Situation aspectual properties of creation/consumption predicates

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Abstract: This paper is concerned with the situation aspectual properties of creation and consumption verbs. More specifically, it aims to explore how telic interpretations arise in this verbal domain. The analysis which is couched in a scalar semantic framework will focus on how created/consumed themes contribute telicity given the unique, verb-mediated relationship that obtains between these themes and the scales of creation/consumption verbs. Although it is Hungarian verbs that constitute the main data set of this study, examples from English and some other languages will also be discussed for cross-linguistic comparison.

Keywords: consumption verbs; creation verbs; scalar semantics; situation aspect; telic

1. Introduction

Creation/consumption verbs like English *write, build, eat,* and *drink* can be described as expressing events progressing in an incremental fashion as the referent of their theme comes into being or disappears. This incrementality is reflected in the fact that with these verbs there is a precisely definable correspondence between parts of the event described by the verb and parts of the theme undergoing a change in the course of the event. This correspondence, which has been extensively discussed in the literature on aspectology (cf. Verkuyl 1972; 1993; Mourelatos 1978; 1981; Bach 1981; 1986; Krifka 1989; 1992; 1998), can be characterized as follows: a theme with quantized reference contributes to a bounded/telic situation, as in (1), whereas a cumulative theme results in unboundedness/atelicity, as in (2).[1]

(1)   a.   John built a house in a year/$^{??}$for a year.

   b.   Dave drank a beer in half an hour/$^{??}$for half an hour.

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[1] In this work I use boundedness and telicity (as well as unboundedness and atelicity) interchangeably. For a different view, see Depreatere (1995).

(2) a. John built houses for a year/*in a year.

  b. Dave drank beer for half an hour/*in half an hour.[2]

As evidenced by the compatibility of the *in*-time adverbial and unacceptability of the *for*-type adverbial, the sentences containing the verb phrases *build a house* and *drink a beer* receive a telic interpretation in (1a) and (1b). This is due to the fact that the themes *a house* and *a beer* have quantized reference, i.e., no proper subpart of a house or a beer is in the denotation of the DPs *a house* and *a beer*. In a similar vein, no proper subpart of the events expressed by *build a house* and *drink a beer* can also be characterized by the same verb phrases. By contrast, the event descriptions associated with (2a) and (2b) are atelic due to the fact that the bare themes *houses* and *beer* have cumulative reference. If two things can be described as *houses* or *beer*, their sum can also be described as *houses* or *beer*. Likewise, if two events are in the denotation of *build houses* and *drink beer*, their sum is also in the denotation of the same verb phrases.

  Nevertheless, the above correlation between the quantization properties of the theme and the temporal structure of the event described by the verb does not always hold. In certain contexts it is possible to get an atelic reading of a sentence containing spatially bounded objects. This is what the examples in (3) illustrate.

(3) a. I ate the soup for two days, and froze several meal-sized containers for future meals.   (http://sistersosf.org/savory-sacred-soup)

  a.′ I ate the soup in two days.

  b. John built a Lego tower in three hours/for three hours. (Smollett 2005, 50, (18))

In (3) both *the soup* and *a Lego tower* have quantized reference, and yet an atelic reading, in addition to a telic reading, is available, as shown by the temporal adverbial test (see also Hay et al. 1999; Kennedy & Levin 2008, among others). This kind of aspectual duality has also been discussed with respect to other verb classes in English, e.g., activities like

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[2] It is well known that *in*-adverbials are generally compatible with telic predicates and incompatible with atelic predicates and the opposite is true of *for*-adverbials (on the relevant interpretation). However, as pointed out by Beavers (2012, 26), contextual factors may allow native speakers to get a partitive interpretation of examples like (1a) and (1b), which is why I indicate the unacceptability of the *for*-adverbials with *built a house* and *drank a beer* with two question marks instead of an asterisk. For some reason, this kind of coercion is more difficult with *in*-adverbials in the environment of atelic predicates and thus I use an asterisk in (2a) and (2b) to indicate the unacceptability of the *in*-adverbials with predicates like *built houses* and *drank beer*.

run, achievements like *arrive*, degree achievements like *warm* and surface contact verbs like *wipe*. For more on this, see, for example, Dowty (1979); Moens & Steedman (1988); Hay et al. (1999), and Levin & Sells (2009).[3]

Furthermore, it is also worth noting that some verbal constructions containing creation/consumption verbs are associated with invariably atelic event descriptions, as in (4).

(4) a. Sam ate at the soup for ten minutes/*in ten minutes.

    b. Sam wrote on his dissertation for an hour/*in an hour.

Contrary to what we saw in the case of *eat the soup* in (3), the verb phrases *ate at the soup* and *wrote on his dissertation* in (4), which exemplify the conative construction in English, are invariably atelic, as shown by their incompatibility with the adverbials *in ten minutes* and *in an hour*, respectively, in spite of the theme's having quantized reference.

A similar picture emerges in Hungarian when it comes to base verbs such as *eszik* 'eat', *iszik* 'drink', *ír* 'write', *épít* 'build', *rajzol* 'draw', *fest* 'paint', *tervez* 'design', and *süt* 'bake'. First, the same correlation can be perceived between the referential properties of the incremental theme (Dowty 1991) and the (a)telicity of the verbal predicate as in English, as is apparent from (5) and (6).

(5) a. János tíz perc   alatt evett egy almá-t.
        J.NOM ten minute under ate   an apple-ACC[4]
        'János ate an apple in ten minutes.'

    b. János tíz perc-ig/*tíz   perc   alatt almá-t/almák-at   evett.
        J.NOM ten minute-for/ten minute under apple-ACC/apples-ACC ate
        'János ate apples for ten minutes.'

(6) a. Péter egy év   alatt épített egy ház-at.
        P.NOM a   year under built   a   house-ACC
        'Péter built a house in a year.'

    b. Péter egy év-ig/*egy év alatt házak-at   épített.
        P.NOM a   year-for/a year under houses-ACC built
        'Péter built houses for a year.'

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[3] Rothstein (2006) observes that mood can also prevent quantized themes from having a measuring out function in the sentence.

[4] As will be clear from the glosses of the examples in the paper, the Hungarian indefinite article is *egy*, whereas the definite article has two instantiations, *a* or *az*.

In (5a) and (6a), the quantized themes *egy almát* 'an apple' and *egy házat* 'a house' are responsible for a telic reading, whereas bare themes like *almát* 'apple', *almákat* 'apples' and *házakat* 'houses', which have cumulative reference (Maleczki 2008), yield atelicity, as diagnosed by the temporal adverbial test. Crucially, atelic readings are also easily available without any contextual support with themes having quantized reference, as in (7).

(7) a. János tíz perc-ig   evett egy almá-t.
       J.NOM ten minute-for ate   an apple-ACC
       lit. 'János ate an apple for ten minutes.'

    b. Péter egy év-ig   épített egy ház-at.
       P.NOM a   year-for built   a   house-ACC
       lit. 'Péter built a house for a year.'

Furthermore, there are signs of invariability in Hungarian as well, as shown by the examples in (8) from Kardos (2016).

(8) a. Kati   tíz perc-ig/*tíz   perc   alatt esze-get-ett   egy almá-t.
       K.NOM ten minute-for/ten minute under eat-FREQ-PAST an apple-ACC
       'Kati spent ten minutes eating tiny bites from an apple.' (Kardos 2016, 29, (68a))

    b. Kati   tíz perc   alatt/*tíz perc-ig   meg-esze-get-ett   egy almá-t.
       K.NOM ten minute under/five minute-for PRT-eat-FREQ-PAST an apple-ACC
       'Kati ate an apple in small bites in ten minutes.'   (*ibid.*, 30, (70a))

The example in (8a) illustrates that the verb phrase *eszegetett egy almát* 'eat small amounts of food by taking small bites', which contains the frequentative morpheme *-get*, is atelic regardless of the quantized nature of the theme, while (8b) shows that once the particle *meg* is attached to the verb, an invariably telic reading arises.[5]

Similarly to Hungarian particles like *meg*, the English particle *up* also leads to strict telicity, as in (9), in the environment of themes with quantized reference.[6]

(9) a. John ate up an apple in five minutes/*for five minutes.

    b. John built up a house in a year/*for a year.

[5] As a reviewer points out, it is not only morphologically derived verbs like *eszeget* 'eat small amounts of food by taking small bites' that can receive a strictly atelic interpretation in Hungarian, but base verbs like *majszol* 'nibble' can also be invariably atelic.

