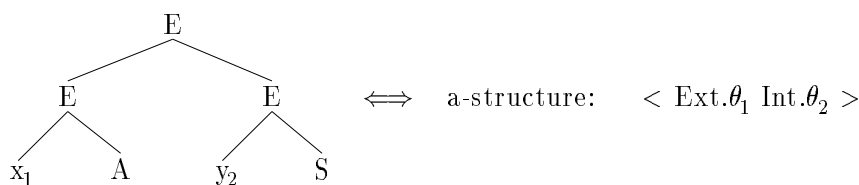
As for the mapping of a-structure to f-structure (that is, the assignment of gram-
matical functions to a-structure arguments), I follow Alsina 1996. Grammatical func-
tions are grouped as direct and indirect (or oblique) functions. Direct functions are
either subject or nonsubject (or object). The subject is a special grammatical function
in that every f-structure with propositional content (or clause) must have a subject
and no f-structure may have more than one subject—the *Subject Condition.* I will
assume the following a-to-f-structure mapping principles: (1) an external argument
maps onto the subject; and (2) an internal argument maps onto a direct function.
Direct functions, unlike obliques, must be licensed by a mapping principle; that is, a
direct function can only exist if there is an argument linked to it and this link satis-
fies one of the two mapping principles. (See Alsina 1996 for a more precise definition
of this principle, called *Coherence.*) Obliques, in contrast, need not be licensed by
any principle, but need only satisfy the semantic (or other) requirements imposed by
the preposition, case marker, or other morphological property that characterizes the
oblique in question.

The a-structure in (17a), corresponding to a one-argument achievement, has an
internal argument as its sole argument, which is constrained to map onto a direct
function (either a subject or an object). In order for the structure to satisfy the
Subject Condition, it maps onto a subject, as shown in (18b). The a-structure in
(17b), corresponding to a two-argument accomplishment, has an external argument
and an internal argument. The mapping principles require the external argument
to map onto the subject function; the internal argument, which must map onto a
direct function, is constrained here to map onto an object function, in order to avoid
a violation of the Subject Condition. This mapping is shown in (18a). (The linking
between an argument A at a-structure and a grammatical function GF is notated as
the coindexation between the argument A and both the attribute and the value that
make up the grammatical function GF.)

(18) a.

$$< \text{Ext}.\theta_1 \ \text{Int}.\theta_2 >_3$$

$$\left[\begin{array}{ll} \text{SUBJ}_1 & \left[\begin{array}{ll} \text{DEF} & + \\ \text{NUM} & \text{PL} \end{array} \right]_1 \\ \text{OBJ}_2 & \left[\begin{array}{ll} \text{DEF} & + \\ \text{NUM} & \text{SG} \end{array} \right]_2 \end{array} \right]_3$$

b.

$$< \text{Int}.\theta_1 >_2$$

$$\left[\begin{array}{ll} \text{SUBJ}_1 & \left[\begin{array}{ll} \text{DEF} & + \\ \text{NUM} & \text{SG} \end{array} \right]_1 \end{array} \right]_2$$

As for the mapping between f-structure and c-structure, I assume the theory proposed in Alsina 1996. According to this theory, we can pair the f-structures in (19) with c-structures corresponding to the same examples in (13a) and (13b), as in (18a) and (18b) respectively. (As elsewhere, linking is notated by coindexation.) This network of linked representations allows us, on the one hand, to factor apart the different properties of linguistic expressions into various levels of information and, on the other hand, to access these different properties simultaneously thanks to the connections between the levels. For example, comparing (18a) and (18b), we see that the NP *the window* is internal to the VP and maps onto the object function in (18a), but is external to the VP and maps onto the subject function in (18b). It is when we also take into account the a-structure and event structure corresponding to the same sentences that similarities otherwise not apparent are expressed. For both sentences, the NP *the window* maps onto an internal argument at a-structure and maps onto the argument at GS of which a change of state is expressed, as we can see clearly by pairing the representations in (18b) with those in (17a) and the representations in (18a) with those in (17b).

2.3   Resultatives

In presenting the levels of GS and a-structure, we have not made the assumption that the GS or a-structure representations of the verb of a clause must be the GS and a-structure representations of the clause. This, as it happens, is a very common situation, but not by any means the only one we want the theory to allow. An essential property of the present theory is that the GS event structure of a clause contains that of its verb, but need not be identical to it. We must assume that the event structure of a clause belongs to one of the four event types presented in 2.1.

Consider sentence (1a), repeated here as (19). Let us assume that the lexical information of the verb *bark* relevant to its syntactic subcategorization is present in its GS representation. We have to express the idea that, semantically, *bark* is a process involving one participant. This verb can be used with only one argument, as in (20), without entailing the existence of any other participant.

