ON THE (A)TELICITY PROPERTY OF ENGLISH VERB PHRASES

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Abstract: The aim of the paper is that of offering an overview of various executions of the aspectual notions of (a)telicity in the current literature. The core idea is that in English the telic-atelic contrast is compositionally computed at the level of VP or IP. We discuss (a)telicity of complete VPs in the analyses put forward by Krifka (1989, 1992, 1998), Rothstein (2008), Filip (2008), and Landman and Rothstein (2008).

Keywords: (a)telic predicates, quantization, cumulativity, event maximalization, incremental homogeneity.

1. Aim of the paper

The aim of the paper is that of offering an overview of various executions of the aspectual notions of (a)telicity in mostly current literature.

The structure of the paper is as follows: in section 2 we distinguish between the notions of (a)telicity and (im)perfectivity and interpret these systems as orthogonal to each other. Section (3) reviews tests that identify (a)telic predicates. Sections 4-8 are devoted to the analyses and evaluations of (a)telicity calculated at VP level in Krifka (1989, 1992, 1998) (section 4), in Rothstein (2004, 2008) (sections 5 and 7), in Filip (2008) (section 6), and in Landman and Rothstein (2008) (section 8).

2. (A)telicity vs. (im)perfectivity

Many linguists clearly distinguish between the perfective-imperfective aspectual opposition and the telic-atelic contrast. The perfective-imperfective opposition is signaled by distinct tense inflectional morphology. The perfective aspect and imperfective aspect, also called aspectual viewpoints, are treated as aspectual operators and they embody grammatical aspect (Smith 1991, Filip 2000, contra de Swart 1998). The telic-atelic contrast interacts with the perfective-imperfective grammatical aspects but (a)telicity is compositionally calculated at the level of VP or IP.

Therefore, the syntactic ordering of temporal and aspectual operators that appear in a sentence is given in (1) (Caudal 2005) and illustrated in (2):

(1) [Tense [Viewpoint [Aspect shift [eventuality description]]]
(2) John was running: [PAST [PROG [John run]]]

At the lexical level, eventuality descriptions (i.e., states, processes and events) are denoted by verbal predicates with all their argument positions filled. Parsons (1990) and Filip (2000) argue that eventuality descriptions are *neutral* with respect to perfective and imperfective grammatical aspects (i.e., uninflected predicates such as *run* or *write a letter* serve as input to both the perfective operator and to the imperfective operator).

Perfective and imperfective aspectual operators are interpreted in terms of conditions that operate on eventuality descriptions (Filip 2000). The perfective operator restricts the denotation of eventuality descriptions to a total or complete interpretation. The totality condition combines state, process and event predicates and yields total or complete eventualities in their denotation. In contrast, the imperfective operator contributes the partitivity condition which, in mereological terms is a part-of relation "<" (Bennett and Partee

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1978, Krifka 1992, Filip 2000). The imperfective operator combines with predicates of states, processes or events and yields predicates of *partial* states, processes or events.

The semantics of perfectivity, unlike the semantics of imperfectivity, is related to the property of telicity. Garey (1957), who coined the term "telic" (derived from the Greek word *télos*, meaning "goal" or "purpose") defined telic verbs as "…the category of verbs expressing an action tending towards a goal envisaged as realized in a perfective tense" (Garey 1957: 6, in Filip 2000: 2). Atelic verbs, on the other hand, do not involve any such goal or temporal boundedness in their semantic structure.

In recent years, the term telicity is used to describe the property of VPs that *entails* a temporal boundary or delimitation of the situation in which they occur (Krifka 1998, Filip 2000). The main purpose of the present paper is to bring evidence that in English (a)telicity is a property that applies at the level of VP or IP rather than at the level of verb category.