[6] For more on the telicizing role of English particles like *up* in *eat up*, see Brinton (1985).

However, an important difference between the two languages also arises when it comes to particle verbs. Whereas in English themes with quantized or cumulative reference can appear with a particle verb, it is only themes with quantized reference that can occur with particle verbs in Hungarian. This is illustrated with English *eat* and Hungarian *eszik* 'eat' in (10).

(10) a.   John ate up apples.

    b.   János meg-evett *almák-at/egy/három almá-t.
        J.NOM PRT-ate   apples-ACC/a/three   apple-ACC
        'János ate (up) three apples.'

While in English the string *eat up apples* is possible and describes a series of bounded events, in Hungarian strings like *megevett almákat*, which consists of a particle verb and a theme with cumulative reference, are ungrammatical. Grammaticality obtains only in the presence of a theme whose quantity is specified, as in the case of *egy almát* 'an apple' or *három almát* 'three apples'.

    Another interesting property of Hungarian particles is that they are obligatory with some verbal predicates. Achievements like *(el)tör* 'break' and *(meg)hal* 'die' and degree achievements like *(ki)ürít* 'empty' and *(ki)egyenesít* 'straighten' show this property, as pointed out by Dékány (2008), É. Kiss (2008b) and Kardos (2012; 2016), among others.

(11) a.   János *(el)-tört   egy tányér-t.
        J.NOM (PRT)-broke a   plate-ACC
        'János broke a plate.'

    b.   János *(meg)-halt.
        J.NOM (PRT)-died
        'János died.'

    c.   János *(ki)-ürített   egy doboz-t.
        J.NOM (PRT)-emptied a   box-ACC
        'János emptied a box.'

    d.   János *(ki)-egyenesített egy kötel-et.
        J.NOM (PRT)-emptied a   rope-ACC
        'János straightened a rope.'

In this paper, which is a significantly revised version of the analysis given in Kardos (2012; 2016), I would like to address the obligatory nature of particles like *el, meg* and *ki* with certain verbs in Hungarian and I also explore how telic interpretations arise in the class of creation/consumption verbs. I aim to show how these verbs, their themes and verbal particles like

meg contribute to the aspectual interpretation of complex verbal expressions like *megeszik egy almát* 'eat (up) an apple'. The obligatory nature of telicizing particles will be shown to follow from the Principle of Telicity Marking, a form-to-meaning principle in Hungarian, proposed in Kardos (2012; 2016), according to which telicity must be overtly marked by an event-bounding element. I will also assume based on Kardos (2012; 2016) that verbal particles like those in (10b) and (11) encode an event-maximalizing operator MAX_E, which is responsible for the semantic constraints that particles impose on themes and the strictly telic intepretations associated with these verb phrases. In the analysis of the aspectual role of the themes of creation/consumption verbs, which will be couched in the scalar semantic framework of Beavers (2012), I claim that given the unique, verb-mediated relationship between the scales and the theme arguments of verbs like *eszik* 'eat', whereby crucial properties of the scale are directly determined by the theme, the (a)telicity of the event descriptions follow.

The structure of the paper is as follows: in section 2 I present some well-known properties of verbal particles and creation/consumption verbs based on previous analyses. In section 3 I discuss some theoretical assumptions underlying the analysis of the aspectual effect of the internal argument of creation/consumption verbs and I also address how verbal particles and resultative expressions contribute to telicity in Hungarian. In section 4 I provide an analysis of the scalar structure associated with creation/consumption predicates and in section 5 I point out some consequences of the analysis with respect to Hungarian. Section 6 concludes the paper.

2. Previous literature

The aspectual structure of creation/consumption verbs has long been an important issue in the literature on aspectology. Various analyses have been proposed for the delimiting role of themes in examples like (1a) and (1b) and the non-delimiting nature of themes in examples like (2a) and (2b), including Verkuyl's (1972; 1993) Plus-principle, Tenny's (1994) Measuring-Out Constraint, and Krifka's (1989; 1992; 1998) highly influential homomorphism-based account. Aspectual duality in the case of verb phrases like *eat the soup* has received less attention in the literature than in the case of degree achievements and surface contact verbs. The few works that did address this issue include Hay et al. (1999) and Smollett (2005), who argue that variability in the aspectual interpretation of *eat*-type expressions is possible because telicity with these expressions arises

via implicatures and thus can be cancelled.[7] Also, de Swart (1998) analyses variability phenomena as aspectual coercion. As for the absence of aspectual duality, Beavers (2012), for example, explains the obligatory atelicity of data like (4a) and (4b) by analysing the verbal predicates in these examples as being involved in double incrementality, an idea that will be further discussed and adopted in subsequent sections of this paper.

Where Hungarian is concerned, that the internal arguments of creation/consumption verbs like *eszik* 'eat', *iszik* 'drink', and *süt* 'bake' can serve as delimiters has been known for linguists working on this language (cf. Wacha 1978; Kiefer 1992; 2006; Maleczki 1995; 2008; É. Kiss 2005; 2008b; Csirmaz 2008b; Piñón 2008, among others). Particles have traditionally been analyzed as perfectivizing elements (Kiefer 1992; Piñón 1995; Kiefer & Ladányi 2000; É. Kiss 2002; Alberti 2004). More recently, however, scholars like É. Kiss (2005; 2008b), Csirmaz (2008c), and Kardos (2012; 2016) took issue with the idea that verbal particles directly influence grammatical/viewpoint aspect (Smith 1991) by virtue of having a direct perfectivizing role in the sentence and argued for their direct telicizing function. Section 3.3 will reflect on how telicity obtains in the presence of particles.[8]

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[7] For more on cancelability in various languages, see Travis (2010).

[8] I follow Csirmaz (2008c) in assuming that viewpoint aspect and situation aspect are distinct, albeit related, grammatical categories in Hungarian. As also discussed by Kardos (2016, 7), the contrast between the perfective and imperfective (progressive) aspects is encoded in the syntax in a way that, in the case of particle verbs, the particle precedes the verb in perfective sentences and it follows it in imperfective (progressive) ones. This is shown in (i) and (ii):

(i)   A   macska fel-mászott a   fá-ra.
      the cat.NOM PRT-climbed the tree-to
      'The cat climbed up the tree.'

(ii) A   macska ˈmászott ˈfel   a   ˈfá-ra,
      the   cat.NOM climbed PRT   the tree-to
      amikor a   kutya   kinézett az óljá-ból.
      when   the   dog.NOM looked.out the his.doghouse-from
      'The cat was climbing up the tree when the dog looked out of his house.'
                                (adapted from Kardos 2016, 7, (13) and (14))

The grammatical aspectual difference between the sentences above is also reflected in the fact that the sentences are associated with different intonation patterns, as shown by the ˈ sign, which indicates primary stress. However, as for situation aspect, the two sentences are similar in that they both contain telic event descriptions. For more on the independence of situation aspect and viewpoint aspect, see Csirmaz (2008c, 113).

In addition to their telicizing function, particles with some verbs are also known to trigger the Specificity Effect, which is a semantic-pragmatic restriction on the interpretation of internal arguments (see Szabolcsi 1986; É. Kiss 1995; Bende-Farkas 1995; 2002, among others). I illustrate this with the creation verb *talál* 'find' in (12).

(12) a. János talált egy kulcs-ot.
         J.NOM found a   key-ACC
         'János found a key – János didn't know about this key before.'

     b. János meg-talált egy kulcs-ot.
         J.NOM PRT-found an   key-ACC
         'János found a key that was known to have been lost.'

What is interesting about the examples in (12) is that whereas in (12a) the theme *egy kulcsot* 'a key' can only be interpreted as a new entity that János did not know about, in (12b) János or someone else from the context knew about a group of missing keys and János found one of those keys. As pointed out by a reviewer, the Specificity Effect is also observable in English. For example, the direct object in *write up a report* is familiar, similarly to its Hungarian counterpart *meg-ír egy jelentést* 'PRT-write a report'.[9]

Finally, verbs like *eszik* 'eat' and *iszik* 'drink' have also been shown to exhibit the Definiteness Effect (DE) along with verbs of creation like *épít* 'build' and *rajzol* 'draw' (cf. Wacha 1978; Szabolcsi 1986; Bende-Farkas 1995; 2002, É. Kiss 1995; Kálmán 1995, Maleczki 1995). Consider (13).

