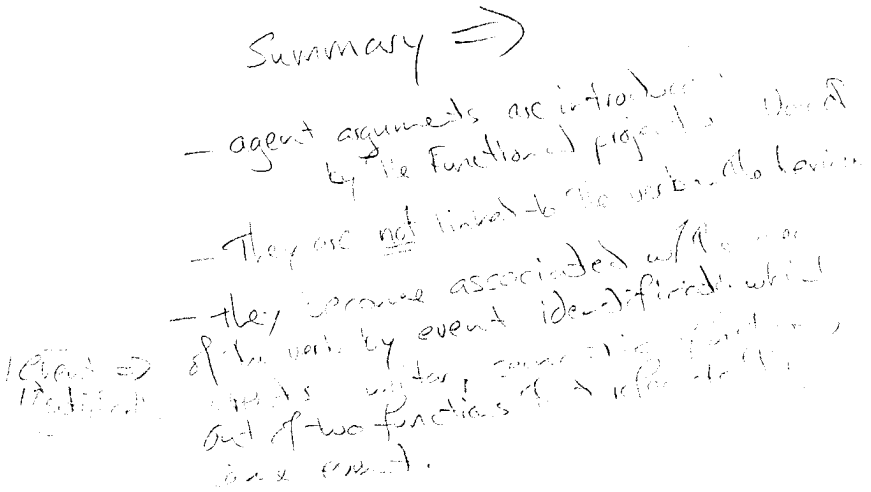


SEVERING THE EXTERNAL ARGUMENT FROM ITS VERB

Angelika Kratzer

0. MODES OF ARGUMENT ASSOCIATION

In his analysis of action sentences, Donald Davidson drew a clear distinction between arguments and adjuncts. Neglecting temporal relations, sentences like

(1) We bought your slippers in Marrakesh.

are analyzed as

(1') ∃e [buy (your slippers)(we)(e) & in(Marrakesh)(e)].

In (1'), *buy* is a three-place predicate. Apart from an Event Argument, it has an argument denoting the agent and another one denoting what was bought (the theme, in the terminology of Gruber 1965). That is, the subject and the object in (1) correspond to arguments of the main predicate in the logical representation (1'), while the locative argument *Marrakesh* is introduced by a secondary predicate (the preposition *in*). What (1') says, then, is that there is an event which is a buying of your slippers by us, and which takes place in Marrakesh.

Davidson's distinction between arguments and adjuncts was criticized by Castañeda right after Davidson's talk (Castañeda 1967), and has been abandoned in the work of Parsons. Both Castañeda and Parsons let agents and themes introduce independent predicates as well. For Parsons (not for Castañeda), the independent predicates are two-place predicates denoting thematic relations. On this proposal (inspired by Panini and Fillmore's case grammar, Fillmore 1968), (1) has the logical form (1''):

(1'') ∃e [buying(e) & Agent(we)(e) & Theme(your slippers)(e) & in(Marrakesh)(e)]

(1'') says that there is an event which is a buying, whose agent is us, whose theme are your slippers and which takes place in Marrakesh. Some terminology will be useful. (1') uses what Dowty (1989) call the 'ordered-argument' method

for the association of agent and theme arguments with their verb. In (1'') we see what Dowty labels the 'neo-Davidsonian' method. On the neo-Davidsonian method, arguments are associated with their verbs via secondary predicates.

Davidson and Parson's theories are theories of logical form, where 'logical form' is not the same as the syntacticians' 'Logical Form', a level of syntactic representation (as in May 1977, 1985). Parsons' logical form is more like the linguists' semantic structure or conceptual structure.[1] Parsons' (1993) emphasizes that the theory presented in Parsons (1990) is a "proposal for the logical forms of sentences, unsupplemented by an account of how those forms originate by combining sentence parts." In other words, Parsons' theory is a theory of logical or conceptual structure that is not committed to particular claims about argument association in the syntax. It is possible to agree, for example, that English verbs are associated with their arguments by the ordered argument method. Here is an illustration of what such a quarrel would be about.[2]

The first position: Ordered argument association in the syntax and in conceptual structure

buy $\lambda x \lambda y \lambda e[$ buy(x)(y)(e) $]$

Figure 1

The second position: Ordered argument association in the syntax, neo-Davidsonian association in conceptual structure

buy $\lambda x \lambda y \lambda e[$ buying(e) & Theme(x)(e) & Agent(y)(e) $]$

Figure 2

Both proposals agree that the English verb *buy* is a three-place predicate. The Event Argument is the highest argument, the agent argument comes next, and the theme argument is at the bottom. Note that the hierarchy of arguments is part and parcel of a verb's meaning, and doesn't have to be stipulated. I think of verb meanings in the way semanticists in the Fregean tradition usually do.[3] They are functions. Following Schönfinkel (1924), we construe the (classical Davidsonian) denotation of *buy* as a function-valued function f which, if applied to an individual a, yields a function g which, if applied to an individual b, yields a function h which, if applied to an event c, yields truth if and only if c is an event of b's buying a. Fregean denotations of this kind make it possible to maintain the generalization that predicates and their arguments semantically combine by Functional Application.

What distinguishes the two views presented above is their assumptions about the counterpart of English *buy* in logical form or conceptual structure. For a classical Davidsonian it would be a three-place predicate as well. For a neo-Davidsonian, it would be a predicate with just one argument, the Event Argument. Implemented in this way, the neo-Davidsonian view would have no consequences for the syntactic theory of argument structure, and I would have very little to add to the issue beyond what you find in Parsons' work.

The enterprise that I am about to embark on is of a different nature. In this paper (and subsequent work, Kratzer (forthcoming)), I will show that some neo-Davidsonian argument association is present in the *syntax* of verbs. Not all of a verb's arguments are syntactically associated by the ordered argument method. Most importantly, I am going to argue that all external arguments in the sense of Williams(1981) are associated by the neo-Davidsonian method in the syntax. This view has radical consequences for the syntactic theory of argument structure. A verb like *buy* is now a predicate without an external argument. It does not have an agent argument anymore. Here is what its lexical entry looks like:

Severing the external argument from its verb

buy $\lambda x \lambda e$ [buy(x)(e)] or
$\lambda x \lambda e$ [buying(e) & Theme(x)(e)]

Figure 3

On this proposal, the English verb *buy* is a two-place predicate in the syntax (I want to stay uncommitted as to its status with respect to logical form or conceptual structure). The inner argument is the theme argument denoting what is being bought. The higher argument is the Davidson Event Argument. Since the agent argument is not an argument of *buy*, it has to be added via secondary predication. The challenge for the present proposal is to tell a good story about the addition of external arguments in natural languages. Why cannot all verbs add external arguments? What is it that makes external arguments obligatory with many verbs? What is it that determines the thematic role of external arguments? (Not all external arguments are agent arguments.) In this paper, I

will not be able to address those important questions in any detail (see Kratzer (forthcoming)). All I intend to do here is present some arguments that show that the proposal I just made has initial plausibility.