3. Tests that identify (a)telic predicates

The Vendlerian classification of verbs into states (e.g., *know, believe, desire*), activities (e.g., *run, walk, push a cart*), achievements (e.g., *recognize, find, reach the summit*) and accomplishments (e.g., *paint a picture, draw a circle, run across the street*) is best seen as a study of lexical aspect, that part of aspect that is determined by the verbal heads (Vendler 1967, Dowty 1979, Smith 1991, Rothstein 2004). It has also been argued that *states* and *activities* may be taken as *atelic* (unbounded) predicates and *achievements* and *accomplishments* as *telic* (bounded) predicates. *Telic* predicates are characterized by two pieces of linguistic behavior: they co-occur with expressions that give information about how long an event took till it was over (in particular *in α time*) and their use in the progressive gives rise to the imperfective paradox:

(3) a. I arrived in an hour. (achievement)
b. John dug a ditch in an hour. (accomplishment)

(4) a. John was arriving at the station (when he fell).
does not entail : John arrived at the station
b. John was digging a ditch.
does not entail : John dug a ditch

In contrast, *atelic* predicates are characterized by their co-occurrence with homogeneous duration adverbials such as *for α time* and their use in the progressive does not give rise to the imperfective paradox:

(5) a. John believed in the devil for several years (state)
b. Mary ran for an hour (activity)

(6) Mary was running
entails Mary ran (at least a minimal interval)

The data in (3-6) show that unmodified achievements and accomplishments are telic predicates while states and activities are atelic predicates.

On the other hand, Verkuyl (1972) and Dowty (1979), among others, pointed out that Vendler's classification of verbs applies at the level of VP since choice of verbal complements affects the linguistic behavior of the VP as a whole. Thus, *intransitive activity verbs* may head telic VPs when modified by directional or measure phrases:

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(7) John ran a mile/to the store in an hour/*for an hour.

In their turn, *accomplishments* may head atelic VPs when their direct objects are bare plurals or mass nous:

(8) John wrote novels/propaganda for a year/*in a year.

A bare plural object and an unaccusative *achievement* predicate form together an atelic predication:

(9) Guests arrived for an hour/*in an hour.

Transitive activity verbs seem to be insensitive to the type of direct object they occur with:

(10) a. John pushed/dragged the cart for an hour/*in an hour
b. John pushed/dragged carts for an hour/*in an hour

The data in (7-10) clearly show that (a)telicity is a *compositional property* of VPs and other linguistic material contained in the VP affects the (a)telicity of the whole VP. The basic properties of Vendler's classes of verbs in terms of features with aspectual relevance (i.e., whether or not predicates are inherently temporally extended – activities, accomplishments vs. states, achievements and whether or not they express changes of state – achievements, accomplishments vs. states, activities) cannot be left aside because they have grammatical reflexes and these features enter the compositional calculation of (a)telicity of the eventuality.

4. (A)telicity of complete VPs. Krifka's (1989, 1992, 1998) analysis of (a)telicity

A well-founded and insightful account of what it means that (a)telicity applies at the VP level has emerged from the work of Krifka (1989, 1992, 1998). It had been already noticed that events *per se* never culminate (Zucchi 1999) and that events cannot be directly measured because they have no measurable dimension as part of their ontological make up (Krifka 1989, Filip 2008). Following the general intuition that telic predicates are predicates which have a specific endpoint (temporal bound), Krifka argues that telic predicates are *quantized* (e.g., *John ate an apple*) while atelic predicates are *cumulative* (e.g., *John ate apples*). Quantization and cumulativity are properties that apply to both nominal and verbal domains and are defined as in (11) and (12) below:

(11) A predicate P is quantized iff $\forall x, y\ [P(x) \wedge P(y)] \rightarrow \neg\ y <_p x$]
[A predicate P is quantized iff whenever it applies to x and y, y cannot be a proper part of x]

(12) A predicate P is cumulative iff $\forall x, y\ [[P(x) \wedge P(y)] \rightarrow P(x\ sum_p\ y)]] \wedge card(P) > 2$]
[A predicate P is cumulative iff whenever it applies to x and y, it also applies to the sum of x and y, provided that it applies to at least two distinct entities]

When applied to the verbal domain, the property of *quantization* says that if e is an event in the set denoted by *eat an apple*, and e' is a proper part of e, then e' cannot also be an event of eating an apple. (However, if e is in the set denoted by *eat apples* then there will be proper

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parts of e which are also in that set). So, the predicate that is quantized is also telic and the quantized status of the VP is determined by the quantized status of the theme argument. *Cumulativity* works in exactly the same way. When applied to the verbal domain, the property of cumulativity says that if e and e' are in the set denoted by *eat apples*, the sum of e and e' will also be in that set. So, the predicate that is cumulative is also atelic and the cumulative status of the VP is determined by the cumulative status of the theme argument.