(13) a. Kati   evett   egy almá-t.
         K.NOM ate.INDEF an apple-ACC
         'Kate was eating/ate an apple.'

     b. Kati   ette   az almá-t.
         K.NOM ate.DEF the apple-ACC
         'Kati was eating the apple.'

An important consequence of the DE is that *eszik* 'eat' requires a non-specific, indefinite theme unless it appears in a progressive sentence, as in

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[9] Another reviewer notes that the theme may also be non-specific in the environment of *write up* in examples like *write up an experiment* as in *John is going to write up an experiment today*. This suggests that the Specificity Effect is a property of verb phrases, and not verbs.

(13b).[10] That *egy almát* 'an apple' is non-specific in (13a) is illustrated below in (14a), where the relative pronoun *amit* 'which' cannot be linked to the theme of the verb *evett* 'ate'. This example contrasts with (14b), where the expression *egy almát* 'an apple' appears with the particle verb *meg-evett* 'PRT-ate' and can serve as an antecedent to *amit* 'which'.[11]

(14) a. ^{??}Kati   evett   egy almá-t,   ami-t   már
        Kati   ate   an   apple-ACC, which-ACC already
        régóta   szerettem volna meg-enni.
        for.a.long.time I.liked.DEF would PRT-to-eat
        'Kati ate an apple, which I had been wanting to eat for a while.'

   b. Kati   meg-evett egy almát,   ami-t   már
      Kati   PRT-ate   an   apple-ACC, which-ACC already
      régóta   szerettem volna meg-enni.
      for.a.long.time I.liked.DEF would PRT-to-eat
      'Kati ate an apple, which I had been wanting to eat for a while.'

That *ette az almát* in (13b) has only a progressive interpretation is illustrated in (15).

(15) Kati ette az almá-t,   amikor Péter be-jött a   szobá-ba.
     Kati ate the apple-ACC, when   Péter in-came the room-to
     'Kati was eating the apple when Péter came into the room.'

The only reading that the complex sentence in (15) can receive is that Péter came in as Kati was in the middle of the apple-eating event. This shows that the eating event in the first clause is presented from a progressive viewpoint (cf. Csirmaz 2008c, 113).

   The example in (13a), on the other hand, has two readings. The test below provides evidence for this:

(16) Kati evett egy almá-t,   amikor Péter be-jött a   szobá-ba.
     Kati ate   an apple-ACC, when   Péter in-came the room-to
     'Kati ate an apple when Péter came into the room.'
     'Kati was eating an apple when Péter came into the room.'

On one reading, the eating event precedes Péter's coming into the room, which is a sign of the availability of perfective aspect in the main clause.

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[10] For more on the encoding of the perfective and imperfective aspects in these sentences, see Kálmán (1995, 239).

[11] I thank György Rákosi for the examples in (14).

The second reading that one can assign to this sentence is that Kati was in the middle of eating an apple when Péter came into the room. This diagnoses progressive aspect.

From the perspective of aspectual composition, another crucial property of DE-verbs is that, unlike most verbs in Hungarian (cf. Kardos 2012; 2016), they can be compatible with a telic interpretation in the absence of telicizing particles or resultative/locative expressions on the condition that they appear with a beneficiary participant in the sentence. Compare (17) and (18).

(17) Mari   tíz perc-ig   vasalt egy ing-et.
      M.NOM ten minute-for ironed a   shirt-ACC
      'Mari was ironing/ironed a shirt for ten minutes.'

(18) a. Mari   tíz perc   alatt ki-vasalt   egy ing-et.
          M.NOM ten minute under PRT-ironed a   shirt-ACC
          'Mari ironed a shirt in ten minutes.'

      b. Mari   tíz perc   alatt simá-ra vasalt egy ing-et.
          M.NOM ten minute under even-to ironed a   shirt-ACC
          'Mari ironed a shirt crease-free in ten minutes.'

      c. Mari   tíz perc   alatt vasalt (magának) egy ing-et.
          M.NOM ten minute under ironed for.herself a   shirt-ACC
          'Mari ironed a shirt for herself in ten minutes.'

The sentences above illustrate that the DE-verb *vasal* 'iron' can receive a telic reading either in the presence of a particle like *ki* or a resultative expression like *simára* 'crease-free' or, in the absence of these elements, the beneficiary *magának* 'for herself' can also be responsible for telicity. Building on Milsark's (1977) analysis of English *there*-sentences, Szabolcsi (1986) proposes that Hungarian DE-verbs contain an existential quantifier. Given that existential sentences have been shown to contain a generalized goal argument (in the sense of Gruber 1965), which can be realised as a possessor, a beneficiary, or a location, it can be claimed that DE-verbs contain such a goal argument. Bende-Farkas and Kamp (Bende-Farkas & Kamp 2001, 97) illustrate this with the verb *lő* 'shoot', which, as a DE-verb, can only mean 'shoot for some purpose/for someone'. Without a goal argument, there is no definiteness effect. Other meanings involving shooting must be expressed with particle verbs like *le-lő* 'eliminate by shooting' and *meg-lő* 'wound by shooting'. Informally speaking, telicity concerns the attainment of a goal point in the course of the denoted event, and thus the acquisition of a telic reading is expected.

In what follows I will further explore these phenomena within the framework of scalar semantics. Although I focus on predicates like *eszik egy almát* 'eat an apple' and its English counterpart, I will also offer some insights into how various facts of Hungarian particle verb constructions can be accommodated in the analysis.

3. Theoretical assumptions

3.1. The model in a nutshell

In my analysis, I follow Beavers (2012),[12] which is an extension of Krifka (1998), in assuming the following: All entities belong to one of three domains, the domain of objects U_E, the domain of events U_E, or the domain of connected, directed paths P_H. The set of objects U_E, the set of events U_E, and the set of connected direct paths P_H are structured as complete join semilattices without a bottom element. The lattice structures are characterized by the sum operation $(\oplus_P, \oplus_E, \oplus_H)$, which is commutative, idempotent, and associative. The entities in U_E, U_H, and P_H may be related to each other via the part relation $(x' \leq_X x)$, the proper part relation $(x' <_X x)$ or the overlap relation $(x' \otimes_X x)$. Non-overlapping events in U_E are ordered by a temporal precedence relation $(e' \ll_E e'')$ and non-overlapping paths are partially ordered by a spatial precedence relation $(x' \ll_H x'')$. Also, any two entities x' and x'' in U_E and P_H may be adjacent $(x' \infty_X x'')$. The mereological part structures of incremental themes and those of events are related to each other by homomorphisms, which are encoded by the head verb. These homomorphisms ultimately give rise to the structural analogy between nominal and verbal expressions in cases like (1) and (2). On this analysis, a predicate is telic iff for any event it describes it does not describe any non-final subevent of that event (Beavers 2012, 35, (2.23)). See also Krifka (1992, 35).

A crucial ingredient of this analysis is that the aspectual structure of predicates is determined by not one but two incremental themes, the participant that undergoes some kind of change, referred to as the figure, and the path that serves as a spatial trajectory for the event. Consider the examples in (19) from Filip (1999, 100, (33)).

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[12] I refrain from discussing Beavers (2012) in detail in this paper since in section 2.2 of Kardos (2016) I provide an in-depth characterization of this model.

(19) a. The earthquake shook a book off the shelf in/$^?$for a few seconds.

    b. The earthquake shook books off the shelf for/$^{??}$in a few seconds.

    c. The earthquake shook a book for/$^{??}$in a few seconds.

    d. The earthquake shook books for/$^{??}$in a few seconds.

The sentences above reveal that a telic interpretation becomes available only in the presence of a theme/figure whose quantity is known and a bounded path, as in (19a). If either of these two conditions fails to hold, atelicity emerges, as in (19b), (19c) and (19d).

Beavers captures double incrementality by proposing that ternary homomorphic relations, which he refers to as figure/path relations (FPRs), obtain between the part structure of events, the part structure of paths, and the part structure of figures. As argued at length in Beavers (2012, 35–44), it follows from the definition of telicity and figure/path relations that in order to determine the boundedness of the event (i.e., the telicity of the predicate), we must know how much of the figure ends up where on the path. More precisely, telicity arises if the figure has quantized reference and the path is bounded.

In addition, this model is also innovative in the sense that it provides a uniform analysis of incremental theme verbs by assuming that they are associated with mereological scalar structures along which change occurs.[13] Section 3.2 is aimed at providing some insights as to crucial properties of these structures.

