SEMELFACTIVES

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ABSTRACT

The present paper discusses the aspectual class of *semelfactives*, which comprises expressions that introduce eventualities with inherent boundaries, often a very short duration, but no lexically defined change of state, e.g., *flash* and *cough*. After reviewing previous analyses of semelfactives (including their integration into an overall system of aspectual classification), an analysis of semelfactives that treats them as denoting singleton (rather than iterated) eventualities will be defended. As a challenge for this analysis of semelfactives, semantic construction of semelfactives with frequency adverbials will be presented and analysed in terms of a coercion operator.¹

[1] INTRODUCTION

Semelfactives are a class of predicates (expressions that denote properties of eventualities or states of affairs). They are defined in terms of aspectual properties, where ‘aspect’ is defined as the way in which predicates present the temporal progression of an eventuality.

Typical examples include *flash*, *cough*, *knock*, *rap*, or *nudge*, all of which introduce eventualities with inherent boundaries but no lexically defined change of state. In addition, these eventualities have a rather short duration, which has often been modelled as an aspectual property of “punctuality”. These predicates are a challenge for aspectual classification because they can be used not only to refer to singleton eventualities, they frequently are used to denote whole *iterations* of such eventualities. E.g., (1) is used to refer to a single coughs as well as to a whole series of coughs:

(1) *Amélie coughed.*

In such an iterative interpretation, the predicate has completely different aspectual properties: Such iterations do not introduce inherent boundaries, as the number of repetitions is not limited. In this way, they are *cumulative*, or closed under a suitable join operation for eventualities. (*P* is cumulative iff two adjacent *P*-eventualities sum up to another *P*-eventuality.) At the same time, they are

[1] The author wishes to thank Alexandra Spalek, an anonymous reviewer, and the participants of the 2017 Workshop on approaches to coercion and polysemy at the University of Oslo for their valuable feedback.

neither stative nor fully *divisive* (closed w.r.t. a suitable part-of relation for eventualities), as there is a clear lower bound, e.g. for (1), one single cough. These two aspectual properties are the hallmarks of the aspectual class of process or activity predicates like *run*, *dance*, or *sing*.

Consider for instance *cough*, for which either of these interpretations can be supported by appropriate linguistic contexts that are compatible with only one of the readings. This predicate lends itself to a combination with *suddenly*, which suggests inherent boundaries and short duration, as well as to a combination with durative adverbials like *the whole night*, which has traditionally been cited as a “test” (linguistic environment) that indicates process predicates (see e.g. Dowty 1979):

- (2) *Suddenly, Amélie coughed.* (once)
- (3) *Amélie coughed the whole night.* (repeatedly)

While this pattern as exhibited by *cough* and other semelfactives has been familiar since Comrie (1976) or Talmy (1985), in-depth analyses and formalisations of this flexibility are of more recent origin. Short of assuming polysemy, there are two main lines of analysis, in that the iterative use of semelfactives is either included in their lexical meaning (Rothstein 2004) or the result of aspectual coercion (Moens & Steedman 1988; Smith 1991). The contribution of this paper lies in an attempt to compare and assess these two lines of analysis on the basis of appropriate formalisations.

The analyses will be introduced and discussed in the following section, but before doing so I want to introduce a challenge for the semantic construction of semelfactives in combination with frequency adverbials like *five times*, as in (4):

- (4) *Amélie coughed five times.*

In (4), the adverbial can count the number of repetitions of singleton eventualities, but it can also count distinct iterations of such singleton eventualities. I.e., (4) might refer either to a sequence of five coughs of Amélie, or to a group of five sequences (of undetermined number) of such coughs.

I will show that these two readings require specific attention in either of the proposed analyses and, finally, I will argue for the first interpretation of semelfactives, viz., that semelfactives refer to singleton eventualities, and iteration emerges through coercion or semantic construction.

The structure of the paper is the following. First I will introduce previous analyses of semelfactives (including their integration into an overall system of aspectual classification). Against this background I will defend an analysis of semelfactives that treats them as denoting singleton (rather than iterated) eventualities. As a challenge for this (and, in fact, any) analysis of semelfactives, se-

mantic construction of semelfactives with frequency adverbials will be discussed and formalised in detail.

[2] TWO ANALYSES OF SEMELFACTIVES

This section presents the two major analyses of semelfactives, first, the singleton analysis, which regards them as denoting typically quite short eventualities without a change of state, and the iterative analysis, which interprets them as denoting iterations of such eventualities.