The (a)telic properties of accomplishments such as *build a house, build houses/eat an apple, eat apples*, which are verbs that take incremental theme arguments, are accurately captured by Krifka's (1992) *Rule of Aspectual Composition*: "an episodic verb combined with a quantized incremental theme argument yields a quantized verbal predicate, while a cumulative incremental theme argument yields a cumulative verbal predicate, provided the whole sentence expresses a statement about single eventualities" (in Filip 2000: 16):

(13)	a.	Mary ate an apple / three apples in an hour	(telic/quantized)
	b.	Mary ate apples for hours	(atelic/cumulative)

This is because the properties of the thematic relation between an accomplishment and its theme argument, which is a "gradual Patient" (Krifka 1992) or "Incremental Theme" (Dowty 1991), show that the event denoted by the verb applies to the theme argument in a part-by-part way. Quantized direct object themes lead to telic VPs since the event is said to be over when the whole of the object/sum of objects specified by the nominal is "used up" by the verb, and thus the endpoint of the event has been reached, as in (13a) (cf. Rothstein 2004). In an event of *eating apples*, as in (13b), there is no given endpoint. As *apples* is cumulative, there is no limit to the sum of entities that constitutes the theme of the event and the event can be extended in an unlimited way.

Formally, there is *homomorphism* from the extent of the theme to the extent of the running time of the event and this operation allows the endpoint of the event to be calculated just in case the theme argument is quantized. Krifka'a account relies crucially on the fact that only accomplishments assign gradual thematic roles. The assignment of gradual thematic roles distinguishes accomplishment VPs such as *build a house, eat an apple* from activities such as *push/drag a cart, push/drag carts*. In this latter case, the theme direct object is not affected gradually/incrementally and activity VPs give no information about when the events in their denotation are over. It follows that accomplishments and activities contribute to the telicity of VPs in different ways: in an eating event, the theme is affected bit by bit, whereas in a pushing event, the theme is affected "holistically". As a result, pushing events can be indefinitely extended while the extent of an eating event is determined by the extent of its theme (cf. Rothstein 2004). With accomplishment predicates (i.e., those with incremental theme arguments) the cumulativity / non-cumulativity property of the theme percolates up to the VP.

5. Quantization is not the basis for telicity. Rothstein's (2008) critique of Krifka's approach.

Rothstein (2008) and Landman and Rothstein (2008) observe that on closer scrutiny the characterization of telicity in terms of *quantization* does not work. They notice that a large number of accomplishment predicates co-occur with theme arguments that are cumulative but the overall result at the VP level is a quantized/telic predicate that allows modification only by *in*-phrases and not by *for*-phrases:

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(14) a. John wrote a sequence of numbers in a minute/*for a minute.
b. Mary ate at least three apples in 5 minutes/*for 5 minutes.
c. Mary ate at most three apples in 5 minutes/*for 5 minutes.
d. Mary ate a few/a lot of apples in 5 minutes/*for 5 minutes.

Similarly, the progressive forms of these predications do not entail the truth of the simple past tense sentence, which proves that they are all telic predications:

(15) John was writing a sequence of numbers in a minute.
does not entail John wrote a sequence of numbers in a minute.

Notice that on Krifka's definition of cumulativity both *eat at least three apples* and *eat at most three apples* come out as cumulative. That is, an event of eating at least three apples may have a proper part e' (e.g., eating two apples) which is also an event of eating at least three apples. In the same line, an event of eating at most three apples can have a proper part e' (e.g., eating two apples) which is also an event of eating at most three apples. The same argument goes for the event e in the other examples in (14).

Zucchi and White (2001) make several suggestions to account for the telicity of the predications in (14) and claim that these predications are quantized because the theme arguments in question form maximal objects in a particular discourse situation. In essence, it is argued that *write a sequence of numbers* and *eat at least three apples* denote sets of maximal/quantized events of writing a sequence of numbers or eating at least three apples since pairs of two such maximal events cannot be put together to make a single maximal event relative to the same discourse situation.

