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Transitivity and the Nature of the Arguments: Activities and Accomplishments

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0. Introduction

It has been argued that verbs can be classified in terms of their tense/aspect properties. One fundamental distinction is that between state verbs and non-state verbs. State verbs such as *know* cannot normally occur in the progressive (**John is knowing the answer*); they cannot occur as a complement of *force* nor as imperatives (**John forced Harry to know the answer. *Know the answer!*).¹ Vendler 1967 gives more detailed criteria and classifies non-state verbs into three subgroups; Activity, Accomplishment, and Achievement:

(1) STATE	ACTIVITY	ACCOMPLISHMENT	ACHIEVEMENT
<i>know</i>	<i>push (a car)</i>	<i>draw a circle</i>	<i>reach the top</i>
<i>exist</i>	<i>play (tennis)</i>	<i>write a letter</i>	<i>receive a letter</i>
<i>resemble</i>	<i>drink</i>	<i>eat an apple</i>	<i>catch a ball</i>

Achievements, though they are clearly non-stative (i. e., dynamic), are quite different from the two other types of dynamic verb and cannot occur in the progressive in a usual sense, nor as a complement of *stop*:²

- (2) a. John was pushing a cart for 5 minutes. (ACT)
 b. John was drawing a circle for 5 minutes. (ACCOMPL)
 c. *John was reaching the top for 5 minutes. (ACHIEV)
- (3) a. John stopped pushing a cart. (ACT)
 b. John stopped drawing a circle. (ACCOMPL)
 c. *John stopped reaching the top. (ACHIEV)

In this paper, we will focus upon the differences between Activity and Accomplishment, and show that the distinction between them does not lie in the verb itself but in the nature of the internal argument and the 'inner' adjunct³ involved in the predicate. We will also claim that this distinction

is determined at the level of D-structure in the Syntax in the sense of the GB theory, and in this way we can provide a unified account of the Accomplishment reading of 'ergative' verbs.

We shall review Dowty 1979 and Mittwoch 1982 in Section 1, and point out some problems of their analyses. In Section 2, we shall examine the data more carefully and then introduce the rule of Aspectual Binding at D-structure and attempt to explain the phenomena observed in Section 1 in a systematic way. Finally, in Section 3, we will show that the distinction between Activity and Accomplishment reflects one instance of the Transitivity Hypothesis proposed by Hopper and Thompson 1980, which assumes systematic co-variation between transitivity of a sentence and the nature of the arguments involved in it.

1. Activity vs. Accomplishment

Mittwoch 1982 presents six differences between Activity predicates and Accomplishment predicates. We shall look at three of them here.

i) Atelic durational phrases like *for 10 minutes* occur with Activities but not (normally) with Accomplishments:

- (4) a. John ate (peanuts) for 10 minutes. (ACT)
 b. *John ate half a pound of peanuts for 10 minutes. (ACCOMPL)
 (Mittwoch 1982: 115)

ii) The question *What happened?* can be answered by Accomplishments but not by Activities; (5 a) is good but (5 b) is anomalous:

- (5) a. John typed some letters/something.
 b. John typed (letters). (ibid: 118)

iii) With Activities, *x is ϕ ing* entails *x has ϕ ed*, but this entailment does not hold with Accomplishments:

- (6) a. John is walking. \supset John has walked. (ACT)
 b. John is painting a picture. (ACCOMPL)
 \nexists John has painted a picture.

Dowty 1979 gives several more criteria to distinguish Activities and Accomplishments. Let us now take a look at two of them:

iv) Accomplishments are compatible with *ϕ in an hour/take an hour to ϕ* ,

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but Activities cannot occur with such 'telic' expressions (except in the sense of inception of the action)⁴.

- (7) a. *John walked in an hour. (ACT)
b. John painted a picture in an hour. (ACCOMPL)

(Dowty 1979 : 56)

v) Accomplishments can be a complement of a verb *finish* but Activities cannot:

- (8) a. *John finished walking. (ACT)
b. John finished painting a picture. (ACCOMPL)

(ibid : 57)

It can, in general, be said therefore that Activities and Accomplishments are systematically different in their grammatical behavior.