1. EXTERNAL ARGUMENTS

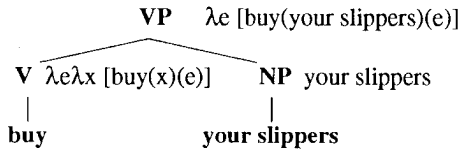
Most contemporary theories of argument structure assume some kind of asymmetry between the agent argument and the theme argument of a verb like *buy*. More generally, most theories of argument structure give a special status to the external argument. For Williams (1981), the special status is indicated by underlining. Rappaport and Levin (1986) use angled brackets to distinguish external and internal arguments. For Grimshaw (1990), the external argument is defined as the most prominent argument with respect to both a thematic and an aspectual dimension. Marantz (1984) makes a proposal that comes closest to what I am arguing for here: for him, too, the external argument of a verb is not an argument of the verb. His lexical representations look as follows (neglecting a distinction between internal arguments that is not relevant to the present discussion):

(2)

buy	(theme)
give	(theme, goal)
steal	(theme, source)

In these representations (as in mine), information about the external argument is missing. According to Marantz, the object of a verb is an argument of the verb and is assigned a semantic role by the verb. Subjects are arguments and semantic role assignees of predicates (where 'predicates' is used in the sense of Williams (1980), referring to maximal projections like VPs or APs), and this is why the external argument does not appear in the lexical representation of verbs. Marantz is not explicit about how to execute his proposal. If a verb does not carry any information about the presence of an agent argument, how can the VP it projects acquire this information? Consider a VP that consists of the verb *buy* and the object NP *your slippers*. Assuming the usual interpretation mechanisms, semantic composition would proceed via Functional Application in the following fashion:

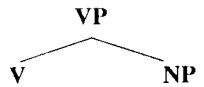
(3)



If this is how the meanings of VPs are composed, it is impossible for the VP to have an agent argument without the V having such an argument to begin with. In the example above, the VP ends up denoting a property of events that is true

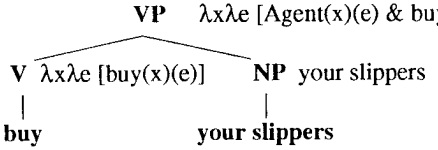
of any event if it is an event of buying your slippers. No agent argument has come into existence. Trying to maintain Marantz' account, we have to consider the possibility that a verb and its object are not semantically combined via Functional Application. We may associate a special composition rule with syntactic configurations that combine a V and an NP into a VP:

(4)

Input configuration	**Semantic interpretation**
	If V* is the denotation of V, and NP* is the denotation of NP, then λxλe [Agent(x)(e) & V*(NP)(e)] is the denotation of VP.[4]

Applying this rule yields the right result for our example: an agent argument is added.

(5)



On this proposal, the agent argument is an argument of the VP without being an argument of the V, as desired. This execution of Marantz's proposal does not come for free, however. Its price is a semantic stipulation that would be a blemish for any serious theory of semantic composition.[5] We would be forced to give up the fundamental generalization that heads and their arguments semantically combine via Functional Application. Marantz's proposal, then, does not tell an optimal story about the introduction of the external argument.

Yet Marantz presents an important argument supporting the assumption that external arguments are not true arguments of their verbs. He observes that there are many instances where a particular kind of internal argument triggers a particular interpretation of the verb, and claims that there are few (if any) instances where an external argument does the same. Here are some of his examples (Marantz 1984):

(6)
a. throw a baseball
b. throw support behind a candidate
c. throw a boxing match (i.e., take a dive)
d. throw a party
e. throw a fit

(7)
a. take a book from the shelf
b. take a bus to New York
c. take a nap

(7) d. take an aspirin
e. take a letter in shorthand

(8) a. kill a cockroach
b. kill a conversation
c. kill an evening watching TV
d. kill a bottle (i.e., empty it)
e. kill an audience (i.e., wow them)

Marantz point out that these facts follow if external arguments are not true arguments of their verbs. Bresnan (1982) and Grimshaw (1990) reply that they can be equally well explained by any theory that has it that external arguments are semantically processed after internal arguments. Since most theories currently on the market are of this kind, Marantz's argument would lose much of its force if Bresnan and Grimshaw were right. While his generalization may very well follow from his assumptions, it couldn't be used to distinguish his theory from most of the others.

> In short, one could capture the subject/non-subject generalization without affecting the lexical representation of predicate argument structure, simply by giving the subject a distinguished role as final argument in the semantic composition of the sentence. (Bresnan 1982: 350)

> In any theta-marking calculation, the external argument is the last to enter in. Thus, in effect, calculations performed over the internal arguments are done without reference to the external arguments, but any a-structure calculation involving the external argument will of necessity involve the internal ones. The special properties of externals follow from their occupying the position of maximal prominence. (Grimshaw 1990: 35)

What is interesting and highly relevant about the data in (6) through (8) is that the phrases listed there do not involve completely frozen idiom chunks. Consider the expression *kill an evening*. This is not a real idiom, since we can have variations of the following kind:

(9) a. kill every evening (that way)
b. kill an afternoon (reading old Gazettes)
c. kill a lovely morning (paying overdue bills)

I can think of two ways of approaching these alternations. One possibility is that there is a number of homophonous verbs *kill*, all closely related in meaning. The range of variation for the object in (9) would then indicate that the *kill* that means 'waste' semantically selects a time interval for its internal argument; that is, it denotes a partial function that is only defined for time intervals. The other

verbs *kill* have different semantic selection properties. If *kill* is paired with an object that does not denote a time interval, then the 'waste' reading cannot be chosen, since it would lead to uninterpretability. Hence the impression that properties of the internal argument influence the interpretation of the verb. If the phenomenon illustrated by (6) through (8) can be reduced to a very narrow kind of semantic selection, it should be able to show up with any one of a verb's arguments, since a verb can impose any kind of selectional restrictions on any of its arguments *regardless* of its hierarchical position and the order of semantic processing. By way of illustration, suppose that a two-place predicate denotes the (function valued) function f. If we want to impose a selectional restriction on its inner argument, we state that f is only defined for individuals that obey this restriction. If we want to impose a selectional restriction on the outer argument, we state that for any individual a in the domain of f, f(a) is only defined for individuals that satisfy the restriction. If external arguments are true arguments of their verbs, then we expect verbs to impose selectional restrictions on external arguments that are similar to the ones observed in (6) through (8). If they are not, no comparable selectional restrictions are expected. There would be no way of stating them as part of a verb's meaning.