Explaining telicity of the VPs in (14) in terms of quantization cannot work since, as Rothstein (2004, 2008) remarks, accomplishment verbs head telic/quantized VPs *only* when these verbs occur with a "measured" direct object. The expression of quantity expressed by the direct object need not be a precise measure when it comes to making the VP telic. Consider the following examples:

(16) a. Mary ate a few apples in half an hour/*for half an hour
b. Mary crossed an infinite number of points in 10 minutes/*for 10 minutes
c. The doctor examined an enormous number of patients in 3 hours this morning

It seems that any expression of quantity, rather than a precise expression of quantity, is sufficient for a predicate to qualify as telic. This makes it implausible that a VP is telic if and only if there is a homomorphism from the extent of the theme to the extent of the running time of the event, as many telic VPs have themes whose extent is not fully specified. The same accomplishment verbs in (16) may head atelic/cumulative VPs *only* when their theme direct object is a mass noun or a bare plural:

(17) a. Mary ate apples/fruit for 5 minutes/*in 5 minutes
b. Mary ate candy/candies for half an hour/*in half an hour

Based on the set of examples in (16-17) the following generalization emerges (Rothstein 2008): a VP headed by an accomplishment is telic when the theme direct object renders some expression of quantity and is atelic when the direct object is a mass noun or a bare plural.

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Rothstein (see section 7 below) argues that a *telic* VP is one in which singular events come with a criterion for individuation or an atomic measure while an atelic VP has no such measure and can therefore be extended indefinitely. It seems that telicity of accomplishment verbs does not depend on the precise quantity expressed by the theme argument but depends on the morphological shape of the direct object: the direct object should not be preceded by a determiner. In Landman and Rothstein (2008) it is shown that VPs in sentences of the form in (18) are of the accomplishment type and are incompatible with *for*-phrases.

(18) John ate DET apple(s) in α time.

6. Explaining telicity in terms of maximalization of events and scalar implicatures – Filip's (2008) account of (a)telicity

Another account for how telicity is encoded is given in Filip (2008) in terms of maximalization of events at a given situation. Under this approach, the maximalization operation picks out the unique largest event at a given situation and the maximal interpretation of an event is triggered by pragmatic scalar implicatures. Scalar implicatures are a species of Quantity-based conversational implicature (Grice 1962, Horn 1972). They are generated in the following manner: by using a weaker scalar item (e.g., *some boys*), the speaker implicates that he does not know that any of the stronger ones hold (e.g., *all boys*). The maximalization operation applies when the verb takes an argument that has a certain measurable property on a scale, a property such as volume, temperature, length, weight, temporal extent, etc. Measured quantities (e.g., *a glass of wine, two miles, from 70^0 Celsius to 3^0 Celsius*) provide a scale and an upper bound for delimiting maximal events (e.g., *drink a glass of wine, run two miles, cool the metal from 70^0 Celsius to 3^0 Celsius*).
In English, telicity as maximalization of events is rendered externally to the verb itself by the verb's arguments and a variety of modifiers (such as *in α time*) and operates at the VP or IP level (e.g., *John ate three apples (theme), John (theme) entered the icy water very slowly*).

Filip claims that all English stem verbs come out from the lexicon as *unmarked* for telicity and it is the structure of their theme arguments, the pragmatic context and world knowledge that decide on the (a)telicity of the VP.

The intriguing telicity of VPs such as *drink at least two bottles of wine* in (19), made up of the incremental verb *drink* and a cumulative theme argument *at least two bottles of wine*, Filip argues, cannot be explained by the application of Krifka's *Rule of Aspectual Composition*:

(19) John drank at least two bottles of wine in two hours

The *Rule of Aspectual Composition* states that if a verb is incremental and its theme argument is cumulative then the whole VP is cumulative while if the theme argument is quantized then the whole VP is quantized.

Instead, Filip argues that the upper bound of the predicate *drink at least two bottles of wine* is given by *scalar implicature* and the entire verbal predicate receives a telic interpretation. The VP in (19) conversationally implicates that no more wine than two bottles of wine was drunk. The truth of the sentence is defeasible as it can be continued without contradiction with "…and in fact, John drank four bottles of wine". Filip concludes that the maximalization on events relies on pragmatic inferences based on scalar implicatures. The same type of pragmatic knowledge explains (a)telicity of incremental verbs with incremental theme arguments such as *wash, read, examine, comb, brush, pollute, decorate, mop* or *drain*:

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(20) John washed three windows.
a. …(clean) in an hour
b. …for an hour, but none of them got completely clean

Verbs of this class are correlated with two different measure scales: the scale measuring the property of cleanliness (associated with *wash*) and a numerical scale (induced by *three windows*). Although the incremental theme argument *three windows* induces a closed scale it does not enforce telicity in (20). Telicity in (20a) is triggered in one of the following possible ways: it is either induced by the time-span adverbial *in an hour* or, without the adverbial, telicity is triggered by pragmatic implicature at the sentence level. The *wash*-type of verbs have as a characteristic feature the mapping to subevents property as part of their lexical meaning and hence directly facilitates but does not condition the application of the maximalization operation.

