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Telicity and Path Structure in Japanese

Eri TANAKA

1. Introduction

The temporal constitution of an event may be changed by various factors. One of the factors that have been received much attention in the literature is the semantics of NPs (e.g. Bach (1986), Dowty (1991), Verkuyl (1993), Krifka (1992/1998), Jackendoff (1996), and among many others). As is well known, *eat an apple* and *eat apples* are said to be aspectually different: the former event has a natural endpoint, at which an apple is fully consumed, while the latter cannot have such a point.

In this paper, we will focus on another factor, which is less studied, the existence of locative phrases. The previous studies have formalized their effect on aspectuality in terms of argument structural configuration of a (host) verb (e.g. Tenny (1994), Ueno and Kageyama (2001)). In such theories, an argument locative phrase can behave as a delimiter, but a non-argument one cannot. The aim of this paper is to rather extensively examine the semantics of the locative phrase itself, and to show that by doing so, we can naturally extend our analysis to a seemingly non-argument locative phrase which in fact delimits an event. Our analysis also explains why non-argument locative phrases usually do not contribute to aspectual composition.

The organization of this paper: In the next section, we will elucidate the locus of the problem. In section 3, the semantics of a Japanese locative is proposed. In section 4, we will present our analysis to the problems raised in section 2, mainly based on Krifka's (1992/1998) system. Section 5 will be a conclusion. Although the data in this paper is confined to Japanese, I hope that this will be extended to other languages.

2. The Issue: Setting the Stage

-Made 'as far as/until' is a postposition that poses a 'boundary' on objects. It provides a spatial boundary for objects such as a road and a pavement:[1]

(1) hodo -wa koko -kara asoko -made da.
pavement -TOP here -from there -as far as COPL
(Lit.) 'The pavement is from here to there.'
'The boundary of the pavement is from here to there.'

It also gives a boundary of a motion or an activity by designating the final point of the motion or activity. In (2), phrase *gakko-made* 'as far as school/until school' sets up the final point that the events end. In (2b), for example, the reading of a book will be stopped when the reading agent gets to school:

(2) a. gakko -made aruita
school -as far as walked
'(I) walked to school'
b. gakko -made hon -o yonda
school -as far as/until book -ACC read
(Lit.) '(I) read a book until school'

A similar meaning of *-made* to this 'locative' use is the one that specifies a final point on non-spatial domains. In (3a), for example, *5 do* '5 degrees Celsius' marked by *-made* is the ultimate degree of the dropping/rising temperature:

(3) a. kion -ga 5 do -made sagatta/agatta
temperature -NOM 5 degrees-as far as dropped/rose
'The temperature dropped/rose to 5 degrees Celsius.'
b. kono hon -o 30 page-made yonda
this book-ACC 30 page-as far as read
'(I) read this book to page 30.'

In this paper, we will not deal with *-made* as a so-called 'focus' particle, which

does not set some boundary, at least not in the same way as the postpositional one.[2] Some are exemplified in (4).

(4) a. John-made party -ni kita
-FOC party -LOC came
'Even John came to the party.'
b. John-ga party -ni -made kita
-NOM party -LOC -FOC came
'John came even to the party.'

In the examples in (2) and (3a), the sentences without the *-made* phrases show "atelic" property. These events do not have a set terminal point, which is confirmed by the (in)compatibility with time adverbs:

(5) a. John-ga {5 hun-kan /*5 hun-de} aruita
-NOM {5 minutes-for/5 minutes-in} walked
'John walked {for 5 minutes/in 5minutes}.'
b. John-ga {5 hun-kan /??5 hun-de} hon -o yonda
-NOM {5 minutes-for/5 minutes-in} book-ACC read
'John read a book {for 5 minutes/in 5 minutes}.'
c. kion -ga {5 hun-kan /*5 hun-de} agatta/sagatta
temperature-NOM {5 minutes-for/5 minutes-in} rose/dropped
'The temperature rose/dropped {for 5 minutes/in 5 minutes}'

In (6), in contrast with (5b), either frame or durative adverb may be associated with the event:

(6) John-ga kono hon -o {5 hun-kan /5 hun-de} yonda
-NOM this book-ACC {5 minutes-for/5 minutes-in} read
'John read this book-ACC {for 5 minutes/in 5 minutes}.'