Now, let us consider the following sentences:

- (9) a. John walked $\left\{ \begin{array}{l} \text{to the park} \\ \text{a mile} \end{array} \right\} \left\{ \begin{array}{l} \text{in an hour.} \\ \text{*for an hour.} \end{array} \right.$
b. John finished walking $\left\{ \begin{array}{l} \text{to the park} \\ \text{a mile} \end{array} \right\} \left\{ \begin{array}{l} \text{in an hour.} \\ \text{*for an hour.} \end{array} \right.$

The sentences in (9) obviously have an Accomplishment reading, and then if we assume the Activity/Accomplishment distinction lies in the verb itself, how can we account for the differences between the Activity 'verb' *walk* as in (7-8) and the Accomplishment 'verb' *walk* as in (9)? It is evident that this difficulty comes from the wrong assumption that verbs like *walk* (lexically) can be classified into Activity and Accomplishment. We can reasonably claim therefore that the terms Activity and Accomplishment apply to the predicate, not to the verb itself⁵. Our next question is this; What distinguishes Activity and Accomplishment in the predicate of the verbs as in (4-9)?

Mittwoch presents that a process verb⁶ without an object or with an object NP that lacks a quantifier, i. e., that consists of a "bare" plural or mass noun, enters into an Activity predicate; a process verb with a quantified object NP enters into an Accomplishment predicate.

There are some process verbs, however, which occur with a 'quantified' object NP but are still interpreted as Activity but not as Accomplishment:

- (10) a. John pushed a cart for an hour.
 b. *John pushed a cart in an hour.
 c. *John finished pushing a cart.
 d. John is pushing a cart. \supset John has pushed a cart.
- (11) a. John drove his Toyota for an hour.
 b. *John drove his Toyota in an hour.
 c. *John finished driving his Toyota.⁷
 d. John is driving his Toyota.

\supset John has driven his Toyota.

It is suggestive that (10) and (11) can be Accomplishments if a locative of destination like *to the office* is added (Cf. (9) as well):⁸

- (12) a. *John pushed a cart to the office for an hour.
 b. John pushed a cart to the office in an hour.
 c. John is pushing a cart to the office.
 \supset John has pushed a cart to the office.

More interestingly, there are some sentences which have neither surface object NPs nor appropriate adverbials but still have an Accomplishment reading:

- (13) a. The boat sank in 5 minutes.
 b. *The boat sank for 5 minutes.
 c. The boat is sinking. \supset The boat has sunk.
- (14) a. The ice melted in 5 minutes.
 b. *The ice melted for 5 minutes.
 c. The ice is melting. \supset The has melted.
- (15) a. The boy drowned in 5 minutes.
 b. *The body drowned for 5 minutes.
 c. The boy is drowning. \supset The boy has drowned.

Now, it is clear that we cannot distinguish Activity and Accomplishment simply in terms of the existence of a 'quantified object NP' in Mittwoch's sense. This criterion is incorrect in some significant respects; it is incorrect because there are some process verbs with a quantified object NP which cannot induce an Accomplishment reading but continues to signify an Activity reading as shown in (10-11): it is also incorrect because there are some process verbs with no surface object NP which can be an Accomplishment as in (13-15).

Dowty attempts to capture the aspectual properties of the verbs like *sink* only at the surface level, and thus his analysis also seems to fail to provide a unified explanation of the Activity/Accomplishment distinction among transitive process verbs like *paint*, *eat*, motion verbs like *push*, *walk*, and 'ergative' verbs like *sink*, *drown*.

We are now in the position to explain these observations in a more systematic way.

2. Delimiting the Event

2.1. Internal Arguments and Adjuncts

Mittwoch's general description of the distinction between Activity and Accomplishment is quite suggestive, but not sufficient (and even incorrect in some respects) as we have just seen in Section 1 above.