3.2. Scales in the analysis

In recent years a growing body of research has suggested that dynamic verbs form two natural classes as scalar or nonscalar and that class membership has consequences for aspectual behavior and argument realization (cf. Hay et al. 1999; Kennedy & McNally 2005; Wechsler 2005; Kennedy & Levin 2008; Rappaport Hovav 2008; Rappaport Hovav & Levin 2010; Kennedy 2012, among others). A scale, as encoded by certain verbs, is generally described as an ordered set of degree values for a particular attribute (e.g., volume, temperature, length, width) associated with an event

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[13] In previous literature, Tenny (1994), for instance, distinguished between three types of verbs encoding some kind of incrementality, i.e., incremental theme verbs like *eat*, change-of-state verbs like *ripen*, and route verbs like *walk*. Other works including Jackendoff (1996); Hay et al. (1999); Kennedy & McNally (2005), and Ramchand (2008) have also analyzed different predicates expressing an incremental change under one rubric.

participant. In light of this, a scalar change – change along a scale – can be defined as follows:

(20) A scalar change is one which involves an ordered set of changes in a particular direction of the values of a single attribute.   (Rappaport Hovav 2008, 17)

Predicates expressing scalar change include *warm, cool, ascend, descend, build a house*, and *eat an apple*, whereas non-scalar predicates are illustrated by *dance, play, exercise, scrub*, and *steam* (Rappaport Hovav & Levin 2010). Scalar verbs are further grouped into various subclasses based on the type of scales that they encode. For instance, *warm* and *cool* have property scales, *ascend* and *descend* have path scales, whereas *build a house* and *eat an apple* have volume/extent scales. Scalar verbs can also differ with respect to the complexity of their scale. Verbs like *warm* and *cool* are associated with scales having multiple values, whereas verbs like *break* and *die* have scales with exactly two degree values, i.e., an initial and a final degree value (Beavers 2008). Verbal predicates on this view are taken to express a transition between these values. For example, *break* expresses a transition between an initial value of its property scale corresponding to a state of affairs where the entity undergoing change is not broken and a final degree value, which corresponds to a state of affairs where this entity is broken. The type of scale that a predicate is associated with has important consequences for the aspectual interpretation of the predicate. For instance, predicates like *break the vase*, which encode two-point scales, are inherently telic, whereas predicates of the type *warm the soup*, which have multi-point scales, are interpreted as atelic or telic. Furthermore, multi-point scales can also differ as to whether they are open-ended or upper closed; the former type of scale is encoded by predicates like *warm*, which are by default atelic in the presence of a theme with quantized reference (cf. *warm the soup*), whereas predicates encoding a closed scale are generally assigned a telic interpretation in the presence of quantized objects (cf. *straighten the rope*). For more on this, see Kennedy & McNally (2005).

   Beavers (2012) states that perhaps all predicates of change are associated with a scale. In earlier work, he provides various pieces of evidence for this claim, including the occurrence of overt scalar expressions in degree achievements and various resultative constructions, and the fact that, in some cases, the aspectual properties of a verb can be tied to the scalar properties associated with the adjective underlying that verb (see also Kennedy & Levin 2008, 156).[14] On this view, verbs have an additional argument slot

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[14] For a detailed discussion of these pieces of evidence, see Beavers (2006, 89–94).

that denotes a scale, where scales are associated with a mereological part structure, just like the event argument and the figure argument.[15] More precisely, a scale is a directed path $s \in P_H$ with the following properties:

(21) a. Each $s \in P_H$ represents a specific property.

    b. Degrees on s are atomic subparts of s.[16]

    c. Precedence relation $\ll_H$ orders subparts of s.   (Beavers 2012, 53, (2,54))

This reinterpretation of scales makes it possible that dynamic predicates of different types can be analyzed in a uniform manner. Their representation in a Krifka semantics would be as in (22):[17]

(22) a. The liter of wine flowed onto the floor in/$^?$for one minute.
    $\lambda e \exists s [flow'(\textbf{wine}, s, e) \wedge GOAL(\textbf{floor}, s, e)]$

    b. Caesar wiped the table clean in/$^{??}$for one minute.
    $\lambda e \exists s [wipe'(\textbf{caesar}, \textbf{table}, s, e) \wedge GOAL(\textbf{clean}, s, e)]$

    c. Caesar drank his beer in/$^?$for one minute.
    $\lambda e \exists s [drink'(\textbf{caesar}, \textbf{beer}, s, e) \wedge GOAL(\textbf{empty}, s, e)$
              (adapted from Beavers 2012, 43, (2.38); 53 (2.55a); 57, (2.66a))

The representations above show that all these predicates describe an event e that progresses along some scale s. In each case, the verbal predicate provides sufficient information as to the quantity of the referent of the argument undergoing a change and is responsible for the boundedness to the scale, as indicated by the constants **floor**, **clean**, and **empty**, respectively, representing the fixed value of the goal point of the scale. Given that these two conditions are met, telicity arises, as indicated by the temporal adverbial test. Something that is left unspecified is, however, the difference between various predicates when it comes to the relationship between the scalar and the figure arguments. As Beavers (2012, 58) notes in his discussion of the aspectual effect of the internal complexity of the theme on the verbal predicate, where he provides further evidence for multiple incrementality, creation/consumption predicates like *eat* differ from predicates like *wipe* in that the former are associated with scales that are **directly** determined by the theme argument. In previous literature, Levin (2010, 14) also points out that the extent scales of predicates like *eat an apple*

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[15] Note that scalar analyses like Hay et al. (1999) and Kennedy & McNally (2005) do not attribute a mereological part-whole structure to scales. For more on mereological and non-mereological scalar approaches to lexical aspect, see Filip (2012, 735–745).

[16] An atomic entity x has no subparts other than x (cf. Beavers 2012, 48).

[17] Boldface indicates logical constants in the representations.

are "qualitatively" different from property scales (cf. *warm* and *cool*) and
path scales (cf. *ascend* and *descend*) by virtue of the fact that in the case
of *eat an apple* the theme specifies the scale, whereas in the case of *warm,
cool, ascend*, and *descend*, the scale is inherent in the meaning of the verb.
A more precise characterization of how **exactly** the theme determines the
structure of creation/consumption scales is, however, missing from these
analyses. This gap is what I would like to fill in section 4 of this paper. Be-
fore that, however, I review how verbal particles telicize verbal predicates
in Hungarian.

3.3. Event maximalization in Hungarian

In Kardos (2012; 2016) I argue that in Hungarian telicity must be overtly
marked. This is expressed in the following principle:

(23) **Principle of Telicity Marking**: Telicity must be overtly marked by event bounders.

In the domain of non-creation/non-consumption verbs, which is the subject
of investigation in Kardos (2016), overt telicity marking is typically carried
out by verbal particles and resultative/locative expressions in a way that
they encode an event-maximalizing operator MAX_E, which picks out the
largest events in the denotation of verb phrases (Filip & Rothstein 2006;
Filip 2008). The definition of MAX_E is as follows:

(24) Telicity corresponds to the **maximalization operator** MAX_E. It is a monadic opera-
      tor, such that $MAX_E(\sum) \in \sum$, which maps sets of partially ordered events $\sum$ onto
      sets of maximal events $MAX_E(\sum) \in \sum$.   (Filip & Rothstein 2006, 139, (2))

An important novelty of the analysis in Kardos (2012; 2016) is that, in
accordance with Beavers's (2012) figure–path relations (FPR) model, the
events are partially ordered relative to the part structure of the internal
argument and the part structure of the scale/path. The event-maximal-
izing operator applies in the presence of a verb lexicalizing a figure-path
relation, a theme whose quantity is known and a bounded path.[18] This
has important interpretive consequences for the verbal predicate. For ex-
ample, in the presence of an event-maximalizing element, aspectual duality
does not emerge. This is shown in (25) with the degree achievement verb
melegít 'warm'.

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[18] For a detailed discussion of event maximalization, see section 3.2 in Kardos (2016).

(25) a. Mari   10 perc-ig/*10   perc   alatt melegített egy csészé-t.
       M.NOM 10 minute-for/10 minute under warmed   a   cup-ACC
       'Mari warmed a cup for 10 minutes.'

     b. Mari   10 perc   alatt/*10 perc-ig   fel-melegített egy csészé-t.
       M.NOM 10 minute under/10 minute-for PRT-warmed a   cup-ACC
       'Mari warmed a cup in 10 minutes.'   (adapted from Kardos 2016, 14–15, (28))

As evidenced by the temporal adverbial test, the sentence containing the
base verb *melegít* 'warm' is interpreted as strictly atelic, whereas the sen-
tence with the particle verb *fel-melegít* 'PRT-warm' is strictly telic.