(5b) and (6) are minimally different in that the object NP in (6) (and (3b)) is definite, while the one in (5b) is in its bare form. The impact of definiteness of object NPs on telicity is a well-known phenomenon.[3] Kitahara (1999) attributes this effect to the specificity of the definite NP, which denotes a specific amount.

We will not go into the specificity (definiteness) of NPs in this paper.[4]

In the examples in (2)–(3), where an *-made* phrase is attached to an atelic event, the boundary set by the locative not only bounds the objects such as a spatial path, but also 'bounds' the run time of the event, except for (2b):

(7) John-ga gakko-made 5 hun -de aruita
-NOM school-as far as 5 minutes -in walked
'John walked to school in 5 minutes.'

(8) a. kion -ga 5 do -made 5 hun -de
temperature -NOM 5 degrees -as far as 5 minutes -in
sagatta/agatta
dropped/rose
'The temperature dropped/rose to 5 degrees Celsius in 5 minutes.'

b. John-ga kono hon-o 30 page-made 5 hun -de
-NOM this book -ACC 30 page-as far as 5 minutes -in
yonda
read
'John read this book to page 30 in 5 minutes.'

In contrast to these examples, (2b) does not show a telic property:

(9) *John-ga gakko -made 5 hun -de hon -o yonda
-NOM school -until 5 minutes -in book-ACC read
'*John read a book until (he reached) school in 5 minutes.'

In (9), although the *-made* phrase seems to bound a spatial path as in (7), it cannot bound the time of the event. The question here is why this sentence cannot be interpreted to be a telic event, albeit an apparent similarity with the sentences in (2a)–(3).

An answer to this question has been given by Ueno and Kageyama (2001, henceforth U&K). They state that for an atelic (motion) event to be delimited by a locative phrase, the locative phrase must satisfy both of the following conditions (U&K (2001:65)):

(10) Necessary conditions for a locative phrase to delimit an (atelic) event

a. The location phrase itself is bounded; and
b. The location phrase is a 'Path' argument of a verb.

These conditions predict the ungrammaticality of (9): in (9), phrase *gakko-made* 'as far as school' is not a Path argument of the verb, and thus, it does not satisfy the second condition. On the other hand, the sentence in (7) is grammatical because it satisfies both of the conditions in (10): the *-made* phrase is bounded, and the verb can take it as a Path argument.

It is not impossible that these conditions can be extended to cases like (8a): given that temperature rising/dropping is a kind of 'movement', following Krifka (1998), the temperature moves along the implicit 'path' of measuring degrees which can be induced by the *-made* phrase. In (8b), however, since the reading event cannot be considered to be a kind of movement, the extended application of the conditions in (10) is not as straightforward as the case in (8a).

Condition (10) is compatible with the theory of Tenny (1994), which advocates that only direct and indirect arguments of a verb can contribute to aspectual composition. When we follow this theory, the *-made* phrases in (7) and (8a) are arguments of the verbs, while the one in (9) is not an argument, but an adjunct.[5] In the case of movement, the claim that a *-made* phrase can function as an (indirect) argument of a verb seems to be tenable, but it seems to be difficult to extend it to cases like (8b), because the *-made* phrase cannot be an argument of the reading event. In this paper, we will not claim that the grammatical difference between (7)–(8) and (9) is due to the argument-adjunct distinction, rather, our theory analyzes a *-made* phrase as a predicate which takes a 'path'. The notion of 'path' in our theory is thus slightly different from the one in U&K. We will give a definition of 'path' in our theory in the next section. The present theory can deal with (7)–(8a) and (8b) in the same way, without any drastic extension, and also explain the ungrammaticality of (9) without referring to the distinction between an argument and adjunct.

3. The Semantics of *-Made* Phrases

3.1 *-Made* Phrase as a Predicate of a PATH

It is implicitly presupposed in the preceding section that for a *-made* phrase to be felicitously used, it must co-occur with an object having some 'length'. The

length of the object can be unbounded, and a *-made* phrase serves as a delimiter of the length. When the object is an individual which cannot be any length in the relevant sense, say John, it cannot be used with this phrase:

(11) *John-ga genkan -made iru
-NOM entrance hall-as far as be
(Lit.) 'John is as far as the entrance hall.'