[2.1] *The singleton analysis*

The singleton analysis of semelfactives dates back to [Vendler's \(1967\)](#) classification. Here they are classified as “achievements” (predicates that introduce eventualities with inherent boundaries and are applicable to temporally minimal entities). In Vendler’s achievement class, semelfactives are grouped together with predicates that introduce a lexically defined change of state, e.g., *vanish* as a termination of being present. Thus, [Dowty's \(1979\)](#) and [Rothstein's \(2004\)](#) reconstruction of Vendler’s achievements as change-of-state predicates excludes semelfactives.

Semelfactives were described in [Talmy \(1985\)](#) as “full-cycles”, combinations of two changes of states, in which the second one immediately follows the first one and reverts it. E.g., for *flash*, the first change of state would be from darkness to light, the second one, the other way round. In [Moens & Steedman's \(1988\)](#) and [Smith's \(1991\)](#) classification, semelfactives are assigned a class of their own (Moens and Steedman call it “point”), thus, their achievement class excludes semelfactives, too.² They define semelfactives as predicates that denote temporally minimal entities but explicitly do not introduce a change of state.

Their definition of “punctuality” differs from Vendler’s in that exclusive reference to temporally minimal entities is mandatory. In Vendler’s system, “punctuality” is a feature that groups his achievement predicates together with stative predicates, because the latter also can (though need not) refer to temporally minimal entities, because of their full divisivity. An alternative definition of punctuality in terms of the absence of “stages”³ in the denoted eventualities could group predicates in the same way as Vendler’s original definition (Vendler’s achievement class together with the stative predicates).

The singleton analysis of semelfactives can be based on the intuition that semelfactives refer to eventualities which are maximal w.r.t. a predicate P . There are different instantiations of this predicate P , in particular:

- an emission of sound or light (*flash*, *cough*)

[2] [Dini & Bertinetto \(1995\)](#) advocate such a system, too.

[3] Stages are incrementally developing parts of an eventuality which start at its beginning ([Landman 2008](#)).

- contact plus application of force by momentum (*nudge, kick, hit*)
- a combination of these (*knock, rap, tap*)
- movements from and then back into an initial position (*twitch, wink, flap*)

Formally, this maximality can be characterised in terms of an operator MAX, which is based on Löbner's (1989, 1999) notion of the "S-phase". An eventuality e is maximal w.r.t. a predicate P if P holds for e but not for an e' of which e is a proper part:

$$(5) \quad \forall P \forall e. \text{MAX}(P)(e) \leftrightarrow P(e) \wedge \neg \exists e'. e \sqsubset e' \wedge P(e')$$

For example, the semantics of *cough* could be rendered as (6), if we abstract away from details not relevant here. If one wants to follow up on Dowty's (1979) research programme of modelling aspectual classes, in which he tried to assign to each aspectual class typical patterns of lexical decomposition with characteristic operators, one might postulate MAX as one of the aspectually relevant operators.

$$(6) \quad \lambda x \lambda e. \text{MAX}(\mathbf{make-noise}'(x))(e)$$

This definition is fully compatible with Talmy's (1985) intuition that two changes of state are involved in a semelfactive: Maximality of a P -phase entails that before and after this phase, $\neg P$ must hold.

The definition in terms of MAX makes semelfactives *telic* in the sense of Krifka (1998). For telic predicates, all parts of entities e in their extension are simultaneously an initial and a final part of e . I.e., telic predicates introduce eventualities with inherent temporal (but not necessarily spatial) boundaries:

$$(7) \quad \forall P. \text{TEL}(P) \leftrightarrow \forall e \forall e'. P(e) \wedge P(e') \wedge e' \sqsubseteq e \rightarrow \text{INI}(e', e) \wedge \text{FIN}(e', e)$$

What these decompositions do not capture, however, is the claim that semelfactives refer to very short eventualities, i.e., they do not incorporate any version of an aspectual feature of punctuality. However, this is deliberate, because there are two problems for such a feature.

First, there is the general problem of which parts of a larger sequence of eventualities are part of eventualities in the extension of a supposedly punctual predicate. Egg (2005) discusses this question for predicates like *die*: Is eventually fatal physical decay already part of dying, or does the verb only refer to the end of this decay, i.e., the eventual termination of all bodily and mental activities?

This problem is haunting analyses of semelfactives, too. For instance, Rothstein (2004) states that the characterisation of semelfactives as "punctual" seems to be too strict, because some semelfactives involve trajectories (e.g., of a foot for *kick*), which would introduce temporal extension and internal stages. Such an

analysis of *kick* would assign a richer semantic structure to it than my analysis in term of the operator MAX above. Thus, *kick* instantiates the very same problem discussed above for *die* and similar purported punctual predicates.