Marantz does not think of the alternations in (6) through (8) in this way. He is of the opinion that one "would be hard pressed to argue that a different predicate implies a different (homophonous) verb in each case." (Marantz 1984: 25). Suppose that this is so. We would then have a single verb *kill* whose denotation is a function that does not treat all arguments in the same way. Assuming (just for the purpose of illustration) that *kill* has its traditional denotation (agent and theme argument, no Event Argument), its denotation would be a function f with the following properties: If its argument is an animate being a, f yields a function that assigns truth to any individual b if b kills a. If its argument is a time interval a, f yields a function that assigns truth to any individual b if b wastes a. If its argument is a conversation or discussion a, f delivers a function that assigns truth to any individual b if b dampens a. And so on. If this is the correct account of the phenomenon illustrated in (6) through (8), we would again expect that it should affect any argument of a verb, regardless of hierarchical position and order of semantic processing. Any argument of a verb could trigger a particular interpretation of the verb. Here is a fictitious example where the highest argument does so. Suppose that the (traditional) denotation of some two-place predicate is a function f that yields the following output for individuals a in its domain:

(10) If b is a time interval, then f(a)(b) = truth iff a exists during b.
If b is a place, then f(a)(b) = truth iff a is located at b.
If b is a person, then f(a)(b) = truth iff b is the legal owner of a.
. . . . etc. . . . .

It is not true, then, that one could capture the subject/non-subject generalization simply by giving the subject a distinguished role as final argument in the semantic composition of the sentence (contra Bresnan and

Grimshaw). There is no technical obstacle to having verb meanings like the function f if external arguments are true arguments of their verbs. If they are not, Marantz's generalization is expected, however. This means that Marantz's data are very suitable indeed for deciding between theories that assume that external arguments are true arguments of verbs from those that maintain that they are not.

2. THE SYNTAX AND SEMANTICS OF VOICE

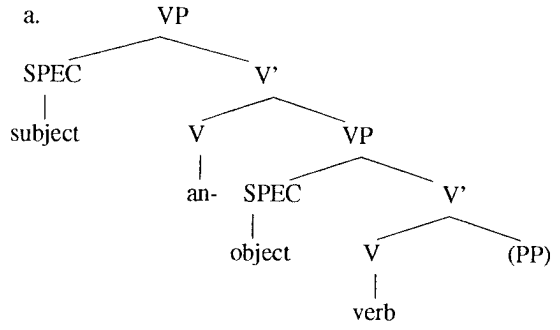
If external arguments are not true arguments of their verbs, where do they come from? Suppose that quite generally, arguments are introduced by heads. This helps keep the theory of semantic composition as general and elegant as it should be. Consider now the following simple English sentences:

(11) **Elsa** wrote those poems with this pen.
(12) **Franz** read the poems on this sofa.
(13) **George** sold the sofa to my aunt.

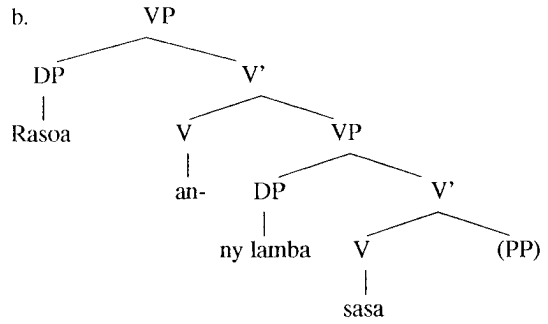
On the story that I am in the midst of telling, we are assuming that in sentences (11) through (13), the agent argument is introduced by a non-overt head. What kind of a head? Is it lexical or functional?

Suppose it is a lexical head. We would then have a higher empty verb present in (11) through (13), maybe a silent *do*. A proposal along those lines has been made for Malagasy. Hung (1988) proposes that the agent argument of active sentences in Malagasy is introduced by a prefix *-an* that heads a higher VP in a layered structure of the following kind:[6]

(14) a.

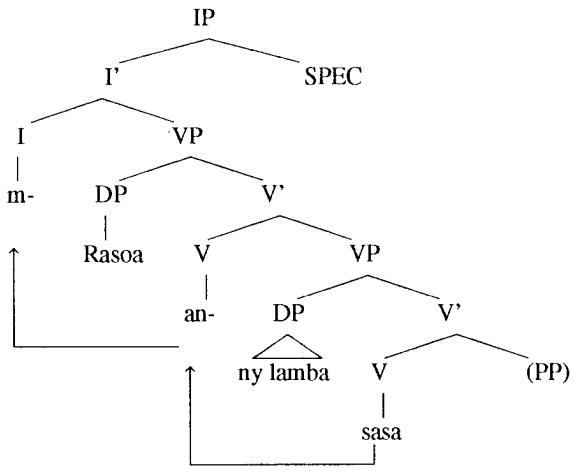


(14) b.



The layered VP structure was originally proposed in Larson (1988) to account for certain properties of the double object construction. In contrast to Larson, Hung assumes that the higher V-node is not empty, but hosts a lexical element that selects the agent argument. Movement of the lower verb to the higher V-position allows the agent affix to incorporate into the verb.[7] Further movement of *an*+verb into I and of the subject into SPEC of IP produces a sentence like (15).[8]

(15) M+an+sasa ny lamba (amin ny savony) Rasoa.
wash+active the clothes with the soap Rasoa
"Rasoa washes the clothes (with the soap)."



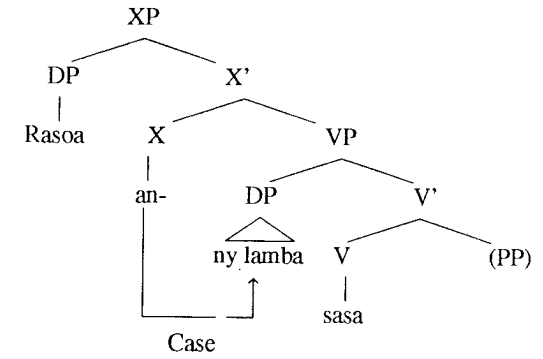
Hung reports that "while the root *sasa* is not a word in itself, it is recognized by speakers as being a root with the meaning 'being washed' or 'having the quality of being washed'. It therefore acts (along with an optional instrument) as a V' predicate of the theme *ny lamba*. The complete reading of the sentence is thus something like 'I caused the clothes to be washed (with soap)', or rather 'I did

the (soap) washing of the clothes'." (Hung 1988: 12). Hung takes *an-* to be a light verb like *do* that has two functions. It adds the agent argument and it assigns Case to the object.[9]

Whether or not this proposal is right for Malagasy, I have a few qualms with adopting it for English. If external arguments are introduced by verbs, what is it that makes their introduction obligatory in sentences (11) through (13)? We may try out the idea that verbs like *write*, *read*, and *sell* have an empty incorporated preverb whose existence is forced by a morphological requirement. Without the preverb, then, these verbs would not be morphologically well-formed. We'll see below, however, that the head that introduces the external arguments is not always present (e.g., in gerunds). If it is a lexical head, its defective distribution comes as a surprise. It is not a familiar phenomenon. But if it is an inflectional head, it is expected that it must be present in some constructions, and absent in others. In particular, it must be present in finite constructions. This explains its obligatoriness in (11) through (13).

My second qualm with the proposal that external arguments are introduced by lexical heads has to do with Case assignment. Hung proposes that Malagasy *an-* is a sister of VP. In this position, it can assign structural Case via government to the object in the SPEC of VP position:

(16)



Most traditional and contemporary syntacticians rely on a notion of structural or grammatical Case that is distinguished from lexical Case. Structural Cases are nominative and accusative, lexical Cases are Cases like ablative, locative, and instrumental. The status of dative is and has been controversial.[10] What is structural Case? Consider the following characterization:

(17) Structural Case: Structural Case is Case that is assigned (checked) by inflectional (=functional) heads.