In contrast to (11), the following sentence becomes good:

(12) kodomo-ga genkan -made iru
child -NOM entrance hall-as far as be
'There are children, forming a line, to the entrance hall.'

The crucial difference between (11) and (12) lies in the fact that the subject NP in (12) is a common noun phrase, which can be interpreted to be either singular or plural.[6] In (12), the subject NP MUST be interpreted to be plural, and otherwise, the sentence becomes ungrammatical by the same reason for the ungrammaticality of (11). Based on the selectional restriction on the subject NPs in these examples, we propose that a *-made* phrase is a predicate that takes a specific type of argument. For the moment, let us express the argument type as $\prod$. Then, the above restriction is couched in the statement that the argument of a *-made* phrase has to be $\prod$. In the semantic representation in (13), *-made* is a three-place predicate which relates its individual arguments (type e) and the event argument:

(13) a. *-made*: $\lambda x \lambda y \lambda e$ [MADE(x, y, e)& $\prod$(y)]
b. *genkan-made*: $\lambda y \lambda e$[MADE(eh', y, e)& $\prod$(y)]

In (13b), *eh'* represents the denotation of NP *genkan* 'the entrance hall'.

We assume that in our universe, in addition to ordinary singular individuals, we have plural and mass individuals (cf. Link (1987)). Our universe forms a part structure, defined by the sum operation $\oplus$ in Krifka (1998: 199). The part relation is reflexive, transitive, and antisymmetric (i.e. a partial-order relation):

(14) a. $\{a,b\} \leq \{a, b, c\}$
b. $a \leq \{a,b\}$
c. the *sum operation* $\oplus$: is a function that satisfies the following:
(i) idempotent: $\forall x\ [x \oplus x = x]$
(ii) commutative: $\forall x, y[x \oplus y = y \oplus x]$
(iii) associative that is: $\forall x, y, z\ [x \oplus (y \oplus z) = (x \oplus y) \oplus z]$
d. *the part relation* $\leq$: $\forall x, y\ [x \leq y \leftrightarrow x \oplus y = y]$

(14a,b) is a set theoretic notation of a part structure. Plural individuals, in contrast to singular individuals, are made up from at least two atomic individuals.

The grammatical disparity between (11) and (12) is related to the denotational difference between the subject NPs. In (11), the subject has to be interpreted to be singular, while in (12), the common noun can be interpreted to be plural. In the universe, *John* is a singular individual, and *kodomo* 'child' can refer to a plural individual. We will tentatively define predicate $\prod$ as follows:

(15) $\forall x[\prod(x) \leftrightarrow \forall P[P(x) \rightarrow \exists y, z\ [y \leq x \wedge z \leq x \wedge P(y) \wedge P(z) y \oplus z = x]]$

The semantics of *John* and *kodomo* 'child(ren)' can be represented as follows:

(16) a. *John*: $\lambda P \lambda e[P(J,e)]$
b. *kodomo*: $\lambda Q \lambda e \exists x[CHILD(x) \wedge Q(x,e)]$, where $\prod(x)$

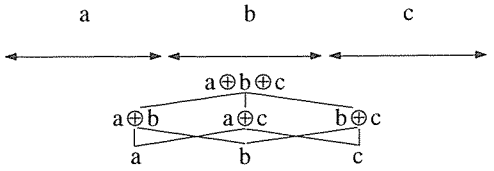
Given that existential verb *aru* 'be' is semantically vacuous (i.e. of type <<e,t> <e,t>>), the two sentences in (11) and (12) will have the following representations:

(17) a. $[\![(11)]\!] = \lambda P \lambda e[P(J,e)]\ (\lambda y \lambda e[MADE(eh', y, e) \wedge \prod(y)])$
$= \lambda e[MADE(eh', J, e) \wedge \prod(J)]$
b. $[\![(12)]\!] = \lambda Q \lambda e \exists x[CHILD(x) \wedge Q(x,e)]\ ((\lambda y \lambda e[MADE(eh', y, e) \wedge \prod(y)])$
$= \lambda e \exists x[CHILD(x) \wedge MADE(eh', x, e) \wedge \prod(x)]$

The ungrammaticality of (11) is thus reduced to the semantic anomaly in (17a), as required.

As pointed out in the previous section, however, the target of the predication by *-made* phrases is not restricted to plural objects. It predicates of a book, a pavement, the measure on the temperature, and a spatial path. How can we put them into one class, including cases like (12)?