I think that my analysis in terms of MAX can be defended, which would also mean that this first problem does not arise for semelfactives. This will be illustrated for the example *kick*. Here the crucial question is: Does the movement of a foot towards a goal before making contact with it also belong to the eventualities in the extension of *kick*? My answer is that the traject of the foot is not part of the eventuality, but it is implied in that the momentum that figures in the definition of the semantics of *kick* is the result of a movement (otherwise, the application of force would have to be described as a push or a shove).

While this first general problem thus does not arise for semelfactives, there still is the second problem, the question of how to define minimal duration, even if we assume that “punctuality” is not a physical but a conceptual category. For instance, there is considerable leeway in the duration of a (singleton) flash, which intuitively does not affect its semelfactive status at all. In the same way, using the verb *cough* to describe a slo-mo recording of a cough would be perfectly fine (as pointed out by [Comrie 1976](#)) even though the described state of affairs would not be punctual (having temporal extension and even stages).

A third problem emerges if one wants to follow [Talmy \(1985\)](#) in decomposing the semelfactive into two subsequent changes of state (his “full-cycles”). Even if a change of state could be instantaneous, semelfactives would require minimally two instants, hence, could not be instantaneous themselves.

Therefore I suggest regarding punctuality not as an aspectual feature but as defeasible conceptual knowledge about the typical duration of events that is associated with predicates. See [Egg \(2005\)](#) for a worked out formalisation of this idea and [Bary & Egg \(2012\)](#) for an application to aspectual semantics and coercion.

If one regards the singleton use of semelfactives as basic, the iterative use of semelfactives emerges by *aspectual coercion* or *reinterpretation*. Such coercions introduce a suitable operator between an aspectually sensitive operator and its predicate argument that does not fulfill the aspectual selection restriction of the operator. In this way, an impending aspectual mismatch is avoided, e.g., for semelfactives that are the complement of *keep on* or are modified by durative adverbials like *for five hours* ([Talmy 1985](#); [Moens & Steedman 1988](#); [Smith 1991](#); [Egg 2005](#)).

Concretely, coercion for such syntactic structures with semelfactives introduces into their semantic representations an iterative operator ITER between a semelfactive argument and an aspectually sensitive functor like the durative adverbial *for five hours*. The functor selects for a cumulative argument, and the application of ITER to the semantic contribution of the semelfactive returns such a cumulative argument, which fulfils this selection restriction.

The formalisation of ITER is given in (8). In prose, *e* is a *P*-iteration iff it is

a minimal entity “ $\sqcup E$ ” that is (at least temporally) uninterrupted and contains the subeventualities of the iteration set E (such that P holds for each of these subeventualities):

$$(8) \quad \forall P \forall e. \text{ITER}(P)(e) \leftrightarrow \exists E. e = \sqcup E \wedge \forall e'. e' \in E \rightarrow P(e')$$

The motivation for the last condition on $\sqcup E$ is that when we measure the length of an iteration, the breaks between the subeventualities are taken into account, too. This can be illustrated by an attempt to express the fact that Amélie played the Moonlight Sonata every day in June by the sentences in (9). Even though (9)b sums up the lengths of the individual performances (each of which lasts approximately 15 minutes) appropriately, the adequate description is (9)a, which also considers the breaks in between:

- (9) a. *Amélie played the Moonlight Sonata for 30 days.*
 b. *Amélie played the Moonlight Sonata for 7.5 hours.*

After coercion, the semantic representation of the iterative use of *cough* would then be (10):

$$(10) \quad \lambda x \lambda e. \text{ITER}(\text{MAX}(\text{make-noise}'(x)))(e)$$

[2.2] The iterative analysis

In Rothstein’s (2004, 2008) analysis, the iterative interpretation of semelfactives is the basic one. E.g., for *cough*, its basic semantic contribution would roughly be represented by (10).

She considers the two uses of semelfactives to instantiate neither ambiguity nor aspectual coercion. Instead, the choice between the two uses emerges as a context-dependent specification of an underspecified lexical meaning. The singleton interpretation is a mere fringe case of this meaning, in which the iteration consists of only one single eventuality.

Consequently, the iterative operator is present even in this fringe case, which would make semelfactives cumulative.⁴ At the same time, semelfactives in iterative interpretation are not fully divisive; the singleton interpretation indicates the lower bound of divisivity. This means - and Rothstein argues - that semelfactives do not emerge as achievement predicates anymore. Due to their cumulativeness and limited divisivity, they can be grouped together with prototypical process or activity predicates such as *move*, *dance*, or *sing*.