    Yet another consequence of the event-maximalizing operation and the
FPR is that non-specific themes like *csészék* 'cups', which have cumulative
reference, cannot occur in the presence of particle verbs like *fel-melegít*
'PRT-warm'.

(26) a. *A kukták   fel-melegítettek csészék-et.
       the sous chefs.NOM PRT-warmed   cups-ACC

     b. A kukták   fel-melegítettek egy/három csészé-t.
       the sous chefs.NOM PRT-warmed   a/three   cup-ACC
       'The sous chefs warmed a specific cup/three cups.' (telic)(Kardos 2016, 19, (31))

As for the semantic effect of verbal prefixes or verbal particles on the
incremental theme and the aspectual interpretation of the verbal predicate,
there are differences across languages. As shown by Borer (2005), verbal
particles in English do not necessarily impose a semantic requirement on
themes such that they be specific. Consider (27).

(27) We ate up sandwiches (for hours/all afternoon/*in three hours).
                               (adapted from Borer 2005, 211, (56a))

Examples like (27) show that English *up* does not have an event-maximal-
izing function; it does not necessarily lead to a telic predication.[19,20]
    Yet another pattern is observable in Slavic languages like Bulgarian or
Upper Silesian, a south-west dialect of Polish. As pointed out by Czardy-

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[19] Borer also shows that once the particle shows up after the object, examples like (27)
become ungrammatical. For more on this, see Borer (2005, 210–211).

[20] As for other Germanic languages, there are different judgements in the literature
regarding the co-occurrence of particle verbs and themes with cumulative reference.
Travis (2010, 248), for example, provides the following data from Dutch and Ger-
man, where in each case the particle verb appears with a bare noun and an atelic
interpretation arises.

bon and Fleischhauer (2014), although the incremental theme predication becomes telic if the verb is perfective, the definite article is not required, unlike in Hungarian. This is shown in (28).

(28) a. Łon z-jod$_{PF}$ jabk-o   za godzina.
          he   Z-eat.PAST apple-ACC.SG in hour
          'He ate an apple in an hour.'

      b. Łon z-jod$_{PF}$ te jabk-o   za godzina.
          he   Z-eat.PAST DEF apple-ACC.SG in hour
          'He ate the apple in an hour.'
                          (Upper Silesian; Czardybon & Fleischhauer 2014, 389, (25))

By contrast, if the incremental theme is a bare plural or a mass noun, a telic interpretation can only arise in the presence of the definite article. If the definite article is not present in the sentence, it is only a kind reading of the incremental theme that is available.

(29) a. Łon z-jod$_{PF}$ jabk-a.
          he   Z-eat.PAST apple-ACC.PL
          'He ate [some plurality of the kind] apple.'

(i)   Elena heeft $^{??}$binnen een jaar/jarenlang   brieven afgeschreven

      Elena has   within a   year/years-long letters off-written

      'Elena finished writing letters $^{??}$within a year/for years.'
                                              (Dutch; Travis 2010, 248, (9b))

(ii) Ich habe *in zwei Stunden/$^{?}$zwei Stunden lang Weinflaschen ausgetrunken

      I   have in two hours/two   hours   long wine bottles up-drunk

      'I drank up wine bottles *in two hours/$^{?}$for two hours.'
                                              (German; *ibid.*, (10b))

The Dutch example in (i) and the German example in (ii) show that it is possible for non-specific themes like *brieven* 'letters' in Dutch and *Weinflaschen* 'wine bottles' in German to appear in the environment of particle verbs like *afgeschreven* and *ausgetrunken*, respectively. However, a reviewer finds the German example odd and the following example is also considered ungrammatical by Fleischhauer and Czardybon (2016), where the German verb *aufessen* 'eat up' appears with the bare noun *Äpfel* 'apples':

(iii) *Der Mann hat Äpfel   auf-gegessen.

      the man   has apples AUF-eaten

According to the authors, the example above becomes grammatical once the definite article *die* appears in the sentence. This datum shows that German is similar to Hungarian in that *auf* seems to have an event-maximalizing function.

    b. Łon z-jod~PF~   te   jabk-a   za godzina.
       he   Z-eat.PAST DEF apple-ACC.PL in hour
       'He ate the apples in an hour.'

Returning back to Hungarian, it is important to note that event max-imalization in this language is not only dependent on a verb encoding a figure-path relation, a theme whose quantity is known and a bounded path, but it is also required. This is supported by the facts in (30) and (31).

(30) a. $^{??}$A kukták   melegítettek több, mint három csészé-t.
       the sous chefs.NOM warmed   more than three   cup-ACC

    b. $^{??}$A munkások   szélesítettek több, mint három ut-at.
       the workers.NOM widened   more than three   road-ACC

(31) a. A   kukták   10   perc   alatt/*10 perc-ig   fel-melegítettek
       the   sous chefs.NOM 10   minute   under/10 minute-for PRT-warmed
       több, mint   három csészé-t.
       more than   three cup-ACC
       'The sous chefs warmed more than three cups in 10 minutes.'

    b. A munkások   10 év   alatt/*10 év-ig   autópályá-vá szélesítettek/
       the workers.NOM 10 year under/10 year-for freeway-into widened

       ki-szélesítettek több, mint három ut-at.
       PRT-widened   more than three   road-ACC
       'The workers widened more than three roads into a freeway in 10 years.'
                            (Kardos 2016, 21, (38) and (37))

As the examples in (30) show, the base degree verbs *melegít* 'warm' and *szélesít* 'widen' are unacceptable in the presence of the quantified themes *több, mint három csészét* 'more than three cups' and *több, mint három utat* 'more than three roads'. The event-maximalizing particles *fel* and *ki* or the resultative expression *autópályává* lit. 'into a freeway' appear to be required so that the respective sentences become fully grammatical, as in (31).[21]

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[21] A reviewer points out that once the quantified expression occupies the pre-verbal focus position, the sentence in (30a) becomes fully acceptable, whereas (30b) is only slightly marked. As noted by Kardos (2012, 75), this "remedial" effect of focus is also illustrated by the fact that sentences like (26a) can be improved once the bare plural theme occupies the focus position as in *A kukták csészéket melegítettek fel* 'It was cups that the sous chefs warmed up'. I leave for further research the question of how focus improves the acceptability of these sentences.

That telicity must be overtly marked via an event-bounding element, e.g., a particle, is supported by the fact that achievements must generally be expressed by particle verbs in Hungarian, as also pointed out by Komlósy (1994), Szili (2001), and É. Kiss (2005; 2008b). The obligatory presence of an event-maximalizing element is also observable in the case of degree achievements associated with an inherent endpoint, such as *ki-ürít* 'PRT-empty' and *ki-egyenesít* 'PRT-straighten'. Examples illustrating this are provided in (32) and (33).

(32) a. János *(fel)-robbantott egy ház-at.
        J.NOM (PRT)-exploded a   house-ACC
        'János exploded a house.'

     b. Péter *(fel)-ért   a   hegycsúcs-ra.
        P.NOM (PRT)-reached the hilltop-to
        'Péter reached the hilltop.'

(33) a. Sára   *(ki)-ürített   egy doboz-t.
        S.NOM (PRT)-emptied a   box-ACC
        'Sára emptied a box.'

     b. Mária *(ki)-egyenesített   egy kötel-et.
        M.NOM (PRT)-straightened a   rope-ACC
        'Mária straightened a rope.'

As pointed out at the outset, telicity marking can also be achieved by themes of creation/consumption verbs both in English and Hungarian.[22] This marking strategy is, however, significantly different from the event-maximalizing strategy for which Hungarian verbal particles and resultative/locative expressions are responsible. Section 4 is meant to show how created/consumed themes make verb phrases telic.

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[22] Pseudo-objects like *egyet* in *tüsszentett egyet* 'sneezed once', *jót* as in *jót táncolt a lakodalomban* 'had a good dance at the wedding' and *nagyot* as in *nagyot bulizott* 'had a great party experience' can also delimit events in Hungarian. However, these elements differ from verbal particles and resultative expressions in that the former do not name a prominent result state at the termination of the denoted event. For more on these delimiters, see Csirmaz (2008a) and Farkas & Kardos (2018; 2019; in press).