A locative of destination such as *to the park* or an adverb of extent such as *a mile* induces an Accomplishment reading as in (9) and (12). Now, what is a common function in those quantified NPs and adverbials which induce an Accomplishment reading? Intuitively, both of them entail the end point of the event described by the VP; they necessarily entail such a point of time that specifies the completion of the event. In other words, they *aspectually delimit* the event. For example, while a quantified NP *half a pound of peanuts* entails the end point of the event of eating, bare plural NPs like *peanuts* do not:

- (16) a. John ate half a pound of peanuts $\left\{ \begin{array}{l} * \text{for 10 minutes.} \\ \text{in 10 minutes.} \end{array} \right.$
 b. John ate peanuts $\left\{ \begin{array}{l} \text{for 10 minutes.} \\ * \text{in 10 minutes.} \end{array} \right.$

With motion verbs, however, a quantified NP alone does not entail the terminal point of the event, and therefore the predicate is not Accomplishment but Activity even with a quantified NP like *a cart* or *his Toyota* as its direct object as shown in (10-11). A locative of destination and an adverb of extent, on the other hand, do entail the end point of the event described by a motion verb; that is, they aspectually delimit the event of pushing a cart or walking:

- (17) a. John pushed a cart $\left\{ \begin{array}{l} \text{to the park} \\ \text{two miles} \end{array} \right\} \left\{ \begin{array}{l} \text{in an hour.} \\ * \text{for an hour.} \end{array} \right.$

- b. John walked $\left\{ \begin{array}{l} \text{to the park} \\ \text{two miles} \end{array} \right\} \left\{ \begin{array}{l} \text{in an hour.} \\ \text{*for an hour.} \end{array} \right.$

It seems that these adverbials lie within the VP, because they can all be preposed with the head V by the operation of 'VP Preposing.' (cf. Andrews III 1982)

- (18) a. John said he would push the cart 100 miles, and push the cart 100 miles he did.
 b. John said he would drive his Toyota to the office, and drive his to the office he did.
 c. Mary said she would walk to the valley, and walk to the valley she did.
 d. Mary said she would walk 100 miles, and walk 100 miles she did.
 (19) a. Push the cart 100 miles though John did, nobody thought he was crazy.
 b. Drive his Toyota to the office though John did, nobody envied him.
 c. Walk to the valley though Mary did, nobody thought she was brave.
 d. Walk 100 miles though Mary did, nobody thought she was crazy.

It is therefore plausible to claim that their structural relation to the head V is similar (if not identical) to that of complement objects; both occur within the VP. We will represent this structural relation formally in terms of binding in Section 2.3 below.

2.2. Ergative Verbs

Let us consider the sentences (13-15), repeated here as (20-22) for convenience:

- (20) a. The boat sank in 5 minutes.
 b. *The boat sank for 5 minutes.
 (21) a. The ice melted in 5 minutes.
 b. *The ice melted for 5 minutes.
 (22) a. The boy drowned in 5 minutes.
 b. *The boy drowned for 5 minutes.

These b-sentences with a *for* durational phrase are very anomalous⁹ and thus it shows that they are not Activities but Accomplishments, even though there is no surface quantified object NP nor adequate adverbials which delimit

the event. Now, when we compare (20-22) with their transitive counterpart, we can see that it is the quantified surface subject itself (i. e., the object at D-structure level) such as *the boat*, *the ice*, and *the boy* that delimits the event described. That is, with these verbs too, the predicate with a quantified object NP is compatible with a telic adverbial but not with a durational phrase, whereas the predicate with an unquantified object NP (such as a bare plural or mass noun without the definite article), conversely, is compatible with a durational phrase but not with a telic adverbial :

- (23) a. The enemy sank the boat in 5 minutes.
b. *The enemy sank the boat for 5 minutes.
c. *The enemy sank boats in 5 minutes, and then began another operation.
d. The enemy sank boats for 5 minutes, and then began another operation.
- (24) a. Jack drowned the cat in 5 minutes.
b. *Jack drowned the cat for 5 minutes.
c. *Jack drowned cats in 5 minutes, and went away.
d. Jack drowned cats for 5 minutes, and went away.