Next, Rothstein points out that semelfactives (in iterative interpretation) and prototypical activity predicates are both iterative in some sense; e.g., *move* is

[4] Adjacency must be defined appropriately here, because e.g. for an iterative interpretation of *flash*, the phases of light must be interrupted by phases of darkness.

an iteration of minimal changes of location (Dowty 1979). She distinguishes the two groups of predicates in that only semelfactives are *naturally atomic*, i.e., have conceptually salient non-overlapping minimal eventualities. This condition is included in Landman's (2016) concept of "neatness". In contrast, minimal eventualities of typical activity predicates lack this property, e.g., the minimal changes of place as the foundation of (continuous) movement overlap and are not conceptually salient.

In a next step, Rothstein links natural atomicity to lexical accessibility by claiming that only minimal eventualities of naturally atomic predicates are lexically accessible, e.g., countable. Consider for instance the contrast in (11), where (11)a can refer to five single coughs but (11)b cannot refer to five minimal changes of location:

- (11) a. *Amélie coughed five times.*
 b. *Amélie moved five times.*

In sum, Rothstein's analysis captures both uses of semelfactives in one single reading, which is a very elegant and attractive solution.

Still, I feel that it is worth while reconsidering the definition of natural atomicity in terms of non-overlapping minimal events: There are process predicates that follow the pattern of (11)b but nevertheless seem to be analysable in terms of conceptually salient non-overlapping minimal events, for instance, *walk*. Although the minimal eventualities could be characterised as single steps here, *walk five times* refers to five iterations of taking steps, not to one single iteration with 5 steps.

Similarly, lexicalised iteratives in the class of process predicates, among them *tremble* and *jiggle*, clearly have minimal eventualities (roughly, specific back and forth movements). Still, *tremble five times* refers to five iterations of such movements only.

One might try to explain away this counterargument by pointing out that, at least under normal circumstances, one does not refer to, say, single jerks or twitches in terms of *jiggle* or *tremble*, respectively. And, if minimal jiggings or tremblings must comprise at least two jerks or twitches, these minimal eventualities would be overlapping, and, consequently, the predicates would not be naturally atomic.

However, one could explain this preference in terms of lexical competition, following a similar argumentation of Gyarmathy (2016) for Hungarian semelfactives: Pairs like *jiggle* and *jerk* or *tremble* and *twitch* form Horn scales, with *jerk* and *twitch* being the stronger alternatives, as they are restricted to an interpretation as singleton eventualities. Hence, using the weaker elements *jiggle* or *tremble* (which could refer to both singleton eventualities or iterations of these eventualities) implies that the stronger elements do not hold.

The preceding discussion argued that not all naturally atomic predicates denote eventualities with lexically accessible parts. The example of *stir* is a counter-example in the other direction. It is not naturally atomic because its minimal eventualities overlap (any completed round of 360 degrees would qualify), but these eventualities are accessible nevertheless and can be counted, as illustrated by a quote from a recipe for the Draught of Living Death (taken from *Harry Potter and the Half-Blood Prince*):

- (12) (i) *Add the infusion of wormwood.*
 (ii) *Add the powdered root of asphodel.*
 (iii) *Stir twice clockwise.*
 (iv) *Add the sloth brain.*
 (v) *Add the sopophorous bean's juice.*
 (vi) *Stir seven times anti-clockwise.*

The conclusion to be drawn from these examples is that natural atomicity is independent of lexical accessibility, and that accessibility is a lexical property that cannot be fully predicted.

Consequently, the property of lexical accessibility is orthogonal to natural atomicity in Rothstein's sense: Naturally atomic predicates can have it (*cough* in the iterative analysis) or not (e.g., *tremble*), similarly, naturally non-atomic predicates can have it (e.g., *stir*) or not (*move*). This property allows counting the elements of a single iteration by means of frequency adverbials like in one of the interpretations of (4). But at the same time this property entrenches the distinction between the class of activity predicates and the semelfactives, in contrary to Rothstein's original enterprise to classify semelfactives as activity predicates.

[3] SEMANTIC CONSTRUCTION WITH FREQUENCY ADVERBIALS

In this section, the modification of semelfactives by frequency adverbials like *five times* will be discussed. This discussion is motivated by the observation that the semantic construction for these expressions provides an environment in which the two proposed approaches to semelfactives as presented in the preceding section make different predictions and hence can be compared.

First, the semantic contribution of frequency adverbials of the type “*n times*” is specified in (13) as the operator “ ITER_n ”. This operator is based on the definition of ITER in (8). It introduces iterations with a fixed number of repetitions in that it specifies in addition the cardinality of the underlying set of eventualities E :

$$(13) \quad \forall n \forall P \forall e. \text{ITER}_n(P)(e) \leftrightarrow \exists E. |E| = n \wedge e = \bigsqcup E \wedge \forall e'. e' \in E \rightarrow P(e')$$

In prose, any e instantiating n times P is temporally uninterrupted and minimal w.r.t. containing n subeventualities in the extension of P .