4. The scalar structure of creation/consumption predicates

In this section my goal is to explore how the scalar structure of creation/ consumption predicates is determined by the theme argument. What follows from the analysis is that created/consumed themes with quantized reference impose (upper) bounds on creation/consumption scales and, consequently, the necessary conditions for telicity will be satisfied. Thus a telic interpretation arises even in the absence of particles or resultative expressions, which are directly responsible for telicity in the class of non-creation/ non-consumption predicates in Hungarian.[23] Conversely, in the presence of themes that have cumulative reference, the goal point of the scale cannot be fully determined, thereby making it impossible for the listener to identify an endpoint to the event, which in turn yields atelicity. For purposes of clarity, in this section, I will mainly, albeit not exclusively, discuss the scalar structure of consumption predicates, which I will illustrate with English examples.

An important intuition behind the analysis is that predicates like *eat* describe events in the course of which some amount of the referent of the affected argument – but minimally one bite of food – disappears completely and they also encode that the denoted event progresses as the theme undergoes change in an incremental fashion.[24] These properties suggest that

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[23] As will be made clear later in this section, telic creation/consumption predicates actually meet more conditions than is required for telicity by virtue of always supplying specific information as to both the source point and the goal point of their scale and hence also the intial and the final subevents.

[24] Canonical examples to which this description applies are those containing themes that have a complex mereological structure as in *eat an apple* and *drink two beers*. In the case of examples like *eat a marble* or *eat a grape*, brought to my attention by Marcel den Dikken (p.c.), where the figure is conceptualized as atomic (i.e., undecomposable), the consumption change can be conceived of as a change from an initial state where the referent of the theme is intact to a final state in which the theme has completely disappeared. In other words, verbal predicates like *eat a marble* and *eat a popcorn* express momentary events. This is evidenced by the following data:

(i) a. Kate will eat a marble/grape in half an hour.
     b. Kate will eat a chicken in half an hour.

The example in (a), which contains an atomic figure, has a single interpretation such that the marble/grape will be consumed once half an hour has passed, whereas the example in (b), which contains a non-atomic figure, is ambiguous. It is either the case that a chicken will be consumed once half an hour has passed or the chicken-eating event will last half an hour (cf. Beavers 2012, 51–56). I assume this to be reflected in the scalar structure of these predicates. I propose achievements like *eat a marble/grape* are associated with a simplex/two-point scale and accomplishments that

verbs like *eat* are scalar, i.e., they are associated with a scalar argument similarly to degree achievements like *warm* and *cool* (Beavers 2012, 57).[25] However, as hinted in the previous section, predicates like *eat* also differ from predicates like *warm* and *cool* since in the case of the former crucial properties of the scale are directly determined by the internal argument (i.e., the figure), in that the structure of the consumption scale of *eat*-type predicates reflects how the referent of the figure argument is consumed bite by bite in the course of the event. Conversely, when it comes to examples like *warm the soup*, no such correspondence can be detected between the part structure of the (property) scale and the part structure of the figure argument, i.e., *the soup*. In other words, the head verbs of creation/ consumption predicates select their scalar arguments as required by their figure arguments, whereas the head verbs of other dynamic verbs select their scalar arguments independently of their figures.

Following Beavers (2012), I assume that consumption predicates like *eat* express a four-place relation between a consumption scale s, a causer y, a figure x, and an event e such that y eats x in e that progresses along s. Scale $s \in S_{cons}$ forms a mereological part structure and it is related to the part structure of the figure argument and the part structure of the event argument via ternary figure/path theta relations (see section 3.1). Atomic subparts of a scale s are totally ordered states (e.g., s_0, s_1, s_2, s_3, etc.), which correspond to states of affairs wherein arbitrary units of the theme have been consumed. For expository purposes, in what follows, I refer to these arbitrary units as bites, which serve to measure how the event denoted by the verbal predicate progresses. It is important to bear in mind that given how mereological structures are built, proper subparts of a scale s are also scales, though the predicate may select only one of these. The properties of the set of consumption scales S_{cons}, which is a set of directed, connected paths, are summarized in (34).

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like *eat a chicken* are associated with a multi-point scale, the structure of which is discussed in detail below.

[25] Caudal and Nicolas (2005) also share the view that verbs such as *eat* have a scalar structure, contra claims by, for example, Rappaport Hovav (2008), and Rappaport Hovav and Levin (2010), who propose that verbs like *eat* and *drink* are not scalar. According to these authors, the volume/extent scale in predicates like *eat an apple* and *drink a beer* is lexicalized by the theme. Also, Copley and Harley (2018) side with Malka Rappaport Hovav and Beth Levin in claiming that *eat*-type verbs express simple properties of events (or "forces" in their terminology) and further propose that the incremental theme DPs of these verbs, which denote entities, are coerced into a measure function, which "ensures homomorphism between the extent of the entity and the progress of the change" (*op.cit.*, 15). This is an idea in line with the analysis given in the present paper.

(34) a. Atomic elements in S_{cons} are s_i, where $i \geq 0$.

    b. For any $s, s_i, s_j \in S_{cons}$, where s_i and s_j are atomic, if s_i and s_j are proper parts of s, $s_i \ll s_j$ (i.e., s_i, the state of having consumed as many bites as i is ordered before s_j, the state of having consumed j bites) iff $i < j$.

To illustrate how themes directly determine scales, I now illustrate visually the relationship between these two entities in Figure 1, where b_1, b_2, etc. indicate the various bites the theme can be partitioned into in a consumption event:

$$b_1 \oplus b_2 \oplus b_3 \oplus \ldots \oplus b_n$$

$$\Downarrow \quad \Downarrow \quad \Downarrow \quad \Downarrow \quad \Downarrow$$

$$s_0 \oplus s_1 \oplus s_2 \oplus s_3 \oplus \ldots \oplus s_n$$
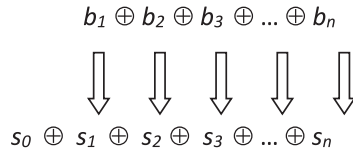
Figure 1: The part structure of the consumption scale as determined by the part structure of the theme

What the figure above demonstrates is that the structure of the consumption scale is maximally determined by the structure of the theme given that atomic subparts of the scale correspond to atomic subparts of the theme. The figure/path relation as encoded by the verb ensures the following structure for the event: The initial subevent corresponds to a state of affairs where not a single bite of the referent of the figure has been consumed, in other words the referent of the theme is available for consumption in its entirety. Subsequent subevents represent states of affairs wherein the first bite, the second bite, the third bite, etc. are consumed. The final subpart of the event is where the figure has disappeared completely. This progression of the event is what is reflected by the scale, which has atomic subparts s_0, s_1, s_2, s_3 and so on. The verb phrase receives a telic interpretation just in case the goal point on the scale, i.e., s_n, can be precisely determined. This is ensured if the predicate provides specific information as to the material extent of the theme; i.e., the theme has quantized reference.[26]

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[26] It remains to be explored why an atelic interpretation is also available in languages like English and Hungarian with some incremental themes that have quantized reference in the class of creation/consumption predicates (see examples (3) and (7)). What this paper aims to show is how telic interpretations arise in the presence of quantized themes in this verb class.

An important upshot of this is that, unlike dynamic predicates like *warm two plates* and *cool two plates*, telic consumption predicates like *eat two pears* always determine uniquely the source point of their scale, which is s_0, and telicity in these cases will always be due to the quantized properties of the theme, which are inherited by the predicate as a whole. In this respect they contrast with predicates like *run to the bank* and *walk to the university*, which are not quantized but telic. Notice that in the case of *run to the bank*, for instance, it is possible for multiple running events to be in the denotation of the predicate given that the initial point to the event is not named.[27]

As for creation predicates I propose that, given that there is a great degree of similarity between how consumption events and creation events unfold (i.e., both types of event advance in an incremental fashion as the theme disappears or comes about), creation scales have a similar structure to that illustrated in Figure 1 with the caveat that creation events progress along the creation scale as the created individual comes about bit by bit. These bits can be thought of as the units of creation (u_0, u_1, u_2, u_3, etc.). That is, subparts of the creation scale are structured according to how subparts of the created theme come about: The initial subpart of the scale, i.e., s_0 corresponds to a state of affairs where not a single unit of creation has come into existence, s_1 corresponds to a state of affairs where one unit of creation has come into existence, and so on until the theme reaches the final state of its being created, i.e., s_n. The final state can be determined, and hence telicity arises, just in case the verb phrase provides information as to the quantity of the theme, as in the case of the predicate *built two houses* (cf. (1)).