Mittwoch has noted that the subject NP may also affect the Activity/Accomplishment distinction in the cases like (20-22) and suggested that we should take a whole clause into consideration in order to determine which reading (Activity or Accomplishment) the sentence is assigned (P. 114n.2). If we follow her suggestion, however, we would run into a difficulty. That is, in some cases, the nature of internal elements determine the aspectual readings and the external elements have nothing to do with this distinction. In other cases, on the other hand, it is the external element which is crucial for determining the aspectual reading. The situation seems to be too complicated to provide a unified account.

Our task now is to investigate comprehensively what affects the Activity/Accomplishment distinction in transitive process verbs including motion verbs and so called ergative verbs as in (20-22).

2.3. The Aspectual Binding

It is clear from the above observations that an Accomplishment predicate necessarily implies the end point of the event described by the process verb, while an Activity predicate does not. In the most obvious cases, a quantified

NP object delimits the event and therefore induces an Accomplishment reading, which is, as such, compatible with telic adverbials like *in an hour*. As we have seen already, a locative of destination like *to the office* and an adverb of extent like *a mile* also delimit the event described by motion verbs.

I will propose now the rule of *Aspectual Binding*, which claims that each process verb has an Aspectual Argument (henceforth AA)¹⁰ as one of its lexical features, and it aspectually binds an internal argument/adjunct under an appropriate condition which is common in the predicates which have an Accomplishment reading. We can state the rule as follows, appealing to the notion of *delimitedness* set forth by Tenny 1987:

(25) *The Aspectual Binding*

The V with AA binds an argument/adjunct iff the argument/adjunct delimits the event described.

(26) *Delimitedness*

An event is *delimited* iff there is some point of time during which the event transpires, but after which the event is no longer transpiring. If the state *p* is a state in which the event is transpiring, and state $\neg p$ is a state in which the event is not transpiring, then for a *delimited* event there is some point of time when state *p* becomes $\neg p$.

(Tenny 1987: 23-24)

The binding here is defined by means of c-commanding and coindexing:

(27) α binds β iff α c-commands and is coindexed with β .

(28) α c-commands β iff

(i) α does not contain β

(ii) Suppose that $\gamma_1, \dots, \gamma_n$ is the maximal sequence such that

(a) $\gamma_n = \alpha$

(b) $\gamma_i = \alpha_j$

(c) γ_i immediately dominates γ_{i+1}

Then if δ dominates α , then either (I) δ dominates β , or (II) $\delta = \gamma$ and γ_1 dominates β .

(Chomsky 1981: 166)

The notion of the Aspectual Binding is analogous to that of the θ -binding proposed by Williams 1989. A binding relation normally holds between NPs; such as anaphors, pronouns and their antecedents; they are all maximal

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projections¹¹. The θ -binding, however, is a relation between a θ -role in the θ -grid of a verb and a NP which receives the θ -role. The Aspectual Binding here in (25) also refers to a relation between a head V with AA and an argument/adjunct which delimits the event described as seen in (25).¹²

Therefore, internal arguments/adjuncts which delimit the event are aspectually bound by V as far as they are within the VP, while external arguments like subject are not, because V does not c-command the subject position and thus does not bind the subject NP. In the former case, the V has an aspectual index, which, if we assume a percolation of the feature index¹³, means that the VP (i. e., the maximal projection of the head V) also has the same aspectual index. In the latter case, however, the V has no such index, which means that the VP has no aspectual index, either. This is, we claim, the formal way to express the Activity/Accomplishment distinction: an Accomplishment VP is marked with an aspectual index, while an Activity VP is not.