The challenge for either analysis of semelfactives is semantic construction for (4). For the singleton analysis, the reading (14) with five iterations of coughs is challenging, and for the iterative analysis, the reading (15) with five single coughs:⁵

$$(14) \quad \lambda e. \text{ITER}_5(\text{ITER}(\text{MAX}(\text{make-noise}'(\mathbf{a}))))(e)$$

$$(15) \quad \lambda e \text{ITER}_5(\text{MAX}(\text{make-noise}'(\mathbf{a}))))(e)$$

The semantic representations highlight the difference between (14) and (15) in that the former but not the latter includes two iterations.

[3.1] *The singleton analysis*

This subsection will review the way in which the different analyses can handle the two readings of (4), starting with the singleton analysis. Here deriving the reading (15) of (4) with five single coughs is straightforward (applying ITER_5 to (6)).⁶

The derivation of the reading (14) with five iterations of coughs is less straightforward, however, as it comprises two iterations. Only one of them is introduced semantically (in the semantics of *five times*), which raises the question of where the other one comes from. Simply assuming an iterative coercion operator between adverbial and predicate would not suffice, though. If this operator is supposed to be more than a post hoc move, it must be motivated, and there is no impending aspectual clash to be avoided by such a move. Frequency adverbials are compatible with predicates from all aspectual classes (consider e.g. *be in the pub five times*), so any motivation for a coercion operator must stem from a different source.

I contend that the motivation lies in the attempt to *align information on the duration of an eventuality*. Temporal duration is expressed in particular in durative and time frame adverbials, but also through the typical duration of the eventualities denoted by predicates, which is given by conceptual knowledge. If adverbials and verb yield potentially conflicting information on the duration of an eventuality, this can trigger coercion irrespective of aspectual compatibility (Egg 2005; Bary & Egg 2012). For instance, temporal alignment uses an iterative operator in (16), which lengthens typical durations of predicates:

$$(16) \quad \textit{Amélie played the piano for years.}$$

[5] In the semantic representations of the remainder of this article, I will occasionally make use of η -equality ($\lambda e. P(e) \equiv P$, if e does not occur free in P) in order to facilitate reading.

[6] Here and in the following, the semantics of the subject *Amélie* is tacitly included in the form of the constant “ $\mathbf{a}$ ”.

A single instance of playing the piano has a typical duration of minutes or hours, but not days, weeks, months, or years. However, an iteration of such playing eventualities might well last years.

For our example (4) this means that the choice of readings can be influenced by temporal adverbials: Time frame adverbials can trigger an insertion of ITER for purposes of safeguarding alignment of duration information. For instance, in the following pair, the interpretation as an iteration of iterations should be more strongly preferred for the second element, which is *bourne out*:

(17) *Amélie coughed five times in the last minute.*

(18) *Amélie coughed five times in the last hour.*

In addition, this analysis would predict that lexicalised iteratives like *tremble five times* have no reading in which single eventualities are counted. Predicates like *tremble* lexically comprise an iteration, very roughly:⁷

(19) $\lambda x \lambda e. \text{ITER}(\text{MAX}(\text{move-bf}'(x)))(e)$

Hence, combining it with a frequency adverbial will always return an expression with two iterative operators, no reading is possible in which the underlying movements of a single act of trembling are counted. This automatic blocking of potential overgeneration is an advantage of the singleton analysis of semelfactives.

Finally, the singleton analysis must address the question of why semelfactives lend themselves so easily to iterative coercion. The answer is that iterating semelfactives is facilitated by the fact that the state of affairs immediately before and after such an eventuality (the “prestate” and “poststate” of Moens & Steedman 1988) must be identical, which in our analysis is modelled by the MAX operator. I.e., immediately before and after an eventuality in the extension of $\text{MAX}(P) \neg P$ must obtain. Compare this to change-of-state predicates, which introduce a change from $\neg P$ to P , hence, iterating them would presuppose the restoration of the prestate $\neg P$ between all the subeventualities of the iteration, which makes the assumption of iterative coercion less easy for them.