Some such assumption is made in much recent work. Chomsky (1991, 1992) proposes that structural Case for objects is not assigned (checked) by the verb, but by some functional head right above VP. If the head that introduces the external argument is not a lexical, but a functional element, we can maintain that

it assigns (checks) accusative Case, while preserving the generalization that structural or grammatical Case is assigned (checked) by functional heads.

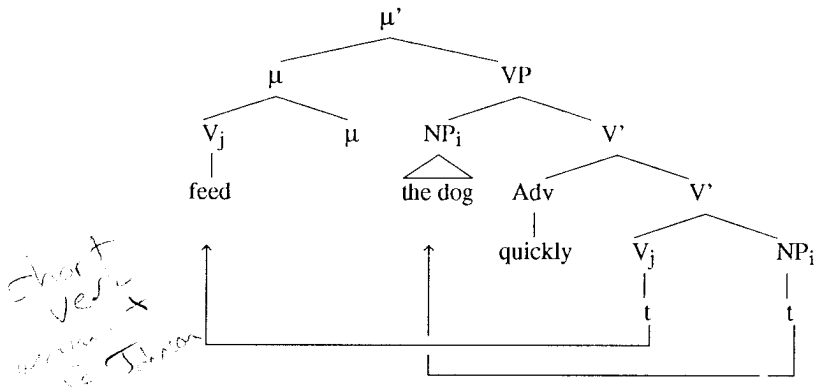
If external arguments are introduced by inflectional heads, we understand why in serial verb constructions verbs can share external, but not internal, arguments, as argued in Collins (1993). According to Collins (1993: 56, 91), "a serial verb construction is a succession of verbs and their complements (if any) with one subject and one tense value that are not separated by any overt maker of coordination or subordination." Here is an example of an Ewe serial verb construction with two transitive verbs:

(18) Kofi a *fo* Ama wu.
Kofi fut hit Ama kill
"Kofi will strike Ama dead."
(Collins 1993: 140)

In (18), the two verbs share the inflectional element *a*, and they share the agent argument *Kofi*. They do not share the direct object *Ama*, however. Collins presents clear evidence for the presence of an empty object NP within the projection of *wu*. If external arguments are introduced by a verb's inflection, verbs that share all of their inflection also share their external argument.

Assuming that the heads that introduce external arguments are functional heads, we are able to connect our analysis to proposals for English phrase structure such as Pesetsky (1989), Johnson (1991), and Bowers (1991, 1993). In making this connection, we can harvest many of the pleasant syntactic consequences of those proposals. Take Johnson (1991), for example. Johnson postulates an unidentified functional head μ that is a sister of VP, and to which the verb must adjoin.[11] He argues that object NPs must move to the specifier of VP, and that the force that drives this movement is the necessity for object NPs to be assigned structure Case from μ via government:

(19) Government (Johnson 1991)
A node α governs a node β iff α c-commands β, and at most one node dominates β, but not α.



If NPs and only NPs move to the specifier of VP, it follows that they precede adverbs and other complements of the verb. This is illustrated by the following examples (from Johnson 1991):

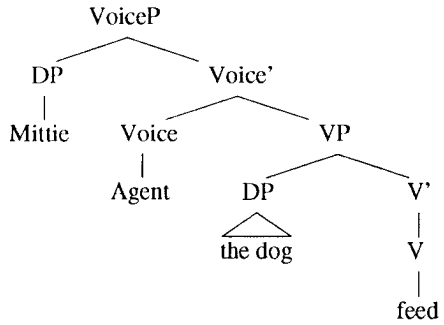
(20) a. *Gary introduced to Sam Mittie.
b. *Gary told to leave Sam.
c. *Mikey visited quietly his parents.
d. *Chris hit quickly the dog.
e. Chris walked quickly down the street.
f. Mikey talked slowly to Gary.
g. Gary tried diligently to leave.

(20a-d) are ungrammatical since the object NP has not moved to the specifier of VP. (20e-g) show that only NPs must undergo this movement.

What I want to suggest is that Johnson's μ is a head that introduces the external argument in addition to assigning accusative Case. Having acquired semantic content, μ deserves a meaningful name. I will call it VOICE. This choice of name is not arbitrary. Kratzer (forthcoming) argues that Voice is truly at the heart of a theory of voice.

In the spirit of Bowers (1993), we may now assume that, quite generally, heads syntactically realize their arguments in their specifier position at D-structure: external arguments are arguments of Voice, and hence are base-generated in SPEC of VoiceP. Direct objects (of verbs) are arguments of V, and hence are base-generated in SPEC of VP.[12] They do not have to move there as assumed by Johnson. Yet we still derive the 'object first' generalization that he was interested in.

(21)



Let us now examine how the phrase structure tree in (21) is interpreted within an event semantics. I will introduce the semantic framework as we walk through an example computation.

(22) VoiceP: semantic interpretation

1. **feed*** = $\lambda x_e \lambda e_s$[feed(x)(e)]

2. **the dog*** = the dog

3. (**the dog feed**)* = λe_s[feed(the dog)(e)]
From (1), (2) by Functional Application.

4. **Agent*** = $\lambda x_e \lambda e_s$[Agent(x)(e)]

5. (**Agent** (**the dog feed**))* =
$\lambda x_e \lambda e_s$[Agent(x)(e) & feed(the dog)(e)]
From (3), (4) by Event Identification.

6. **Mittie*** = Mittie

7. ((**Agent** (**the dog feed**)) **Mittie**)* =
λe_s[Agent(Mittie)(e) & feed(the dog)(e)]
From (5), (6) by Functional Application.

The calculation just given is a step by step derivation of the denotation of the tree in (21). The interpretation process assigns denotations to bracketed strings of lexical items in a type-driven fashion (Klein & Sag 1985). For any string α, α* is the denotation of α. Possible denotations are individuals, events, truth-values, and functions construed from those entities. They are given through expressions of an extensional type logic with three basic types: individuals (type e), events (type s), and truth-values (type t). The denotations of lexical items are provided in the lexicon. To calculate the denotations of complex expressions, we have a handful of composition principles that apply freely whenever they

can.[13] In this particular example, the applicable composition principles are Functional Application and a principle I dubbed 'Event Identification'.[14] Event Identification is one of several admissible conjunction operations and can be stated as follows:

(23) Event Identification

f	g	->	h
<e,<s,t>>	<s,t>		<e,<s,t>>
			$\lambda x_e \lambda e_s$ [f(x)(e) & g(e)]

Event Identification makes it possible to chain together various conditions for the event described by a sentence. It takes a function f and a function g (order irrelevant) as input and yields a function h as output. Input functions f and output functions h are of type <e,<s,t>>. Input functions are of type <s,t>. If s is the type of events, e the type of individuals, and t the type of truth-values, then entities of type <s,t> are functions from events to truth-values, and entities of type <e,<s,t>> are functions that map individuals to functions from events to truth-values.[15] The lambda expression defines the output function h in terms of the input functions f and g. In the computation above (step 5), Event Identification achieves the following:

(24) Example of Event Identification

f	g	-->
<e,<s,t>>	<s,t>	
$\lambda x_e \lambda e_s$ [Agent(x)(e)]	λe_s [feed(the dog)(e)]	

h
<e,<s,t>>
$\lambda x_e \lambda e_s$ [Agent(x)(e) & feed(the dog)(e)]

If the addition of the external argument proceeds via the operation of Event Identification, we expect a connection between the Aktionsart of a verb and the thematic role of its external argument. What are Aktionsarten? I'd like to think of them as originating from selectional restrictions for the Event Argument, not an entirely orthodox use of the term, but a useful one.[16] Event Arguments may be restricted to actions, states, events proper, and so on. An action predicate like *wash the clothes*, then, expresses a partial function that is only defined for actions. A stative predicate like *own the clothes* expresses a partial function that is only defined for states. Actions and states are subkinds of events (or 'eventualities' in the terminology of Bach 1977). That is, they are both entities of type s. The operation of Event Identification is only defined if the two predicates that are being conjoined have compatible Aktionsarten. Here is an example:

(25) Mittie owns the dog.

In (25), the verb is stative, and the external argument denotes the person who is the holder of the state consisting in owning the dog. To compute the meaning of (25), we need a head adding the external argument, call it 'Holder' for convenience. we have then:

(26) **Holder*** = $\lambda x_e \lambda s_s$[holder(x)(e)]
own the dog* = λs_s[own(the dog)(s)]

In spelling out the denotations for *Holder* and *own*, I used the metalanguage variable *s* (for 'state', not to be confused with the semantic type s) to indicate a restriction to eventualities that are states. Since the Event Arguments of both predicates are restricted to states, Event Identification can proceed as before, with no clash so far. What we cannot do, however, is combine the holder function with the denotation of an action predicate or the agent function with the denotation of a stative predicate. Supposing that the set of actions and the set of states are disjoint, the operation of Event Identification comes out undefined in those cases. Given the two input functions, there is no output function of the required kind. This, then, explains why there is a connection between the Aktionsart of a verb and the thematic role of its external argument. The connection is forced by the operation of Event Identification.

How tight is the connection between Aktionsarten and external arguments? Can the kind of external argument always be predicted from the Aktionsart of the corresponding verb? The answer is not a straight 'yes'. A more complicated story has to be told. This is done in Kratzer (forthcoming), but here is a very simplified sketch of the main idea. Suppose there are two kinds of voice heads in English: active and non-active. Active voice heads add external arguments and assign (check) accusative Case. Non-active voice heads do not add external arguments and do not assign (check) accusative Case. They may have a minimal semantic denotation like λe_s[event proper(e)], selecting eventualities that are neither actions nor states. Suppose furthermore that the repertoire of (basic) active voice heads is very limited. Maybe there are just two of them, one adding an agent argument to an action verb, and the other one adding the holder argument to a stative verb. Basic voice markers could now be selected via Aktionsart: action verbs get agent arguments, stative verbs get holder arguments, all other verbs start out with non-active voice markers, and hence without an external argument. They *start out* that way, but they do not have to *stay* that way. If a language learner encounters a transitive verb that has an external argument that doesn't correspond to an active voice head in the basic repertoire, (s)he has to posit a non-active voice head, and build an external argument from a PP via preposition incorporation in Voice (which thereby becomes active). If the preposition originates in a PP within VP, this kind of syntactically derived subject shares some properties with unaccusative subjects. We thus derive the properties of experiencer verbs like *worry*.[17] Preposition incorporation into Voice, then, can create a syntactically derived external

argument in the very same way as preposition incorporation into a verb can create a syntactically derived direct object (Baker 1988).

4. THE LOCATION OF VOICE

I have argued that external arguments are introduced by independent heads that I call 'Voice'. In the generativist tradition, voice heads have been proposed for a number of languages. Rivero (1990) postulates an inflectional head labeled 'Voice' right above VP for Greek and Albanian. Following Bowers (1990; see also Bowers 1991, 1993), Mitchell's (1991) analysis of Finnish Case relies on a functional projection ('Predicate Phrase') whose specifier position is the site where external arguments are base-generated.

Is there any strong motivation for placing the Voice head right above VP? Rivero presents two arguments in support of this assumption. If we assume with Roberts (1987) and Baker, Johnson and Roberts (1989) that passive inflection is a realization of the external argument of the verb, by which it is assigned Case and theta-marked, we expect some tight locality condition between Voice and verb, since theta-marking and Case assignment are local relations. My Voice heads are not arguments, and Kratzer (forthcoming) presents arguments against this assumption. Consequently, Rivero's first argument yields no support for the analysis presented here. Rivero's second argument comes from certain verb forms in Modern Greek and Albanian which she claims have an overt mediopassive affix that is adjacent to the verb root. This argument was challenged by Joseph and Smirniotopoulos (1993) for Modern Greek. Rivero parses the verb *plíθikan* 'they were washed/they washed themselves' as follows (gloss and spelling are from Joseph and Smirniotopoulos):

(27) plí - θ - ik - a - n
Root Voice Aspect Tense AGR

Joseph and Smirniotopoulos point out the *-ik-* is not exclusively an aspect marker, rather it "marks non-active voice, past tense, and perfective aspect all together" (p. 391). This is shown by the fact that *pliθún* is non-active and perfective but not past, *plínane* is past and perfective but active, and *plénondan* is non-active and past but not perfective. While I do not think that these data show that Modern Greek doesn't have independent heads for Voice, Aspect, and Tense, I agree with Joseph and Smirniotopoulos that no evidence has been given that it does. Modern Greek, then, doesn't help us with the question where voice heads are located with respect to other inflectional heads.

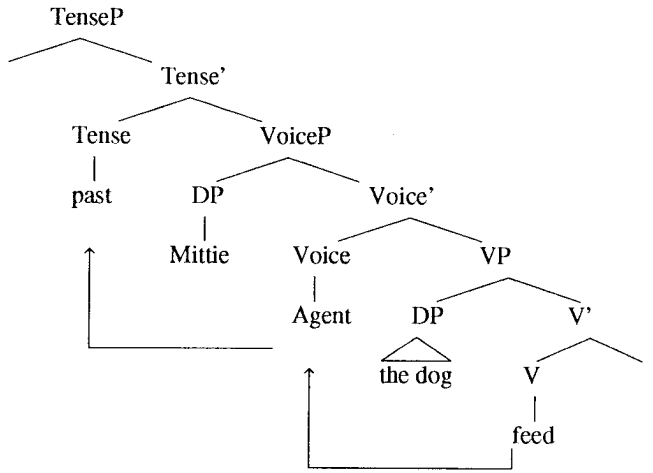
While I have argued that the external argument is not an argument of its verb, there is nothing in my proposal so far that would exclude voice heads that *also* carry temporal or aspectual information. That is, in the absence of evidence to the contrary, there is no semantic obstacle to having voice heads with denotations of the following kind:

(28) $\lambda x_e \lambda e_s$ [agent(x)(e) & past(e) & accomplishment(e)]

The question whether an affix like Modern Greek *-ik-* is the morphological spellout of one of several inflectional heads, then, cannot be answered by the semantics. It could go either way.