From the discussion of the examples in (20) it also follows that the direct object is not systematically linked to the telicity of the VP but it crucially depends on the lexical semantics of the verbal predicate, and on pragmatic inferences.

The same behavior is evinced by root scalar change verbs such as *melt, freeze, grow*, scalar verbs derived from gradable closed scale adjectives such as *clean, empty* or from gradable open scale adjectives like *lengthen, cool* or *dim*. Expectedly, the property scale lexically associated with these scalar verbs is predicated of the entity referred to by their theme argument. However, these verbs are not automatically telic/maximal as the predications in which they occur freely shift between a telic and an atelic interpretation, depending both on the larger linguistic context (their occurrence with duration adverbials) and on the pragmatic situation. Consider the following examples:

(21) a. The snow melted in six days/for six days, but it didn't melt completely
b. I cleaned the kitchen in two hours/for two hours, but I didn't clean it completely
c. The tailor lengthened my pants in an hour/for an hour but they are still too long

The scalar verbs in (21) *do not entail* that the absolute maximal degree of the scale was reached, a fact proved by their co-occurrence with *for*-phrases, and negation of telicity does not give rise to contradictions. Thus, scalar verbs entail only some change along the scale they are lexically associated with but the change along the entire scale is only inferred by conversational implicature, governed by pragmatic conditions. At the two endpoints of the squish of lexically conditioned telicity we find the limited class of strictly incremental verbs such as *eat, build, compose* on the one hand, and activity verbs such as *carry, wave*, on the other.

Filip argues that with strictly incremental theme verbs maximality is *entailed* as part of their lexical meaning:

(22) a. Mary ate three sandwiches ??/*but only finished two
b. Mary built a house ?/*but she didn't finish building it
c. John composed a symphony ?/*but died before he could finish it

In (22) the verbs *entail* a homomorphism between the strictly incremental verb's scale and their strictly incremental theme arguments, a mapping that cannot be negated.

However, the strict incrementality of the verb alone is not enough to guarantee telicity:

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(23) John ate bread/sandwiches for an hour/*in an hour

The sentences in (23) are atelic and non-maximal because mass nouns (*bread*) and bare plurals (*sandwiches*) have no scale lexically associated with them and trigger no scalar implicatures.As can be noticed, this class of verbs is the only one that strictly observes Krifka's *Rule of Aspectual Composition*.

At the other extreme, we find activity verbs which can be followed by quantified direct objects that specify some definite quantity but are nevertheless atelic/non-maximal:

(24) Julia carried three apples in her bag for a whole week/??in a week

The predication is incompatible with *in a week* adverbial which shows that it cannot shift to a telic interpretation. This is so because activity verbs such as *carry, pull, drag, wave*, different from strictly incremental verbs such as *eat, build* or *compose*, do not entail a homomorphism that maps the theme argument (*three apples* in (24)) onto carrying events and no other plausible mapping of the component parts of the VP can be construed based on general world knowledge.

7. Telic predicates denote sets of M(easured)-ATOMS fully specified for a unit of measurement. Rothstein's (2008) account of (a)telicity.

On Rothstein's (2008) approach, verbs denote sets of measured atoms, M-ATOMS, which are elements in the denotation of the verb that count as 1 by some explicit criterion of measurement (U). The Vendlerian classes of verbs (states, activities, events) are sensitive as to whether or not the content of the unit of measurement U is grammatically specified (or, at the limit, for some activity verbs the value of the unit may be retrieved from the context if it is rich enough).

The contrast between those verbal predicates for which the unit of measurement is provided by the linguistic context and those verbal predicates for which such a value of measurement cannot be constructed constitutes the *semantic basis* that distinguishes between *telic* and *atelic* predicates.