We will now introduce the notion of PATH, following Krifka (1998). The objects listed above share one common feature. These objects can be divided into parts that are ordered consecutively. Each part of them does not overlap each other. For example, pages of a book are ordered consecutively and each page does not overlap.



In the figures above, we would like to exclude a ⊕ c as PATH. We also do not include a⊕b⊕a as PATH. Krifka (1998: 203) defines path structures, based on part structures and adjacency structures, which exclude these cases:

(18) the overlap relation ⊕: $\forall x, y \in U\ [x \otimes y \leftrightarrow \exists z \in U\ [z \leq x \wedge z \leq y]]$

(19) $A = \langle U_A, \oplus_A, \leq_A, <_A, \otimes_A, \infty_A, C_A \rangle$ is an adjacency structure iff

a. $\langle U_A, \oplus_A, \leq_A, <_A, \otimes_A \rangle$ is a part structure,

b. ∞_A, adjacency, is a two-place relation in U_A such that

(i) $\forall x, y \in U_A\ [x \infty_A y \rightarrow \neg x \otimes_A y]$

(ii) $\forall x, y, z \in U_A\ [x \infty_A y \wedge y \leq_A z \rightarrow x \infty_A y \vee x \otimes_A z]$

c. $C_A \subseteq U_A$, the set of convex elements, is the maximal set such that $\forall x, y, z \in C_A\ [y, z \leq_A x \wedge \neg y \otimes_A z \wedge \neg y \infty_A z \rightarrow \exists u \in C_A\ [u \leq_A x \wedge u \infty_A y \wedge u \infty_A z]]$

Krifka (ibid.) defines Path structures as follows:

(20) Path structures: $H = \langle U_H, \oplus_H, \leq_H, <_H, \otimes_H, \infty_H, C_H, P_H \rangle$, such that

a. $\langle U_H, \oplus_H, \leq_H, <_H, \otimes_H, \infty_H, C_H, \rangle$ is an adjacency structure,

b. $P_H \subseteq C_H$ is the maximal set such that
$\forall x, y, z \in P_H [y, z \leq_H x \wedge \neg y \otimes_H z \wedge \neg y \infty_H z \rightarrow \exists u \in P_H [u \leq_H x \wedge y \infty_H u \infty_H z]]$

c. $\forall x, y \in U_H [\neg x \otimes_H y \wedge \neg x \infty_H y \rightarrow \exists z \in P_H [x \infty_H z \infty_H y]]$

Condition (20c) ensures that there is a path between any two locations.

The plurality requirement formulated in (15) is now revised to the PATH requirement, as formulated in (20). We replace property $\prod$ with PATH. The semantics of *-made* is now represented as follows:

(21) $[[\text{-}made]] = \lambda x \lambda y \lambda e$ [MADE(x, y, e)&PATH(y)]

4. Telicity and Path

4.1 PATHs to be predicated

In section 2, we have observed that the telicity induced by *-made* phrases is restricted to some cases:

(22) a. gakko -made aruita [telic]
school-as far as walked
'(I) walked to school'

b. kono hon -o 30 page-made yonda [telic]
this book -ACC 30 page-as far as read
'(I) read this book to page 30.'

c. kion -ga 5 do -made agatta/sagatta [telic]
temperature-NOM 5 degree -as far as rose/dropped
'The temperature rose/dropped to 5 degrees Celsius.'

d. gakko -made hon -o yonda [atelic]
school-as far as book-ACC read
(Lit.) '(I) read a book as far as to school'

Some cases that are not delimited by *-made* phrases are added below:

(23) a. gakko -made neta
school -as far as slept

'I slept to school.'

b. gakko -made hanasi-o sita
school -as far as talk -ACC did
'(I) talked (with someone) to school.'