It will be useful to know about the constraints that the semantics imposes on possible locations for Voice. If the semantic connection between Voice and its verb is established by the operation of Event Identification, Voice can appear anywhere in the hierarchy of a verb's inflectional heads, as long as the Event Argument is not existentially quantified. Let me illustrate this point by returning to the computation of our English example.

(29)



We saw that the VoiceP in this sentence receives the following denotation:

(30) ((**Agent** (**the dog feed**) **Mittie**))*
$= \lambda e_s$[Agent(Mittie)(e) & feed(the dog)(e)]

This VoiceP, then, denotes a property of events, and not yet a truth-value, the canonical denotation for a sentence within an extensional semantics. One possibility for getting us to a truth-value is to build existential quantification into the semantics of some higher inflectional head (in the spirit of Higginbotham 1985). If this inflectional head turns out to be Tense, then one of the functions of Tense is to existentially quantify the Event Argument. Here is a possible denotation for a Tense head:

(31) **past** - * $= \lambda P_{<s,t>} \exists e_s$ [P(e) & past(e)]

The denotation of the TenseP in (29) is a truth-value, as can be seen from the following computation:

(32) (**past** ((**Agent** (**the dog feed**)) **Mittie**)) *
= $\lambda P_{<s,t>} \exists e_s$ [P(e) & past(e)] (λe_s [Agent(Mittie)(e) & feed(the dog)(e)])
= $\exists e_s$ [Agent(Mittie)(e) & feed(the dog)(e) & past(e)]
From (30), (31) by Functional Application and two instances of Lambda Conversion.

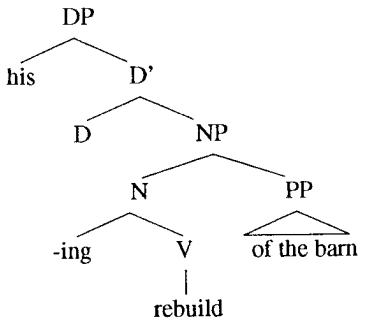
Once the Event Argument is existentially quantified, the operation of Event Identification becomes inapplicable. From this, we conclude that Voice cannot appear above whatever head existentially quantifies the Event Argument. If we have more than one inflectional head in addition to Voice (possibly all of Tense, Agr, Mood, and Aspect), we have to find out which head does the existential quantification. What we know already, however, is which possibilities for the location of Voice are permitted by the semantics of Voice. For the time being, let us tentatively assume that Voice is located directly above VP, but stay open to the possibility that it may turn out that there are intervening inflectional heads after all. In this case, the verb's object would have to move further up to receive accusative Case.

I have argued that the heads that introduce external arguments are inflectional elements that assign accusative Case. The following section will present more support for the existence of such heads.

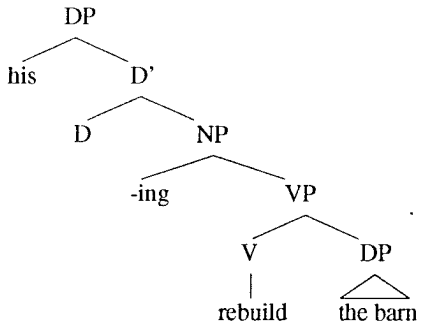
5. GERUNDS AND PARTICIPLES: WINDOWS INTO THE HIERARCHY OF INFLECTIONAL HEADS

Gerunds and participles are hybrids that share properties with two syntactic categories. Over the years, a number of scholars have argued that different kinds of gerunds arise from nominalizing different segments of a verb's projection, and that this is what accounts for their hybrid nature.[18] Abney (1987), for example, proposes that the English nominalizing affix *-ing* can attach to Vs, VPs, or IPs, thereby giving rise to of_{ing}, $poss_{ing}$, and acc_{ing} gerunds:

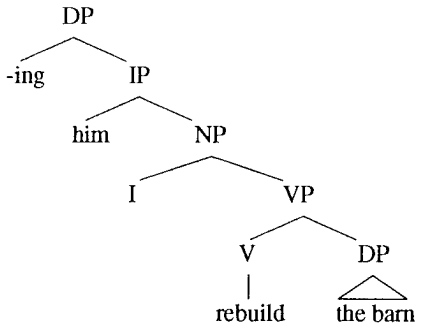
(33) a. of_{ing}: His rebuilding of the barn took five months.



(33) b. $poss_{ing}$: We remember his rebuilding the barn.



c. acc_{ing}: We remember him rebuilding the barn.



If we say that different kinds of gerunds are created by nominalizing different segments of verbal projections, we understand the term 'verbal projection' in an extended sense. Abney distinguishes s-projection (semantic projection) from c-projection (category projection). For him, the maximal c-projection of V, I, and C are VP, IP and CP respectively, and the maximal s-projection of V, I, and C is CP. Grimshaw (1991) uses the term 'extended projection' in very much the sense of Abney's s-projection. Assuming a more articulated sentence structure, the extended projection of verbs might include Tense Phrases, Aspect Phrases, Voice Phrases, Agreement Phrases and the like. Gerunds, then, are formed by nominalizing different segments of a verb's extended projection.

Jackendoff (1977) and Abney (1987) suggest that we might expect other affixes to behave like *-ing* in attaching to lexical or phrasal elements. Both authors think that the English passive participle morpheme *-en* is a case in question, and consider the possibility that *-en* is an affix that turns verbal projections into adjectives. If it attaches to a phrasal element, it attaches to a VP, and the result is a phrasal passive. If it attaches to a lexical element, it attaches to a V, and this yields a lexical passive. A very similar view is expressed in Borer (1984).

If different kinds of gerunds and participles result from affixation to different segments of extended verbal projections, we expect these hybrid structures to offer an ideal window into the hierarchy of inflectional heads. This becomes clear as soon as we incorporate Jackendoff's and Abney's insights into the present approach. Let us return to the English gerunds for the remainder of this section. Participles are discussed in Kratzer (forthcoming).

Assuming the theory presented so far, the fact that the direct object in an *of*$_{\text{ing}}$ gerund cannot receive accusative Case has to be taken as a sign that the nominalized constituent doesn't contain Voice, and hence can be at most a VP. This is compatible with it being a V. Suppose it *is* as V. In example (33a), it would then be the verb *rebuild* that is nominalized. The interpretation of the gerund would proceed as follows: the denotation of the verb is inherited by the N-node (assuming that *-ing* adds at most aspectual information, a contribution that we can afford to ignore here).[19] This means that the denotation of the N-node is the function $\lambda x \lambda e[$ rebuild(x)(e) $]$. The N-node, then, requires an argument denoting what is being built. This argument is realized by an NP, and since this NP is an object of a noun, it is Case-marked in the way objects of nouns are usually Case-marked. Since there is no Voice, there cannot be an agent argument. This last conclusion seems to be contradicted by the sentence in (33a). Doesn't the genitive pronoun *his* express the agent argument? That it doesn't is brought out more clearly by the following example:

(34) Maria's reading of *Pride and Prejudice* received better reviews than Anna's.