[3.2] *The iterative analysis*

For the iterative analysis of semelfactives, the challenge is the other way round: The derivation of (14) is straightforward (applying ITER_5 to (10)), it is the derivation of (15) that is challenging. The problem is that there is only one iterative operator in (15), but the verb and the adverbial each provide one in their semantic contribution. But intuitively, the frequency adverbial does not introduce an additional iteration in the reading modelled by (15), it merely counts the underlying

[7] Here “*move-bf*” is shorthand for moving out of a position and returning back to it.

eventualities of the iteration, which are accessible. This raises the question of how to do semantic construction, because, the underspecified approach of Rothstein needs to be augmented in some way to be able to derive a semantic representation for this reading.

To handle the interpretation of (4) with five eventualities in the iterative approach, one could assume a coercion operator that intervenes between the frequency adverbial and the predicate to “cancel out” the second iterative operator. Formally, this operator would be a function from predicates P to the set of P -atoms, where P -atoms are defined as entities in the extension of P no proper part of which is likewise in the extension of P (Krifka 1998):

- (20) a. $\lambda P \lambda e. \text{ATOM}(P)(e)$
 b. $\forall P \forall e. \text{ATOM}(P)(e) \leftrightarrow P(e) \wedge \neg \exists e'. e' \sqsubset e \wedge P(e')$

Thus, (21), the semantics of (4) with five iterations of knocks, can be derived by applying ITER_5 to (10). The semantics of (4) with five single knocks emerges by applying ITER_5 to the result of applying (20)a to (10), as in (22). Here the frequency adverbial reports on the number of singleton eventualities of coughing, because atomic iterations are singleton eventualities. Consequently, (22) is equivalent to (15).

- (21) $\lambda e. \text{ITER}_5(\text{ITER}(\text{MAX}(\text{make-noise}'(\mathbf{a}))))(e) = (14)$

- (22) $\lambda e. \text{ITER}_5(\text{ATOM}(\text{ITER}(\text{MAX}(\text{make-noise}'(\mathbf{a}))))(e)$

To sum up, either analysis can handle one of the two interpretations of (4) directly and needs to assume a phonologically not visible operator for the other interpretation.

Still, there are two aspects in which the singleton analysis emerges as the more preferable one. First, assuming (24)b as a coercion operator in English would not be straightforward in that it would operate in a different way from other operators: The effect of ITER would be merely the cancellation of lexically introduced semantic material, while normally, coercion operators contribute additional material.⁸

What is more, assuming such an aspectual coercion for English raises the question of how to restrict it appropriately. In particular, we need to prevent the derivation of non-attested readings of *tremble five times* and the like, which have no readings where singleton eventualities are counted. For instance, *tremble five*

[8] At this point, it seems in order to mention as seeming counterexamples analyses of the progressive that assume coercion operators “stripping off” the culmination, e.g., Moens & Steedman (1988) or Parsons (1990). However, the ongoing discussion of the “imperfective paradox” demonstrates that the culmination is in fact not removed, only its status w.r.t. factivity changes, see e.g. Landman (1992) or Bonomi (1997), to name but a few.

times cannot refer to a single act of trembling with five underlying minimal movements, as expressed in (23):

$$(23) \quad * \lambda x \lambda e. \text{ITER}_5(\text{ATOM}(\text{ITER}(\text{MAX}(\text{move-bf}(x)))))(e)$$

Thus, the application of ATOM to the semantics of *tremble* must be blocked. Such a restriction could not fall back on the property of natural atomicity, because *tremble* is naturally atomic. The only way out here would be recourse to the property of (not) applying to singleton entities in the iteration, which *tremble* lacks. However, this presupposes that there is a difference between predicates like *tremble* and those like *cough*, which is best modelled in terms of an aspectual distinction between activity predicates and semelfactives.

In sum, semantic construction for frequency adverbials modifying semelfactives shows that the singleton approach to semelfactives is more advantageous. But in order to obtain further insights into the question of how to interpret semelfactives, it seems advisable to extend the perspective to at least some languages that possess a richer verbal morphology than English in order to search for morphological evidence for the operators sketched in the last two subsections. Relevant data from two such languages, viz., Russian and Hungarian (the latter in a much more preliminary manner), will be discussed in the next subsection.

[3.3] *Semelfactives and iteratives in Russian and Hungarian*

In Russian, a singleton interpretation can be indicated morphologically. For instance, in “prototypical semelfactives” (Dickey & Janda 2009), the verbal affix *nu-* is used for this purpose (Makarova & Janda 2009), like in *kašlja-nu-t* ‘cough once’, which contrasts with *kašljat* ‘cough repeatedly’.⁹ The suffix *nu-* strongly prefers unbounded extended stems that express iterations of (typically very short) “quanta of a situation” (Dickey & Janda 2009), in other words, stems that are naturally atomic in the sense of Rothstein. Nesset (2013) points out that these “quanta” do not introduce an explicit change of state.