As discussed in von Stechow (2001), an important property of creation verbs is that their objects do not exist before the termination of the events that they describe. Creation verbs are not transparent, but temporally opaque. In this respect, these verbs differ from verbs like *break* and *warm* in *break a vase* and *warm a plate*, respectively, which also express a change of state of an entity. I believe the scalar structure proposed for verbs of creation is compatible with the fact that creation objects do not

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[27] Krifka (1998, 207) addresses the difference between the notions 'telic' and 'quantized' as follows: "It is obvious that quantized predicates are telic: If a quantized predicate X applies to some event e, then it does not apply to any proper part of e, hence the only e' such that $X(e')$ and $e' \leq e$ is e itself, which is both an initial and final part of e. But not every telic predicate is quantized; quantization is the stricter notion. For example, assume that X is a predicate that applies to all events that have a run time from 3 p.m. to 4 p.m.; X is telic, but not quantized".

exist during the event time as, for instance, the initial subpart of creation scales corresponds to a state of affairs in which no subpart of the object exists. However, since the present paper focuses on the aspectual effects of created/consumed objects, I will not discuss temporal opacity any further.

This representation of creation/consumption scales is reminiscent of Verkuyl and Zwarts's (1992) path structures, which they assume for verb phrases like *walk to the store* and *eat three apples* alike. The assumption of paths in the meaning of such verb phrases is rooted in Jackendoff's work (cf. 1983; 1990) where it is proposed that both *walk* and *eat* describe motion events in the course of which some entity x moves along some path p. In Verkuyl & Zwarts (1992) the theme determines the path in a way that the denotation of the theme is partitioned and the cells of this partitioning are mapped to a temporal path, thereby creating a new, spatiotemporal path of pairs of points in space and points in time. For instance, the event of some agent eating three apples as described by *eat three apples* has three subevents given the cardinality information encoded in *three apples*. The boundedness of the spatiotemporal path, and thus telicity, here depends on the boundedness of the spatial path.

There are at least two ways in which the analysis of the present paper differs from Verkuyl & Zwarts (1992). First, as also pointed out in Beavers (2012) and Kardos (2016), an important merit of mereological scalar semantic analyses is that their objective is not only to predict telicity by determining the exact point in space that some entity reaches but also to provide a precise characterization of the internal structure of events by representing how exactly the part structure of the theme and the part structure of the scale are mapped to the part structure of the event. On the present analysis, but unlike on Verkuyl and Zwarts's (1992) analysis, the partitioning of the scale associated with *eat apples* and the scale associated with *eat three apples* will be similar given the lexical information encoded in the head verb *eat*, i.e., in both cases the scalar structure is specified as the apples disappear bite by bite. Another difference between Verkuyl and Zwarts's path structure and the consumption scale proposed in this paper is that the latter but not the former reflects change as described by predicates like *eat three apples* more precisely by having an initial subpart (s_0) corresponding to a state of affairs in which the theme is available in its entirety and further subparts corresponding to various states of affairs in which the theme appears in different quantities depending on how much of it has been consumed. In other words, as pointed out in footnote 21, the source point is always known in the case of such predicates, unlike in the case of *walk to the bank*, which is not captured on Verkuyl and Zwarts's analysis.

One question that remains is how to identify the final subpart of the scale, which is necessary for telic interpretations. I suggest this be achieved through the function f' in (35), which serves to pick out the final subpart of consumption scales given that it is known how much of the figure participates in the event.[28]

(35) $f'(x) = s_{\#(x)}$ where $\#(x)$ equals the state of affairs where there is complete disappearance of the theme

The idea is that it is this function that allows us to identify the final subpart of the consumption scale when the theme has quantized reference, which in turn satisfies the conditions for telicity to arise. In the case of creation predicates, the output of the function is the state on the scale that corresponds to the theme's coming into existence over the course of the denoted event. This state is identifiable in the presence of themes that have quantized reference. Again, once the quantization/boundedness requirements of the theme and the scale are fulfilled in the predicate, a telic reading becomes available.

With all the above in mind, I propose the following formal representations for the telic and atelic predicates in (36), which contrast with the predicates in (37) in terms of the scalar structure that they are associated with.

(36) a. Peter ate two pears.
       $\exists s\exists x\exists e[eat'(\mathbf{peter}, x, s, e) \wedge SOURCE(s_0, s, e) \wedge GOAL(f'(x), s, e) \wedge 2pears'(x)]$

      b. Peter ate pears.
       $\exists s\exists x\exists g\exists e[eat'(\mathbf{peter}, x, s, e) \wedge GOAL(g, s, e) \wedge pears'(x)]$

(37) a. The soup warmed. (telic)
       $\exists s\exists e[cool'(\mathbf{soup}, s, e) \wedge GOAL(\mathbf{cool}, s, e)]$

      b. The soup warmed. (atelic)
       $\exists s\exists g\exists e[warm'(\mathbf{soup}, s, e) \wedge GOAL(g, s, e)]$

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[28] Marcel den Dikken (p.c.) points out that, in the presence of a quantized theme, particles like English *up* can also be argued to be responsible for the identification of the final subpart of the consumption scale. The particle is actually necessary when it comes to examples like *ate the soup* so that a telic interpretation can be guaranteed as these predicates are compatible with an atelic construal despite the quantized nature of the theme in them (see example (3a) in section 1). A similar claim can be found in Czardybon & Fleischhauer (2014, 396) regarding the aspectual effect of *auf* in examples like *Der Junge hat das Brot in fünf Minuten/(*fünf Minuten lang) aufgegessen* 'The boy ate up the bread in five minutes/*for five minutes' in German. For more on quantized DPs allowing partitive readings and those that disallow such readings, see, for example, Piñón (2006).

There are two aspectual contrasts in the representations above that need to be emphasized at this point. On the one hand, the predicate in (36a) is different from the example in (37a) in that the former supplies more information about the structure of the encoded scale than the latter, i.e., in (36a) the source point of the scale is uniquely determined given the verb-mediated relationship between the theme and scalar arguments. On the other hand, (36a) also contrasts with (37a) in that scalar boundedness in the case of the former is tied to the physical extent of the theme. In (36a), the upper bound or goal point on the scale can be determined given the spatial boundedness of the theme. This ultimately gives rise to telicity. Conversely, in (36b), the theme with cumulative reference does not ensure that the goal be uniquely determined, as shown by the variable g indicating an unspecified goal in the logical representation, and thus the predicate receives an atelic reading. This correspondence between scale and theme does not characterize the examples in (37). In (37a), scalar boundedness arises due to context. This and the quantized nature of the theme give rise to a telic interpretation. In (37b), lack of contextual information as to a precisely determined goal yields atelicity.[29]

5. Some consequences of the analysis for Hungarian

In this section, I discuss further data from Hungarian, which follow from the scalar semantic analysis of the former sections. First, if the scalar structure that has been proposed for predicates expressing creation/consumption events above is along the right lines, it is expected that the (a)telicity facts of predicates expressing intellectual ingestion be in line with those of canonical creation/consumption predicates like *eszik* 'eat'.[30] That is, an internal argument with quantized reference should be sufficient for calculating telicity, whereas cumulativity should give rise to atelicity. The data in (38) and (39) bear this out.

(38) a. János tíz perc   alatt memorizált egy képlet-et.
        J.NOM ten minute under memorized a   formula-ACC
        'János memorized a formula in ten minutes.'

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[29] For more on the role of context in examples like (37a), see Kennedy & Levin (2008).

[30] That verbs like *understand* and *learn* form a grammatical class with verbs like *eat* and *drink* has also been shown with respect to Hindi in Masica (1976). In this language these verbs pattern together as they behave similarly under causativisation (see also Næss 2011).

b. János tíz perc-ig/*tíz   perc   alatt képletek-et   memorizált.
   J.NOM ten minute-for/ten minute under formulae-ACC memorized
   'János memorized formulae for ten minutes.'

(39) a. Anna egy év   alatt tanult tíz recept-et.
      A.NOM a   year under learned ten recipe-ACC
      'Anna learned ten recipes in a year.'

b. Anna   egy év-ig/*egy év   alatt receptek-et tanult.
   A.NOM a   year-for/a year under recipes-ACC learned
   'Anna learned recipes for a year.'