(19)   The dog barked the neighbors awake.

(20)   The dog barked.

This means that this sentence corresponds to an event structure with one single argument, which can be shown to be an activity. Since the verb *bark* is the only predicate in (20), it is a one-argument activity, with the GS representation in (11b).

As we have argued earlier, a resultative construction containing an activity verb is an accomplishment. Therefore, even though the verb that is used in the resultative example (19) is lexically an activity, we cannot assume that this lexical information remains unaltered at the clause level. The representation of (19) as an accomplishment arises through the composition of the event structure of the verb and the event structure of the resultative adjective phrase. This is possible thanks to the rule in (21) that licenses the event structure common to achievements and accomplishments, given the appropriate c-structure.
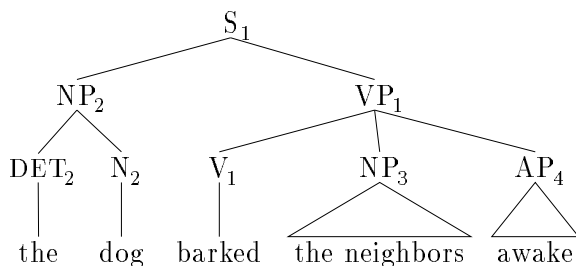
(21)   Resultative Licensing Rule:

$$
\text{VP}_1 \implies
\begin{array}{c}
E_1 \\
\diagup \diagdown \\
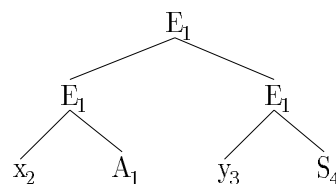E_1 \qquad E \\
\quad \mid \\
\quad S_2
\end{array}
$$
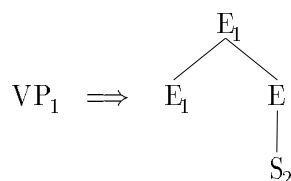
This rule is to be interpreted as follows: a c-structure with a VP node can be paired with the GS structure of accomplishments and achievements such that the VP is coindexed with the first subevent and the predicate of the second subevent is coindexed with some other constituent. It follows without stipulation that the second subevent has to be a state, since only states can be the second subevent of accomplishments and achievements.

The linked c-structure and GS structure of sentence (19) are shown in (22). (Note that the linking indices on the c-structure are independently required for the mapping to f-structure.)

(22)   c-structure: GS:

c-structure tree: S_1 dominating NP_2 and VP_1. NP_2 dominates DET_2 and N_2 (the, dog). VP_1 dominates V_1, NP_3, AP_4 (barked, the neighbors, awake).

GS tree: E_1 dominating E_1 and E_1. Left E_1 dominates x_2 and A_1. Right E_1 dominates y_3 and S_4.

If we assume that the GS information of a phrasal structure (like, presumably, any grammatical information) is either lexically specified or licensed by a rule, we can explain that the GS representation of example (19) is as shown in (22). The reason why the GS information of the clause is not that of the verb *bark*, given in (11b), is because of rule (21). This rule allows the lexical GS information of the verb to be embedded in a complex event structure. Since a complex event structure has a state as its second subevent, there must be some syntactic element in the c-structure that can link onto this state subevent. In (22), the syntactic element in question is the AP *awake*.

The a-structure is mapped onto and constrained by the GS event structure. Since the GS event structure of example (19), given in (22), is identical to that of an accomplishment verb, the a-structure corresponding to the GS structure in (22) will have to be identical to the one corresponding to an accomplishment verb, such as transitive *broke*, in (17b). The GS argument "x" in (22), as the first argument of an activity predicate, maps onto an external argument, and the GS argument "y" in (22), as the first argument of a state subevent, maps onto an internal argument. This a-structure maps onto an f-structure such that the external argument is linked to the subject and the internal argument is linked to the object, as shown in (23).

(23)   a-structure: f-structure:

$< \text{Ext.}\theta_2 \quad \text{Int.}\theta_3 >_1$

$$\begin{bmatrix} \text{SUBJ}_2 & \begin{bmatrix} \text{DEF} & + \\ \text{NUM} & \text{SG} \end{bmatrix}_2 \\ \text{OBJ}_3 & \begin{bmatrix} \text{DEF} & + \\ \text{NUM} & \text{PL} \end{bmatrix}_3 \\ \text{OBL}_4 & \begin{bmatrix} \text{SUBJ}_3 \end{bmatrix}_4 \end{bmatrix}_1$$

By putting the structures in (23) together with those in (22), we get the four linked semantic and syntactic structures corresponding to sentence (19). The linking indices allow us to pick any element at one level of representation and identify its status at the other levels of representation. For example, if we take the NP *the neighbors* in the c-structure in (22), we see that it is linked to the first argument in a state subevent in the GS structure in (22), to an internal argument at a-structure in (23), and to an object at f-structure also in (23).