A telic predicate such as *John ate an apple in 10 minutes* provides information as to what counts as *one* eating event: namely, an event of eating one apple. In contrast, in **John slept in an hour*, the information about what counts as *one* sleeping event is not given. Modifiers such as *in α time* are sensitive precisely as to whether individuating criteria for what counts as one event are specified in the structure.

In essence, Rothstein treats telic predicates as sets of M(easured) ATOMS that have a fully specified value for U. Telic predicates denote sets of single events which count as 1 entity by the specified measure value, while atelic predicates denote sets of events which do not count as 1 because they lack the specification of a unit of measurement. In English, telicity applies at the VP (or IP) level and the whole content of the VP or sentence is used to compositionally recover the value for U. Consider the contrast between (25a) and (25b):

(25) a. *John ran in an hour.
b. John ran to the store/a mile in an hour.

While *run* is not a telic predicate in (25a) as no value of the unit of measurement can be retrieved in the context and thus *in an hour* cannot modify it, the predicates *run to the store/a*

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mile in (25b) are telic since the combination of the verb and a modifier does allow a value for U to be recovered. In (25b) what counts as one running event is an event of running a mile or one running event is a complete event of running to the store.

The larger context, when it is rich enough, can retrieve the content of the unit of measurement and can identify a telic, complete event which can be modified by *in half an hour*:

(26) John runs about the park every morning, and he always times himself. This morning he ran in half an hour

With the restricted class of telic predicates based on strictly incremental verbs such as *eat* and *build* telicity is compositionally computed in a systematic way, according to Krifka's *Rule of Aspectual Composition*:

(27) a. Mary ate three sandwiches in 5 minutes
b. John built a house in a year

These examples also point to another property of telic events: their *singularity*. So, in (27a) the predicate *ate three sandwiches* must be interpreted as denoting a set of M-ATOMS, i.e., as a set of singular events which count as 1 according to the specified unit of measurement. On the assumption that singular events take singular arguments (cf. Landman 1996), the theme direct object argument *three sandwiches* is interpreted as a singular, atomic collection of apples. The modifier *in 5 minutes* applies only to telic predicates and indicates the single temporal location of the event endpoint. The theme noun phrase must be interpreted as a collective noun: there was a three-sandwich-eating event with Mary as agent and which took less than 5 minutes.

There is a second, less natural reading of *Mary ate three sandwiches in 5 minutes* where *three sandwiches* may be interpreted as plural and *in 5 minutes* distributes over a plural VP and modifies its atomic parts. On this reading, the sentence asserts that there were three events of eating one sandwich and one single event took less than 5 minutes. However, this reading must be indicated explicitly by the distributive modifier *each*:

(28) Mary ate three sandwiches in 5 minutes each

Different from direct objects in (27) above, where they designate singular atomic entities and allow a measure for a single event to be determined, whenever the direct object is not atomic (i.e., it is a mass noun or a bare plural) as in (29), we cannot determine a measure for what counts as one atomic event and such sentences cannot be modified by the telic individuating modifier *in an hour*:

(29) a. John ate bread for an hour/*in an hour
b. John ate apples for an hour/*in an hour

In spite of the fact that the notion of telicity is accounted for in different fashions, Rothstein's (2008) treatment of telicity in terms of atomicity is tightly related to the operation of maximalization on VPs argued for in Filip and Rothstein (2005) and Filip (2008). The maximalization operation on events (Filip 2008) or the maximalization operation TELIC on events (Rothstein 2008) apply at the VP level and both operations give a set of maximal

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non-overlapping entities in V if and only if the measured atoms can recover compositionally a value of measurement. This is what happens with accomplishment and some activity predicates: with these predicates telicity may be compositionally derived and the value of measurement is calculated on the basis of the interaction of the category V and the contextual information.

On both approaches the identification of maximal/telic events is relevant as certain operations such as modification by *in α time* can only apply to a predicate if it denotes sets of maximal events. Thus, predicates of the form *in α time* are modifiers of sets of events whose unit measure is specified and these modifiers measure the maximal running time of the predicate, which must be telic.

While Filip (2008) argues that *all* English root verb stems come from the lexicon as *unmarked* for the property of telicity, Rothstein (2008) claims that there are verbs which are *naturally atomic* predicates and thus lexically telic predicates in the lexicon. On Rothstein's account, *semelfactive* and *achievement* predicates are naturally atomic predicates in the lexicon.