Second, activity verbs like *fúr* 'drill', which can express both creation and
non-creation events, are also interpreted telically in the presence of a spa-
tially bounded object on a creation construal. This is illustrated by *fúr
egy lukat* 'drill a hole', but not by *fúr egy falat* lit. 'insert through a wall',
which expresses a non-creation event (see also Kálmán 1995, 238–239).[31]

Likewise, just like durative dynamic predicates, achievements like *tör*
'break' and *tép* 'tear' can also describe either non-creation events or cre-
ation events. In the case of the former, the verb, whose event argument
is associated with a mereologically simplex structure having exactly two
proper parts, i.e., an initial and a final subpart, must occur with a par-
ticle (or a resultative expression) (cf. É. Kiss 2008, 21), as also discussed
in section 3.3. Interestingly, when describing creation events, it is possible
for these verbs to occur without a particle or a resultative phrase. In such
cases, the verb and a quantized theme give rise to a telic interpretation.
Consider (40) and (41), where (40) is from Peredy (2009), who also notes
that the verb *tör* 'break' displays variable grammatical behavior depending
on what theme argument it occurs with.[32]

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[31] That holes can behave like concrete objects in language has also been pointed out in
Geuder (2002, 86).

[32] It has also been shown in the literature that different themes can be responsible for
different creation events encoded in different ways in languages. Levinson (2007), for
example, distinguishes between explicit creation as described by *braid a necklace*,
where the DP in the verb phrase is the object of creation, and implicit creation
as described by *braid one's hair*, where the created object is not named. That this
distinction is grammatically relevant is supported by the fact that the explicit creation
pattern is compatible with benefactive applicatives as in *braided Mary a necklace*,
whereas the implicit creation pattern is not, as shown by the ungrammaticality of
**braided Mary the strands* (*ibid.*, 116).

(40) a. *(El)-törtem egy vázá-t.   (non-creation pattern)
         PRT-broke.I a   vase-ACC
         'I broke a vase.'

    b. Törtem egy darab kenyer-et.   (creation pattern)
         broke.I a   piece bread-ACC
         'I broke a piece of bread (off of a loaf of bread).'
                                    (adapted from Peredy 2009, 212, (25b) and (26b))

(41) a. Mari   *(el)-tépett egy papírlap-ot.   (non-creation pattern)
          M.NOM   (PRT)-tore a   paper.sheet-ACC
          'Mari tore a sheet of paper.'

    b. Mari   tépett egy darab papír-t.   (creation pattern)
          M.NOM tore   a   piece paper-ACC
          'Mari tore off a piece of paper, thereby making this available for herself or someone
          else.'   (Kardos 2016, 25, (55))

Another set of the data that can be accounted for applying the scalar
analysis of section 4 is one representing invariable atelicity, as in (42)
and (43).

(42) Péter tíz perc-ig/*tíz   perc   alatt iszogatott   egy limonádé-t.
     P.NOM ten minute-for/ten minute under drank.small.sips a   lemonade-ACC
     'Péter drank small sips from a lemonade for 10 minutes.'

(43) Károly tíz perc-ig/*tíz   perc   alatt csipegetett   egy csirkecomb-ot.
     K.NOM ten minute-for/ten minute under ate.tiny.bites a   chicken thigh-ACC
     'Károly ate tiny bites from a chicken thigh for ten minutes.'

These predicates are unique, in that they receive a strictly atelic interpre-
tation despite containing quantized themes, something that also character-
izes English conatives like *drank at a glass of beer*. As proposed by Beavers
(2010), this may be due to the fact that the predicate imposes a semantic
constraint according to which the goal point on the scale be existentially
bound. This, violating one of the conditions necessary for telicity to arise,
yields invariable atelicity for the predicate. I propose that the data in (42)
and (43) be analyzed along similar lines with the caveat that in Hungar-
ian it is the frequentative morpheme *-gat/-get* that is responsible for the
atelicizing effect. This claim is further strengthened by the data in (44)
and (45), where *-gat/-get* is responsible for the derivation of strictly atelic
iterative predicates.

(44) Mari   tíz perc-ig/*tíz   perc   alatt ütögette   az asztal-t.
     M.NOM ten minute-for/ten minute under iterative hit the table-ACC
     'Mari hit the table repeatedly for ten minutes.'

(45) János tíz perc-ig/*tíz   perc   alatt integetett.
     J.NOM ten minute-for/ten minute under waved
     'János waved for ten minutes.'

This property of *-gat/-get* has important consequences with other predicate classes as well. Specifically, if this morpheme has aspectual effects according to which the goal point associated with the scalar argument be existentially bound, verbs encoding two-point scales should be incompatible with it. This is borne out by the data in (46), where the achievement *eltör* 'break' proves to be quite unusual with the morpheme *-get* in examples like that in (43). For more examples of this sort, see Kiefer & Ladányi (2000, 456) and Kiefer (2006, 164).

(46) $^{??}$Mari   el-tör-ö-**get**-ett   egy vázá-t.
     M.NOM PRT-break-linking vowel-FREQ-PAST.3SG a   vase-ACC

As a reviewer points out, achievements like *elad* 'sell' are actually acceptable with the morpheme *-gat/-get* when they appear with a theme whose denotation can be partitioned and each cell corresponds to a different event. This also characterizes *eltör* 'break' as shown in (47).

(47) a. Ákos   el-ad-o-**gat-**ta   az ágyak-at.
        Á.NOM PRT-give-linking vowel-FREQ-PAST.3SG the beds-ACC
        'Ákos sold the beds, one bed at a time.'

     b. Kati   el-tör-ö-**get**-te   a tányérok-at.
        K.NOM PRT-break-linking vowel-FREQ-PAST.3SG the plates-ACC
        'Kati broke the plates, one plate at a time.'

The expressions *eladogatta az ágyakat* 'sold the beds, one bed at a time' and *eltörögette a tányérokat* 'broke the plates, one plate at a time' are similar in that they express as many events as there are beds and plates, respectively. This construal is not possible in the presence of themes like *egy ágy* 'a bed' and *egy tányér* 'a plate', which denote singular entities. Thus, examples like (48) below sound odd:

(48) $^{??}$Ákos   el-ad-o-**gat**-ta   az ágy-at.
     Á.NOM PRT-give-linking vowel-FREQ-PAST.3SG the bed-ACC

Similar facts can be observed with other morphemes like *-des* and *-ked*, which are both frequentative suffixes.

(49) a. [?]János el-tép-**des**-ett   egy vonatjegy-et.
     J.NOM PRT-tear-FREQ-PAST.3SG a   train ticket-ACC

    a.′ [?]János el-tép-**ked**-ett   egy vonatjegy-et.
     J.NOM PRT-tear-FREQ-PAST.3SG a   train ticket-ACC

    b. János el-tép-**des**-te   a   vonatjegyek-et.
     J.NOM PRT-tear-FREQ-PAST.3SG the train tickets-ACC
     'János tore the train tickets into pieces, one ticket at a time.'

    b.′ János el-tép-**ked**-te   a   vonatjegyek-et.
     J.NOM PRT-tear-FREQ-PAST.3SG the train tickets-ACC
     'János tore the train tickets into pieces, one ticket at a time.'

As shown above, in the presence of a theme that denotes a singular entity, the verbs *eltépdes* 'tear into pieces, one piece at a time' and *eltépked* 'tear into pieces, one piece at a time' appear somewhat unnatural, as in (49a) and (49a′). However, once the theme denotes multiple entities, the sentence becomes fully grammatical, as in (49b) and (49b′).[33]

     Another interesting question, raised by Marcel den Dikken (p.c.) concerning frequentative morphemes like those above, is where these elements are attached in the syntax. Based on their aspectual behavior, they are associated with the entire VP, but morphologically they appear directly on the verb. I leave this question for future work.

6. Conclusion

In this paper I have examined a variety of grammatical facts from the class of creation/consumption predicates and I have also devoted some attention to aspectual properties of non-creation/non-consumption predicates in Hungarian and in English. I hope to have shown that the scalar semantic analysis outlined in the paper can help us account for several aspectual

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[33] As expected, DE-verbs like *érkezik* 'arrive', which express punctual events, are generally incompatible with the frequentative morpheme *-gat/-get*, as shown by the ungrammaticality of examples like **János érkezgetett* 'János was arriving'. However, in the environment of themes associated with a complex internal structure, the verb *érkezget* becomes acceptable as in *Lassan érkezgettek a gólyák* 'The storks were slowly arriving'. For more on iterative/frequentative morphemes in Hungarian, see, for example, Kiefer (2006; 2009).

facts in these languages, including aspectual variability phenomena, which have received little attention so far, especially in Hungarian.

Acknowledgments

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