In the examples in (22)–(23), what serves as a PATH to be predicated by the *-made* phrases? For (22b) and (22c), the measure phrases (pages, degrees) indicate the predicated paths: it is the pages of the book for (22b), and the measure of the temperature for (22c). For (22a), an implicit spatial path is considered to be the target of the predication. In Japanese, it may be expressed by an *o* (accusative-case) marked element, as in (24a). It has been pointed out that a *-made* phrase cannot be associated with what Kageyama and Yumoto(1997) calls 'goal-oriented' verbs such as *tuku* 'arrive' (cf. Kageyama and Yumoto (1997), Kawano (1999)), as in (24c). This type of verbs yields ungrammaticality when used with *o*-marked paths, as in (24b). The ungrammaticality of these cases (i.e. (24b,c)) can be explained by the lack of appropriate predicational target, i.e. a spatial path. Thus, in (22a), though implicit, the *-made* phrase and a spatial path are related by a predication relation:

(24) a. kono michi-o gakko -made aruita
this road -ACC school-as far as walked
'(I) walked this road to school.'

b. *kono michi-o tuita
this road -ACC arrived
Intended: '(I) arrived (here) along this street.'

c. *gakko -made tuita
school-as far as arrived
Intended: '(I) arrived at school.'

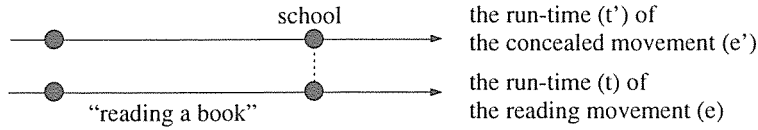
The path in (22d) is not provided by the object NP, because books cannot be predicated by *-eki-made* 'as far as school'. In the examples in (22d)–(23), the sentences can be paraphrased by using subordinate clauses:

(25) a. gakko -ni tuku made hon -o yonda
school-LOC arrive until book-ACC read

'(I) read a book until I arrived at school.'

b. gakko -ni tuku made neta /hanasi -o sita
school-LOC arrive until slept/talk -ACC did
'(I) slept / talked (with someone) until I arrived at school.'

The paraphrases in (25) suggest that when the examples in (22d)–(23) are interpreted, concealed movements are included. The run-times of the concealed movements correspond to the ones of the main event. In (22d), for example, the run-time of the concealed movement fully corresponds to the reading event, as the following figure illustrates:



The relation between the run-times *t'* and *t* are in homomorphism, and thus the following holds:

(26) For function *f* from t' to t,
$\forall t''[t''\leq t' \rightarrow \exists f[f(t'')\leq f(t')]]$

As a consequence, the paths predicated by the *-made* phrases in (22d)–(23) are the run time of the main clause predicates.

U&K (2001) points out that the use of the *-made* phrases in (22d)–(23) has the same function as the one of time adverbial *-made* phrases. As indicated in (27b), *5 ji-made* 'until 5' does not delimit an atelic event:

(27) a. 5 ji made hon -o yonda/neta
5 o'clock until book-ACC read/slept
'(I) read a book/slept until 5 o'clock.'

b. 5 ji made {30 punkan /*30 pun-de} hon -o
5 o'clock until {30 minutes-for /30 minutes-in} book -ACC
yonda/neta
read/slept

'(I) read a book/slept {for 30 minutes/in 30 minutes} until 5 o'clock.'

4.2 Telicity and Path Structure

We assume that in our domain of universe, there are events and times in addition to individuals.[7] We also assume that events and times also form part structures. A time structure composes of an adjacency structure based on a part structure with a precedence and a direction relation. Events are related to times via temporal trace function τ, which maps an event to its run time.[8]

(28) $\forall e, e'[\tau(e \oplus e') \rightarrow \tau(e) \oplus \tau(e')]$

The impact of the semantics of object NPs of verbal predicates to aspectuality has been captured by notions such as incrementality (Dowty (1991)), graduality (Krifka (1992)), and [+SQA] property (Verkuyl (1993)) (cf. Jackendoff (1996)). The property reveals prototypically on consumption(performance)/creation verbs, such as *eat an apple/apples, bake a cake/potatoes*. In the examples we have been discussing, the element which bears PATH shows this property. An event proceeds along the PATH element. We assume the relation θ must satisfy the following conditions, based on Krifka (1992: 39):

(29) θ shows a graduality GRAD(θ)iff

a. UNI-O(θ) $= \forall e,x,x'[\theta(e,x) \wedge \theta(e,x') \rightarrow x = x']$

b. MAP-E(θ) $= \forall e \forall x,y \in U_H[\theta(e,x) \wedge y \leq_H x \rightarrow \exists e'[e' \leq e \wedge \theta(e',y)]$

c. MAP-O(θ) $= \forall e,e' \forall x \in U_H[\theta(e,x) \wedge e' \leq e \rightarrow \exists y \in U_H[y \leq x \wedge \theta(y,e')]$

Since under this theory, the "boundedness" on PATH elements (i.e. elements that are in GRAD(θ)), is percolated to event structural organization by MAP-E property, when a PATH element are predicated by a *-made* phrase, the event structural organization is also altered. We assume here, following Tanaka (2003), the Event Composition operation, which takes two events and turns them into one event.