To be sure, (34) is compatible with Maria and Anna being the agents of their respective readings of *Pride and Prejudice*. Yet (34) does not have to be understood that way. Suppose the 180$^{\text{th}}$ anniversary of the publication of *Pride and Prejudice* is celebrated with readings in every public library. Maria attends a reading in Conway, Anna attends a reading in Ashfield. In this context, we may understand (34) as reporting that the reading of *Pride and Prejudice* that Maria attended received better reviews than the one Anna went to. The genitive NPs in (33a) and (34), then, express a general notion of relatedness of which the agent relation is but a special case. I conclude that in *of*$_{\text{ing}}$ gerunds, the absence of accusative Case is accompanied by the absence of the verb's external argument. This is further confirmed by the following 'control' facts which are modeled after Wasow & Roeper (1972).

(35) Maria enjoyed a reading of *Pride and Prejudice*.

(36) The killing of her cat upset Maria.

In the absence of Voice, the denotation of *reading of Pride and Prejudice* denotes the function $\lambda e[$ reading(Pride and Prejudice)(e) $]$. The whole sentence, then, states that there was an event in which *Pride and Prejudice* was read and Maria enjoyed this event. This interpretation leaves it open whether Maria or

somebody else did the reading. Similar considerations apply to (36). *Killing of her cat* denotes the function $\lambda e[$ killing(her cat)(e) $]$. Consequently, (36) means that there was a unique event in which Maria's cat was killed, and this event upset Maria. Again, the sentence is compatible with Maria or someone else killing the cat.

If it is VPs that are nominalized in *of*$_{\text{ing}}$ gerunds, the semantic interpretation proceeds in essentially the same way, and the genitive NP and 'control' facts are predicted to be the same. The only difference is that the object of the verb is saturated in the local domain of the verb, rather than in the local domain of the noun. Since the nominalized constituent doesn't include Voice, the object still cannot receive accusative Case. There are some clear instances of VP gerunds in English. The following examples are from Jespersen (1940: 109).

(37) The shutting of the gates regularly at ten o'clock had rendered our residence very irksome to me.

(38) From the daily reading of the Bible aloud to his mother. . . .

(37) and (38) both contain adverbs (*regularly* and *aloud*). Since adverbs must modify verbs, we can conclude that what is nominalized is *at least* a VP. Moreover, the verb is unable to assign accusative Case. On the present approach, this is a sign that the nominalized constituent is *at most* a VP.

Given that direct objects in poss$_{\text{ing}}$ and acc$_{\text{ing}}$ gerunds are marked accusative, our approach forces us to depart from Abney and assume that neither construction is a nominalization of a VP. The constituent that is nominalized must at least include Voice. Otherwise, structural accusative could not be assigned. Suppose that only zero or maximal projections, but no intermediate projections can be nominalized. We can now infer that the nominalized constituent in poss$_{\text{ing}}$ and acc$_{\text{ing}}$ must at least include the maximal projection of Voice. Then it must include the agent argument. That it does is shown by the following examples:

(39) We remembered Maria's reading *Pride and Prejudice*.

(40) We remembered Maria reading *Pride and Prejudice*.

In (39) and (40), Maria can only be understood as the agent of the reading event. If the agent argument isn't overt in a poss$_{\text{ing}}$ gerund, it is realized as PRO. If PRO must be controlled, it follows that poss$_{\text{ing}}$ gerunds show obligatory control. This is illustrated by sentences (41) and (42) (again modeled after Wasow and Roeper 1972).

(41) Maria enjoyed reading *Pride and Prejudice*.

(42) Killing her cat upset Maria.

(41) implies that Maria herself read *Pride and Prejudice*. Moreover, (42) implies that Maria herself killed the cat. The control contrast between (35) and (36) on the one hand, and (41) and (42) on the other is accounted for if one and the same head assigns accusative Case and introduces the external argument.

The discussion of English gerunds confirmed our claim that external arguments are introduced by independent heads that are also responsible for the assignment of accusative Case. The relevant properties of the three kinds of gerunds follow now simply from the assumption that the nominalizing affix *-ing* can attach at least to V, VP and VoiceP. No other stipulations are necessary.

It may be instructive to compare the analysis of gerunds presented here with an otherwise fairly compatible analysis that is based on the assumption that external arguments are arguments of their verbs. Take Borer (1984), where the properties of the suffix *-ing* in *of*$_{\text{ing}}$ gerunds are described as follows:

(43) a. It triggers a category change from V to N.
b. The ability to assign accusative is eliminated.
c. It obligatorily selects an agent theta-role.
d. An aspectual (progressive) reading is added.

Borer argues that the first three of those properties violate the Projection Principle of Chomsky (1981), which requires that all lexical features must be represented at every syntactic level. From this she concludes that the formation of *of*$_{\text{ing}}$ gerunds takes place in the lexicon, and not in the syntax. Let us look at the four properties in turn. Property (a) is not a violation of the Projection Principle if we assume with Höhle (1976, 1982) and Williams (1981) that affixes may belong to syntactic categories and head words. The category change in gerunds, then, is not a change in features, but the result of attaching an affix that is an N. On the approach advocated here, the verb's ability to assign accusative Case is not eliminated in *of*$_{\text{ing}}$ gerunds since it was never there to begin with. As for property (c), we have seen above that it is not a property that *of*$_{\text{ing}}$ gerunds have. They do not have an obligatory agent argument. Again, this does not come as a surprise to us. If there never was an external argument, none has to be eliminated. These gerunds, then, do not violate the Projection Principle. While they may very well involve affixation of *-ing* to a lexical category (that is, V as opposed to VP), there is no reason to assume that this affixation is a process that takes place in the lexicon, that is, in a word-building component prior to the syntax.

In fact, the assumption that *of*$_{\text{ing}}$ gerunds are built in the lexicon runs into at least two serious difficulties. The first one is that it would not explain why (even though the lexicon is assumed to be the place where lexical requirements can be violated) *of*$_{\text{ing}}$ gerunds *must* preserve the internal arguments of the verb, as demonstrated by Lebeaux (1986) (see also Grimshaw 1990):

(44) a. The felled *(trees).
b. The felling *(of the trees).

(45) a. They destroyed *(the city).
b. The destroying *(of the city).

The second serious obstacle to the assumption that *of*$_{\text{ing}}$ gerunds are formed in the lexicon is the fact that they may (at least optionally) be formed by attaching *-ing* to a phrasal constituent. The evidence comes from the presence of adverbs in Jespersen 's examples repeated from above:

(46) The shutting of the gates regularly at ten o'clock had rendered our residence very irksome to me.