We have now solved the puzzle we started out with, namely, how can, and why must, a nonthematic object appear in constructions such as (19). The c-structure and the GS structure in (22) are well-formed, as is the linking between them. The event structure of the verb *bark* is not the event structure of the whole clause, because the Resultative Licensing Rule (21) allows this structure to be embedded as the first subevent in a complex event structure. The second subevent links to a constituent that can provide the predicate information of a state. Because of this, the event structure of the clause has one argument more than the event structure of the verb of this clause. This argument can be characterized semantically as a patient. As such, it must link to an internal argument at a-structure, which, in turn, maps onto an object, which, in turn, maps onto the NP sister of the verb in (22). In this way, we explain why a verb may and must take an object that does not correspond to any of its thematic roles. However, paradoxically, this object does have a thematic role within the event structure of the whole clause. In a sense, then, the term "nonthematic object" for the NP *the neighbors* in (22) is a misnomer

One noticeable difference with an f-structure corresponding to a lexical accomplishment verb, such as the one given in (18a), is that the f-structure in (23) has an additional grammatical function labelled here OBL. This grammatical function corresponds to the resultative phrase (e.g., *awake* in (19)). As the resultative phrase bears a grammatical function in the clause (whether we want to call it OBL or something else), it does not form a complex predicate with the verb of the clause. The assumption that the resultative phrase contributes its a-structure to form a complex a-structure would have serious problems, involving, among other things, the binding theory and unbounded dependencies. Therefore, although resultative constructions in English are somewhat similar to complex predicates (such as causatives in Romance), in that the a-structure of the clause may be different from the a-structure of any lexical item in the clause, they are unlike complex predicates, in that they do not constitute one single clause nucleus.

3 Resultatives and Passives: a Paradox?

It is well-known that resultative constructions in English, even those with "nonthematic" objects, can passivize, as the following examples illustrate:

(24) a.   The neighbors were barked awake by several stray dogs.

   b.   The metal was pounded flat.

I have argued in the previous section that the a-structure of resultatives is composed in the syntax. Given the acceptability of examples (24), is this claim compatible with the standard LFG claim that the passive is a lexical operation on the a-structure? I will show that there is no inconsistency.

   I assume that passivization is an operation on the a-structure consisting in the suppression of the logical subject, i.e., the most prominent argument at a-structure. A suppressed argument cannot be accessed by principles of the mapping theory or by (subsequent) operations on the a-structure. The mapping principles that license the mapping of arguments to direct functions cannot access the suppressed argument, which therefore must remain unlinked to any direct function. For this reason, the suppressed logical subject often has no morphological expression. On the other hand, no mapping principles are involved in the use of oblique functions. So, the oblique introduced by the preposition *by* in English can be used to express the logical subject in passives, because what it requires is to be linked to a logical subject.

   Following Bresnan 1982 and others, I assume that the morphology associated with passivization in English is the past participle morpheme, which is an affix that attaches to a verb stem in the lexicon. This morpheme may trigger the operation of passivization making the verb a passive verb form. Let us formalize passivization as the operation on a-structure shown in (25), in which suppression is represented by circling the linking index of the most prominent argument. If passivization applies to the a-structure of a one-argument verb like *bark*, forming the past participle *barked*, the single argument of this verb is suppressed, as shown in (26).

(25)   PASSIVIZATION: $< \theta_{\textcircled{1}} \ \ldots >$

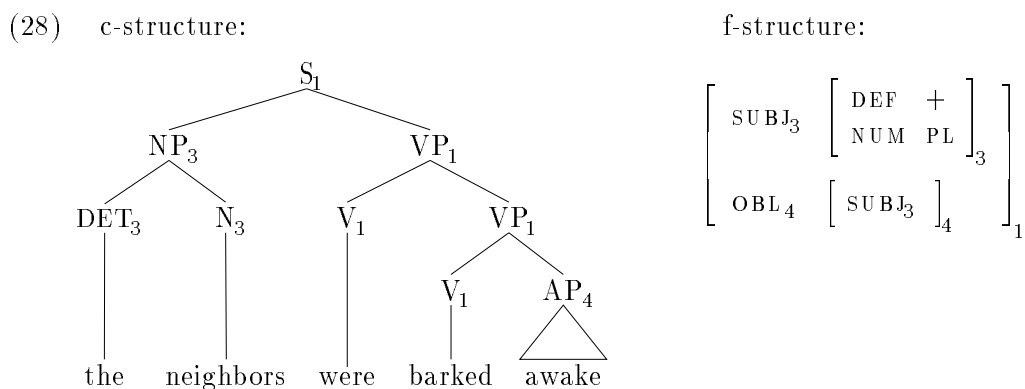(26)   *barked*: $< \text{Ext.}\theta_{\textcircled{1}} >$