One might reject the discussion so far, maintaining that we do not need to assume the feature AA of the verb itself because the Activity/Accomplishment distinction seems to be decided by referring to the nature of VP as a whole. We would like to claim, however, that the feature AA is an inherent feature of a verb which potentially can be assigned an Activity/Accomplishment distinction: only verbs with AA can be Accomplishment. There is another type of V which never has an Accomplishment reading even with a 'delimited' object NP; stative verbs:

(29) a. *John likes the body in 5 minutes.

b. *John knew the answer in 5 minutes.

According to the Delimitedness defined in (26), it seems possible to claim that there is a point of time at which a state of [+liking the body] becomes a state of [-liking the body] and therefore the 'event' is delimited, resulting in an Accomplishment reading. This is, however, not the case; the sentences (29) are not Accomplishment nor Activity. We need therefore the feature AA to distinguish process verbs which have the potentiality to be Accomplishment from stative verbs which are immune from the Activity/Accomplishment distinction.¹⁴

Now, assuming that each modifying expression is checked at the LF level whether it is properly licensed, we can appeal to the notion of Aspectual Binding to propose well-formedness conditions on telic and durational adver-

bials occurring with process verbs.

(30) *Temporal ADV Condition I*

ADV[telic] is licensed iff it occurs with a VP which has an index of aspectual binding.

(31) *Temporal ADV Condition II*

ADV[durational] is licensed iff it occurs with a VP which has no index of aspectual binding.¹⁵

When the V aspectually binds an internal element, it means that the predicate entails the end point of the event and thus is compatible with telic adverbials like *in an hour* but not with durational adverbials like *for an hour*. On the other hand, object NPs which are bare plurals or mass do not delimit the event, i. e., cannot specify the terminal point of the event, and in that case the V cannot bind such NPs and thus the VP has no index of aspectual binding. It is also possible to propose that a telic expression *it takes [TIME] to ...* require (as its subcategorization property) VPs which have the index of aspectual binding:

(32) take [TIME] to ...; +[____VP (aspectually indexed)]

The V cannot bind the subject NP, as is clear from (27-28), and thus the VP is not aspectually indexed; that is to say, the subject NP alone cannot assign an Accomplishment reading to the predicate even if it is a quantified one:

(33) b. *The boy walked in an hour.

a. The body walked for an hour.

Given (25-28), it would be very difficult to account for the Accomplishment reading of ergative verbs as in (20-22) if the subject NPs are base-generated in the position. Now, it is plausible to assume that the 'surface subject' in (20-22) are actually generated in the object position at D-structure and then move to the surface position in the Syntax.¹⁶ This suggests that the rule of Aspectual Binding (25) applies at the level of D-structure. Putting it differently, if we assume that the surface subject NP in ergative verbs is generated in the complement position at D-structure, we can nicely explain the Activity/Accomplishment distinction in a unified way, referring only to the VP internal elements. Theoretically, this in turn provides a piece of supporting evidence for the Unaccusative Hypothesis proposed first by Perl-

mutter in the framework of the Relational Grammar: the hypothesis essentially claims that the surface subject in ergative verbs (i. e., unaccusative in Perlmutter's term) is generated in the direct object position and then 'advances' to the surface subject position. (Cf. Perlmutter 1978 and Bruzio 1986)

Under these considerations, we can explain the Activity/Accomplishment distinction in transitive verbs and ergative verbs in a unified way in terms of the rule (25) which presupposes the notions of Delimitedness (26) and Binding (27).

3. Summary

We have attempted to provide a unified approach to distinguish Activity and Accomplishment with various types of verb. We have proposed the rule of Aspectual Binding (25), which seems to me a plausible way of accounting for the data demonstrated in the above discussion.

Incidentally, it is very interesting that, as we have seen, the 'delimitedness' of the VP is, in some cases, crucially related to the 'delimitedness' of the (internal) arguments involved. That is, if the object NP is 'spatially delimited' by quantification, then the VP as a whole is also 'aspectually delimited,' resulting in an Accomplishment reading. On the other hand, if the object NP is not 'spatially delimited' (appearing as a bare plural, for instance), the VP is not 'aspectually delimited' either, resulting in an Activity reading.