(47) From the daily reading of the Bible aloud to his mother. . . .

I conclude that *of*$_{\text{ing}}$ gerunds can be built in the syntax. On the approach defended here, this is possible without giving up the principle that lexical information is preserved at all syntactic levels of representation.

6. ABOLISHING THE NOTION 'EXTERNAL ARGUMENT'

The discussion in the previous sections makes it possible to do away with the notion of external argument (Williams 1981). This notion has no theoretical significance any longer. It does not figure in any theoretical statement. While I have continued to use Williams' term 'external argument' informally for arguments like the agent argument in active sentences, this term has now acquired a different meaning. Strictly speaking, the agent argument of a verb is not really one of its arguments anymore. Here is an illustration of the different kinds of arguments in the present framework:

(48) We bought your slippers in Marrakesh.

$\exists e$ [bought(your slippers)$(e)_1$ & Agent(we)$(e)_2$ & in(Marrakesh)$(e)_3$]

a. (your slippers): internal argument of *bought*
b. $(e)_1$: Event Argument
c. (we): internal argument of *Agent*; informally, external argument of *bought*
d. $(e)_2$: Event Argument
e. (Marrakesh): internal argument of *in*
f. $(e)_3$: Event Argument

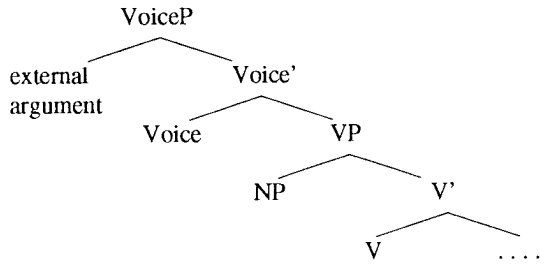
In Williams' theory, the external argument is simply a distinguished argument that is singled out by underlining. The main property of the external argument of a lexical item is that it has to be realized outside of the maximal projection of that item. This property must be stipulated since there is no necessary connection between underlining an argument and its having to be realized in a

particular way. On the present proposal, we don't have to say anything special about the realization of external arguments. All we seem to need is a very general principle for the syntactic realization of *all* arguments (excluding the Event Argument, which doesn't have to be syntactically realized). Here is a version of the principle:[20]

(49) The Realization Principle
Arguments of a head must be realized within the projection of that head.

The possible locations for arguments are now determined by the possible locations of the heads they are arguments of. If external arguments are arguments of Voice, and if Voice is a head right above VP, we get the following configuration:

(50)



The fact that the external argument must be realized outside of VP follows from the Realization Principle and the fact that external arguments are introduced by inflectional heads.

Another peculiarity of external arguments is that they disappear under certain conditions, and they take accusative Case with them when they go away. Why is that? Many answers have been given. One is to deny that external arguments and accusative Case truly disappear. This is the basis for the analyses of passive in Jaeggli (1986), Roberts (1987), and Baker, Johnson and Roberts (1989). I think that these authors are right about the cases they discuss. Yet there are other cases where we have fully developed VPs without any evidence for the presence of even a hidden external argument. *Of*$_{\text{ing}}$ gerunds are an example. Adjectival passives are another example, as shown in Kratzer (forthcoming). If external arguments were true arguments of their verbs or VPs, we would have to stipulate that they are suppressed under certain conditions.[21] On the present approach, no such stipulation is necessary. If the external argument is introduced by an inflectional head that assigns accusative Case, a bare VP without inflection is expected to have neither external argument nor accusative Case. It could not be otherwise. Again, no special statement has to be made about external arguments. This notion has become superfluous.

NOTES

1 See Bierwisch (1983, 1989), Jackendoff (1983, 1990), Hale and Keyser (1987, 1992), Speas (1990), among others.

2 What follows is the beginning of my presentation at SALT II, Ohio State University, Columbus, May 1992. It is reassuring to see that Parsons (1993) independently presents his syntactic options in very much the same way.

3 See, for example, Lewis (1972), Montague (1984).

4 See Parsons (1985) for a similar rule introducing the external argument at the point where a VP combines with its subject.

5 Klein & Sag (1985), Fanselow (1985), Higginbotham (1985), Heim and Kratzer (forthcoming), von Stechow (1991), Portner (1992), Bittner (1994).

6 I am indebted to Lisa Travis for informing me about Hung's work.

7 Cf. Baker (1988).

8 A related proposal is made in Speas (1990) for English. Speas assumes with Hale and Keyser (1987) that agentive predicates have a higher verb *do* in their lexical conceptual structure. Consequently, they license the projection of an extra verbal head at D-Structure. The result are structures of the kind that Larson proposes for double object constructions. Hale and Keyser's proposal is not compatible with my earlier arguments that information about the presence of an agent argument should not be part of the verb's lexical representations at all.

9 Jan Voskuil informs me that the prefix *an-* in Malagasy is not necessarily linked to agentivity.

10 "Man teilt Kasus der idg. Sprachen ihrer ursprünglichen Natur nach ein in *lokale*, d.h. solche, die irgend ein räumliches Verhältnis zur Vorstellung bringen, und *grammatische*, d.h. solche, die eine rein grammatische Beziehung des Nomens zu einem anderen Satzteil ausdrücken; WUNDT spricht statt dessen von Kasus der äusseren und inneren Determination, MARTY unterscheidet relative und korrelative zu den grammatischen den Nom. und Akk. über Zugehörigkeit des Dativs aber zur einen oder zur andern Gruppe ist viel gestritten worden...." (Brugmann 1913: 428).

11 Johnson refers to work by Pesetsky (1989) and Jaeggli and Hyams (1989) for further discussion of this head.

12 The Event Argument is not syntactically realized at all. Indirect objects are introduced by additional heads.

13 See Fanselow (1985), Higginbotham (1985), Heim and Kratzer (forthcoming), Portner (1992), and Bittner (1994).

14 The term is reminiscent of Higginbotham's term 'Theta Identification'. See Higginbotham (1985).

15 In an intensional version, e would be the type of possible individuals, s the type of possible events, and t the type of propositions, where propositions are sets of possible worlds or situations. Note that the resulting intensional language is different from Montague's intensional logic, even though I am using the same type names. The kind of intensional language I have in mind is a λ-categorial language (Cresswell 1973), with an additional basic type for events.

16 My use of the term 'Aktionsart' corresponds very closely to the notion 'situation type' in Smith (1991). I would have to recognize actions as one of the linguistically most significant situation types, however.

17 See Belletti & Rizzi (1988), Grimshaw (1991), Pesetsky (1995), among others.

18 See, for example, Grimshaw & Selkirk (1976), Jackendoff (1977), Borer (1984, 1990, 1991), Baker (1988), Abney (1987), Zucchi (1988), Hazout (1990).

19 See Kratzer (forthcoming) for more discussion of this kind of inheritance rule.

20 See Larson (1988), Speas (1990), Bowers (1993) for similar principles.

21 See, for example, Zubizarreta (1985, 1987), Grimshaw (1990), Grimshaw and Mester (1988).

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