(30) Event Composition (cf. Tanaka(2003))

a. e1 + e2 = <e1, e2>, where e1 precedes or overlap with e2, and e1, e2 ≤e
b. e1 + e2 = <e1, e2> if e1 and e2 include at least one common thematic relation in its semantics.

Under this analysis, the sentences in (22a) are analyzed as follows:

(31) a. [[gakko-made]] = λyλe [MADE(school, y, e)&PATH(y)]
[[∅gakko-made]] = ∃yλe[MADE(school, y, e)&PATH(y)]
b. [[aruku]] = λyλxλe[WALK(x,y,e)&PATH(y)&AGENT(x)]
[[∅aruku]] = ∃yλxλe[WALK(x,y,e)&PATH(y)&AGENT(x)]
[[John-ga∅ aruku]] =∃yλe[WALK(J,y,e)&PATH(y)&AGENT(J)]
c. [[(31a)|] + [[(31b)]] via Event Composition
= ∃yλe,e'[WALK(J,y,e)&PATH(y)&MADE(school, y, e')&AGENT(J)&e'⊗e]

The crucial point here is that by *-made*'s predication of a so-called incremental theme (here, PATH), the event composition is operated, and the entire event structure is changed into bounded one. The entire event E is mapped to its time structure via temporal trace function τ, and the time structure becomes telic.

In the cases of (22d)–(23), on the other hand, we have observed that the predicated paths are run time of the events, not the events per se. The *-made* phrases in these examples do not have an impact on the event structural organization, because the predicated path elements do not show θ property defined above.

5. Conclusion

In this paper, we have discussed in what condition the effect of a locative phrase on telicity emerges. We have presented an analysis which posits a univocal semantics for *-made*, and the difference in the impact on telicity is attributed to the difference in the predication structure and its target. The upshot of the present analysis is that we can extend our theory to non-motion events such as reading.

The theories of aspectuality or eventuality in the recent literature utilize a scalar structure, by which the telicity of an event is determined (e.g. Hay et al.

(1999)). The notion of PATH in this paper may correspond to 'scale' in such theories. Theories that exploit the notions of 'scale' or 'PATH' seems superior to argument structure theories in that they can treat various aspectual phenomena uniformly.

Notes

1 Abbreviations: TOP for topic, NOM for nominative case particle, ACC for accusative case particle, FOC for focus particle, COPL for copular verb.

2 Generally, focus particles are syntactically different from postpositions or case particles. For example, *-made* as a postposition cannot occur in subject or object positions, since it bears a specific thematic relation. It also cannot follow a case particle and other postpositions, unlike (4b).

3 See, for example, Krifka (1992), Ramchand (1997). In the languages dealt with in these studies, the definiteness (or correctly, a strong-weak distinction) is reflected on case marking. Japanese, however, does not have this morphological device, and whether the object NP is interpreted to be definite or not seems to be largely dependent on the context (see also Kitahara (1999)).

4 In (6), the version with the durative adverb results in 'partitive' reading of the object NP. It is interesting to note that the version with the time-frame adverb requires the NP to be interpreted definite. Comparing with (6), the grammatical judgment of the following example degrades:

(i) ?hon -o 5 hun -de yonda
book -ACC 5 minutes -in read

5 U&K's conclusion that *-made* phrase may be an argument or an adjunct is motivated by the fact that even in sentences like (8), the events may be interpreted to be atelic:

(i) John -ga gakko -made 30 pun -kan aruita
-NOM school -as far as 30 minutes -for walked
'John walked as far as the station for 30 minutes.'

U&K conclude that in (i), the *-made* phrase serves as an adjunct, in the same way as (9).

6 In Japanese, bare common NPs are neutral with respect to number, unlike English.

7 These have been implicitly assumed in the preceding sections.

8 The definition here is based on Krifka (1992: 33, 1998: 206).

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