In combination with frequency adverbials, both forms are acceptable, but they have different interpretations, which allows expressing either reading of (4) explicitly:

- (24) a. *pjat’ raz kašljat* ‘cough repeatedly five times’
 b. *pjat’ raz kašljanut* ‘cough five times’

This suggests that *nu-* is a visible version of the operator with the meaning (20)a, which maps predicates *P* to the set of their *P*-atoms. The derivation of the semantics of the examples in (24) follows the patterns sketched above for the

[9] There is a variant *anu-* of *nu-*, which is often considered to contribute an addition flavour of “intensive-ness”, see Makarova & Janda (2009) for details.

iterative interpretation of semelfactives. To derive the semantics of (24)a, ITER₅ is applied to (10), which returns (21). For the semantics of (24)b, we apply ITER₅ to the result of applying (20)a to (10), and receive (22).

Consequently, the effect of this operator, by mapping iterative predicates onto semelfactives, seems to be in line with, and to support the iterative analysis as it was suggested in Rothstein's account of semelfactives.

However, the situation in Russian is more complex, first because of an additional affix, the prefix *s-*, which is used to form semelfactives, too. In such semelfactives, however, the verbal bases do not express iterations of small eventualities, consider for instance *s-letet* 'fly to a specific location and return', whose base is *letet* 'fly'. Even if the verb introduces natural atomicity, like in *s-xodit* 'walk to a specific location and return', whose base is *xodit* 'walk', the affix does not fall back on the level of atomicity (i.e., single steps) but introduces an external criterion of atomicity, which is not inherent in the verb. Thus, *s-* introduces rather than presupposes natural atomicity. As a consequence, it can also be attached to other verb stems, e.g., ones that describe a kind of behaviour like *grubit* 'be rude', to form verbs that describe an action that instantiates this behaviour, here, *s-grubit* 'perform a rude action'.

Nesset (2013) shows that the (historically older) affix *nu-* is also increasingly used to form semelfactives that lack an iterative base, a tendency emerging in particular in non-standard Russian (Sokolova 2015). The resulting semantic overlap between the two affixes motivates Dickey & Janda (2009) to analyse them as (not completely complementary) morphologically conditioned allomorphs.¹⁰ Nesset (2013) describes the history of Russian semelfactive affixes as a development from the "prototypical" cases to a more general word-formation device that introduces what one could call suitably "portions" of an eventuality that in itself does not possess inherent boundaries. While the "portioning" may fall back on inherent atomicity like *kašlja-nu-t'* 'cough once', this is no longer necessary.

Reformulating this development in terms of the analyses of semelfactives discussed in this paper, it is a development away from a situation describable in terms of the iterative approach, in which semelfactives were derived from iteratives, to a situation, in which the semelfactive is independent of underlying iterativity, which fits in with the singleton analysis of semelfactives. Also, we note that the Russian evidence supports the observation that semelfactives do not introduce a change of state and may vary in length (hence cannot be characterised as "punctual").

Hungarian likewise does not present a uniform picture with respect to semel-

[10] They put the distribution of these affixes down to a mixture of factors, in particular, the conjugation type and the semantic class of the verb. Since verb stem class and semantic class are interdependent themselves, affix distribution depends on both. Makarova & Janda (2009) claim that phonological factors influence the distribution of semelfactive affixes, too. The semantic overlap of the affixes also shows up in doublets like *s-xvastat'* and *xvast-nu-t'*, both of which mean 'boast once' (Dickey & Janda 2009).

factives. Iteratives may be formed from semelfactives with the affix *-gAt*,¹¹ e.g., *kacsint-gat* ‘wink repeatedly’ from *kacsint* ‘wink (once)’. But the perfective marker *meg-*, which is used to introduce an inherent final boundary, e.g., in *meg-épít* ‘build’, see Kiss 2011 for details) may also be used to derive semelfactives from suitable iteratives, e.g., in *meg-kapar* ‘scratch’. In addition, semelfactives and iteratives can sometimes be derived from the same stem with different suffixes, compare e.g. *köh-int* ‘cough (once)’ and *köh-ög* ‘cough repeatedly’ (Gyarmathy 2016).

At a first glance, this suggests that the iterating operator ITER is expressed in the affixes *-gAt* and *-Og*, which suggests semantic composition along the lines of the singleton approach. However, there are also morphologically marked semelfactives like *meg-épít* and *köh-int*. Especially for the general perfectivising marker *meg-*, further research is called for in order to explain why it can introduce semelfactivity into the semantics of *meg-kapar* and the like. Consequently, the case of Hungarian cannot as yet be adduced as evidence to contribute to a comparison between the singleton and the iterative approach to semelfactives.¹²

In sum, the evidence from Russian and Hungarian corroborates the insight that semelfactives and iteratives are closely related. Still, the evidence does not yet yield conclusive evidence in favour of either of the two approaches to semelfactives that were compared in this paper. For English semelfactives, their interpretation in the context of modification by frequency adverbials suggests a preference for the singleton approach.