Semelfactives are verbs such as *kick, knock, jump, skip, flap (its wings)* and *wink*, which denote single actions that occur once. They are naturally atomic predicates as their unit structure is perceptually salient and given by the world. Thus, their unit measure U is fully determined by the meaning of the verb. The maximalization operation TELIC applies on a semelfactive verb such as *jump* and gives the same set of events of type *jump*. VPs headed by semelfactives show the properties of telic VPs: they occur with *in α time* modifiers as in (30a), and when used in the progressive with a semelfactive reading (once), they induce the imperfective paradox as in (30b):

(30) a. John jumped in 15 seconds (once).
b. Bill was kicking Mark when he saw the referee so he stopped midway.
(and Bill didn't kick Mark)

Achievement predicates such as *break, arrive, leave, recognize Jane, find* are also naturally atomic since they are non-extended changes of state. Their minimal initial instant i and the minimal final instant i' are temporally adjacent and they are nearly instantaneous changes. Achievements are telic events as their unit measurement U is determined by the properties of the verb itself: what counts as a single achievement event is determined by the lexical meaning of the verb and TELIC (arrive) has a denotation identical with *arrive*. Their telicity is verified by their occurrence with *in α time* as in (31a) and they cannot be used in the progressive as in (31b) (except for achievements such as *die* or *land* whose preliminary stages are detached conceptually from the event, cf. Smith 1991):

(31) a. John noticed the picture in half an hour.
b. *John was noticing the picture.

8. (A)telicity explained in terms of Incremental Homogeneity Property. Landman and Rothstein's (2008) account

Incremental homogeneity, as defined in Landman and Rothstein (2008), captures, in a more sophisticated way, the long-standing intuition that homogeneous verb phrases are true at stages (subintervals) which hold over a time-span interval (Dowty 1979). The property of containing or not containing qualitatively different stages distinguishes between

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homogeneous/atelic VPs and non-homogeneous/telic VPs. Consider the following examples of homogeneous verb phrases in co-occurrence with *for*-phrases:

(32) a. John was happy for a week (state)
b. Bill pushed three carts for an hour (activity)
c. John ate apples for an hour (accomplishment with bare plural object)
d. John ate bread for an hour (accomplishment with mass noun object)
e. English tourists discovered this village all summer (achievement with bare plural subject)
f. Guests arrived for two hours (achievement with bare plural object)
g. Susan drank a glass of juice every 12 minutes for 2 hours (iterated accomplishment)
h. The jogger arrived at a kilometer pole every 12 minutes for an hour (iterated achievement)

More accurately, incremental homogeneity is "incremental preservation of cross-temporal identity of an event and of its event type, between the running time of the initial subinterval (the onset) of that event and the running time of the event itself" (Landman and Rothstein 2008: 6), where event e stands for a state, activity or event eventuality. Two events or subevents e_1 and e_2 are cross-temporally identical iff e_1 and e_2 count as one and the same event at different times, i.e., e_1 and e_2 are qualitatively distinguishable as e_1 is an earlier version of e_2. The essential property of incrementally homogeneous eventualities is that they allow gaps/ pause stages, which should be of a size that does not obscure the event identity in question.

On this approach, *state* and *activity* eventualities evince the property of incremental homogeneity and are *atelic* while *accomplishment* and *achievement* eventualities lack the property and are *telic,* since the latter are events of change predicates. For instance, a *state* eventuality like *John stayed in London for a week* is incrementally homogeneous in this sense: John's state of staying in London on Monday and his state of staying in London on Sunday count as the same state, the state of John's staying in London for the whole week once. State predicates are thus *atelic* predicates and are compatible with homogeneous *for*-phrases.

Under the incremental homogeneity preservation condition, an *activity* predication like *Mary waltzed for half an hour at the inauguration ball* counts as Mary waltzing once in spite of the fact that the waltzing event has gaps and pauses. Activities have gaps if we look at them segmentally but not if we look at them incrementally. There is also a "contextual naturalness" condition that has to be met by the incrementally homogeneous activity: its onset or the pauses should be of a size that does not obliterate the identity type of the activity in question. Thus, what counts for homogeneity is the *incremental preservation* of event identity and event type along growing initial subintervals.