The a-structure in (26) is not ill-formed, as such. However, if the clause in which the passive form *barked* appears has this a-structure as its own a-structure, its f-structure will be ill-formed. Since the a-structure in (26) has no argument that can map onto the subject function, the associated f-structure will have no subject and will therefore be ruled out by the Subject Condition.

   Suppose now that the passive form *barked* is used in a clause with a resultative phrase. In such a clause, the Resultative Licensing Rule (21) will be able to apply successfully, i.e., giving a well-formed GS representation, in which the resultative phrase corresponds to the stative predicate. Importantly, the a-structure information of the verb *barked* is not lost, but is preserved in the new a-structure that is licensed by

the mapping to the complex event structure. Therefore, since *barked* is a passive verb form, the logical subject of this verb is still suppressed in the derived a-structure. In (27), we see the paired GS structure and a-structure corresponding to the resultative example (24a).

(27)

GS:

a-structure:

$$< \text{Ext}.\theta_{\textcircled{2}} \quad \text{Int}.\theta_3 >_1$$

CS: ... barked   ...   awake
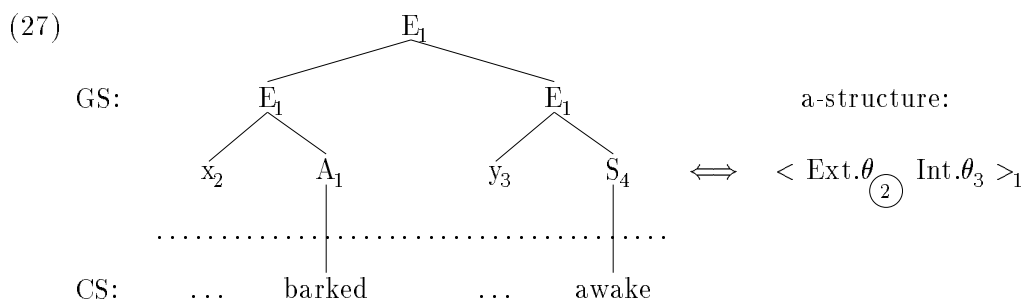
Since the internal argument in (27) is the only argument that can map onto a direct function, it has to be a subject in order to satisfy the Subject Condition. The external argument can be unlinked to any grammatical function, as in the following c- and f- structures corresponding to (27), or linked to an oblique introduced by the preposition *by*.

(28)   c-structure: f-structure:

$$\begin{bmatrix} \text{SUBJ}_3 & \begin{bmatrix} \text{DEF} & + \\ \text{NUM} & \text{PL} \end{bmatrix}_3 \\ \text{OBL}_4 & \begin{bmatrix} \text{SUBJ}_3 \end{bmatrix}_4 \end{bmatrix}_1$$

Putting (28) and (27) together, we see all of the characteristics of a passive construction. The logical subject, which is the argument of the activity subevent in (27) and has the linking index 2, has no morphosyntactic expression in (28). The grammatical subject, SUBJ in (28), with index 3, corresponds to the NP sister of the VP in the c-structure and links to an argument that is not the logical subject in the a-structure in (27) and to an argument at GS structure that can be defined as a patient (the first argument in a state subevent). This argument is the loosely named "nonthematic object," although, as we can see by looking at the structures in (27) and (28), it is thematic and it is not an object.

Thus, the analysis of resultatives in English as constructions whose a-structure may differ from the a-structure of the component lexical items is consistent with the analysis of passivization as a lexical operation.

4   Conclusion

A fundamental assumption in the analysis proposed here is the idea that the grammatical functions of a clause depend in large part on the a-structure of the clause, which, in turn, depends on the semantic properties of the clause. Since the semantic properties of the clause may be different from the semantic properties of the verb of the clause, it follows that the a-structure of the clause may also differ from that of its main verb. In conclusion, then, whether a clause includes an object or not will not depend only on the lexical properties of the verb of the clause.

The implications of this study for LFG include: (a) abandoning the idea that grammatical functions are lexically assigned to a-structures, (b) abandoning the idea that the a-structure of a clause is the a-structure of its verb, and (c) adopting the idea that semantic event structures derived in the syntax may constrain the syntax by selecting a-structures and, through them, f-structures different from those that would be selected by any of the lexical items involved in the structures in question.

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