This is exactly what the Transitivity Hypothesis (by Hopper & Thompson 1980) predicts. They assume that if a sentence has a highly individuated object NP, its transitivity is higher than those which, other things being equal, have a less highly individuated object. (Hopper and Thompson 1980 : 252-255) Therefore, we understand that the correlation between the nature of arguments and the Activity/Accomplishment variation is one realization of the general properties which are systematically and cross-linguistically observed in natural languages.

NOTES

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my own.

¹There are some exceptions to this observation, but I will put them aside here. Cf. Roberts 1986: 257 n. 2 and Quirk et al. 1985: 178 for some comments on them.

²The distinction between Accomplishment and Achievement is also a very interesting topic, but is of a little concern to the discussion in this paper. Cf. Dowty 1979, Quirk et al. 1985: 206 ff, and Mourelatos 1981 etc.

³There are some adjuncts which do not subcategorize the verb and thus are not obligatory, but still prove to be located inside the VP. See Section 3 below for the syntactic status of such adjuncts.

⁴It must be noted that with a telic adverbial like *in an hour*, there is another possible reading in most cases of both Activity and Accomplishment; 'the action starts within an hour from now.' This reading is permitted (or preferred) especially in present or future tense:

- (i) John will walk in an hour.=John will start to walk within an hour from now.
- (ii) John will eat his lunch in an hour.=John will start to eat his lunch within an hour from now.

One might suggest that in the case of the inception reading, the telic adverbial necessarily marks the crucial point of time; the time when the state of 'non-walking' becomes the state of 'walking'. See the definition of delimitedness (26) in Section 2. In any case, we are not going to treat this inception reading in this paper for the simplicity of the present discussion.

⁵It is also possible to assign an Accomplishment reading to an 'Activity' verb (without any appropriate adverbial) in a proper context as shown in Dowty 1979:61. We would like to suggest that in such cases, too, there is some contextual factor which implicitly 'delimits' the action described by the predicate. See note 7 below.

⁶Mittwoch defines 'process' verbs as those which can be modified by the adverbs *slowly* and *quickly*, and this is a cover term for the verbs which can be assigned both Activity and Accomplishment readings in the present discussion.

⁷(11b-c) would be possible, if there is a contextual situation where both the speaker and the hearer know that John makes it a rule to drive his Toyota via the same route every evening. In this case, the terminal point of his activity of driving would be strongly implied and therefore an Accomplishment reading would be possible.

⁸Mittwoch too suggests that 'directional phrases' also induce an Accomplishment reading in the case of motion verbs. (p. 114)

⁹In some context they could be possible with *for* phrase as in (i), but a

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progressive form is much better to represent the same situation as in (ii);

- (i) ? The ice melted for 5 minutes, but it suddenly stopped melting because of the change of temperature.
- (ii) The ice was melting for 5 minutes, but it suddenly stopped melting because of the change of temperature.

¹⁰I owe the idea of Aspectual Argument to the notion of Temporal Argument proposed by Enç 1987.

¹¹Cf. the binding theory in the sense of Chomsky 1981: 188.

¹²The notion of the θ -binding by Williams was brought to my attention by Y. Yamada.

¹³It is not unreasonable to assume the percolation from a head to its projections. Cf. Lieber 1983, Baker 1988: p. 456 n. 33.

¹⁴Stative verbs are compatible with durational phrases if the duration is long enough:

? John liked the boy for the first 3 months.

¹⁵There are other time adverbials (which may have a feature [Temporal]) which are not sensitive to the Activity/Accomplishment distinction:

- (i) John drove *last Sunday*. (ACT)
- (ii) John drew a picture *last Sunday*. (ACCOMP)

¹⁶I assume that the Case Theory provides the motivation for Move- α in ergative verbs. Cf. Burzio's generalization (Burzio 1986).

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