Accomplishment predications such as *John ate an apple* or *achievement* predications such as *John arrived in Paris* do not enjoy the property of being incrementally homogeneous because these eventualities fail to preserve their type. Their event type is not incrementally preserved: the onset of these events is not itself an event in the accomplishment/achievement type and eating an apple and arriving in Paris do not go on at every incremental interval from the time of the onset to the running time of the events.

The notion of incremental homogeneity also explains the *atelicity* property of *accomplishment* and *achievement* predications when this type of predicates occurs with *kind* type of subjects and objects as in (32c-f). Eventualities like *John ate apples for an hour* and *John ate bread for an hour* are interpreted as containing an episodic predicate (*eat*) with a

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bare plural (*apples*) or mass noun (*bread*) as theme arguments that designate *kinds* rather than individuals (cf. Carlson 1977). These past tense predications are *atelic* and compatible with homogeneous *for α time* phrases.

Landman and Rothstein argue that in a predication like *John ate apples*, the event type predicate EAT has two possible interpretations: it is interpreted either as an event type EAT_{GN} (gnomic) or as an event type of episodic eating events EAT_{EPI}. Thus, it is argued that in *eat kind k* (i.e., "be an eating event with k as theme") *eat* means either *gnomic-eat kind k* (i.e., "be a gnomic eating event with k as theme, as in Carlson (1977), with no individual instances of the kind theme) or as an *episodic-eat kind k* (i.e., "be an episodic eating event with k as theme"). Event types that involve the episodic predicate *eat*, a bare plural/mass noun and a *for*-phrase are incrementally homogeneous. By incremental homogeneity, there are kind-eating events (cross-temporally identical to e) incrementally relating John to the k_{APPLE} / k_{BREAD} within the running time of the same event of apple/bread eating. For an hour, each such kind-eating event at an incremental sub-event must be witnessed by eating specific apples or bread and natural gaps in the event do not cancel the event type identity. Instantaneous achievement verbs such as *discover* and *arrive* form homogeneous eventualities when they occur with bare plural subjects and objects as in the following examples, repeated below:

(33) a. English tourists discovered this village all summer
b. Guests arrived for two hours

On former accounts, these predications have been interpreted as saying that at every point of time during the relevant two hours individual guests arrived (33b) or a continuous sequence of English tourists discovered the village all last summer (33a). However, the intuition is that in (33b) for instance, there are intervals/gaps between guest-arrival events within the two hours at which no guest arrivals took place, i.e., the arrival events of guests are not evenly spread over the two hour interval.

Landman and Rothstein treat these predications as involving punctual episodic achievements where their bare plural arguments receive a *kind* interpretation. The punctual arrivals in (33b) are presented as part of the incremental process of more and more instances of *kind* GUEST arriving. The spread – how many guests arrived when within the two hour interval – is part of the cross-temporal identity condition of that process. Thus, the interval is punctuated with frequent arrival events but the interval is not densely packed with arrival events. The predications come out as incrementally homogeneous/atelic eventualities, compatible with homogeneous *for*-phrases.

The iterative reading of *accomplishment* and *achievement* predicates with *for*-phrases, as in (32g-h), repeated below is triggered when the VP is in the scope of an iteration-creating quantificational operation and the felicity of the aspectual *for*-phrase depends only on the presence of the iteration operation:

(34) a. Susan drank a glass of juice every 12 minutes for 2 hours
b. The jogger arrived at a kilometer pole every 10 minutes for an hour

Iteration forms a singular, abstract event e, which corresponds to a temporally ordered plurality of events: in (34a), to the set of drinking a glass of juice at every 12 minutes temporal interval and in (34b) to the set of arrivals at a kilometer pole at every 10 minutes temporal interval. The set of drinking a glass of juice every 12 minutes in (34a) constitutes a singular sequence that lasts 2 hours and ITERATIVE(x) is incrementally homogeneous. Thus,

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the iteration of an event e is an abstract incremental process whose cross-temporal identity is ensured by the spread of iteration. In (34a), the incremental homogeneity of the singular iteration event requires that the onset of the iteration be the first 12 minutes chunk of juice drinking. So, the size of the onset is not determined by the meaning of the verb but by the size of the iteration chunk which is preserved incrementally over the two hour interval.

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