[4] CONCLUSION

To sum up, the paper presented and compared two analyses of semelfactives. The first one was the singleton analysis, which regards them as referring to typically quite short eventualities that have inherent boundaries but do not introduce a change of state. Here an additional iterative coercion operator must be assumed to derive the fact that semelfactives can refer to whole series of such eventualities in specific contexts, for instance, the progressive.

In contrast, the iterative analysis of semelfactives needs to assume a minimising coercion operator that cancels out iteration in order to model the fact that a combination of a semelfactive with a frequency adverbial may refer to one series of eventualities only, in which the adverbial counts the number of the eventualities in the series.

The paper argued for the first of the two analyses, claiming that the iterative use of semelfactives is either due to processes of lexical construction or to aspectual coercion.

As a next step, it seems advisable to continue investigating semelfactives by

[11] Due to vowel harmony, the vowels in the affixes may be realised in different ways, which is indicated by the capital letters.

[12] See also Gyarmathy (2016) for a detailed account on semantic differences between the affixes.

analysing in detail data from further languages, in particular, those with a richer verbal morphology. Furthermore, proposed analyses for semelfactives and related iteratives need to be tested along the lines of [Bott & Gattnar \(2015\)](#); [Piñango & Deo \(2016\)](#): If, like claimed in the present paper, expressions like e.g. *cough for five hours* are indeed the result of aspectual coercion (rather than contextual restriction of a lexically underspecified item), their processing should be more costly than the processing of non-coerced expressions, and the additional processing effort should be demonstrable experimentally.

REFERENCES

- Bary, Corien & Markus Egg. 2012. Variety in Ancient Greek aspect interpretation. *Linguistics & Philosophy* 35. 111–134.
- Bonomi, Andrea. 1997. The progressive and the structure of events. *Journal of Semantics* 14. 173–205.
- Bott, Oliver & Anja Gattnar. 2015. The cross-linguistic processing of aspect – an eyetracking study on the time course of aspectual interpretation in Russian and German. *Language, Cognition and Neuroscience* 30. 877–898.
- Comrie, Bernard. 1976. *Aspect*. Cambridge: Cambridge University Press.
- Dickey, Stephen & Laura Janda. 2009. *Xoxotnul, sxitrl*: the relationship between semelfactives formed with -nu- and s- in Russian. *Russian Linguistics* 33. 229–248.
- Dini, Luca & Pier Marco Bertinetto. 1995. Punctual verbs and the linguistic ontology of events. *Quaderni del Laboratorio di Linguistica* 7. 123–160.
- Dowty, David. 1979. *Word meaning and Montague grammar*. Dordrecht: Reidel.
- Egg, Markus. 2005. *Flexible semantics for reinterpretation phenomena*. Stanford: CSLI Publications.
- Gyarmathy, Zsófia. 2016. Semelfactives in English and in Hungarian: A countability-based analysis. In *Proceedings of IATL* 32, 57–76.
- Kiss, Katalin. 2011. Contributions to the analysis of activity verbs and telicity marking in English and Hungarian. *Argumentum* 7. 107–120.
- Krifka, Manfred. 1998. The origins of telicity. In Susan Rothstein (ed.), *Events and grammar*, 197–235. Dordrecht: Kluwer.
- Landman, Fred. 1992. The progressive. *Natural Language Semantics* 1. 1–32.

- Landman, Fred. 2008. 1066. On the differences between the tense-perspective-aspect systems of English and Dutch. In Susan Rothstein (ed.), *Theoretical and cross-linguistic approaches to the semantics of aspect*, 107–166. Amsterdam: Benjamins.
- Landman, Fred. 2016. Iceberg semantics for count nouns and mass nouns: classifiers, measures and portions. *Baltic International Yearbook of Cognition, Logic and Communication* 11. 1–48.
- Löbner, Sebastian. 1989. German *schon* - *erst* - *noch*: an integrated analysis. *Linguistics & Philosophy* 12. 167–212.
- Löbner, Sebastian. 1999. Why German *schon* and *noch* are still duals: a reply to van der Auwera. *Linguistics and Philosophy* 22. 45–107.
- Makarova, Anastasia & Laura Janda. 2009. Do it once: a case study of the Russian -*nu*- semelfactives. *Scando-Slavica* 55. 78–99.
- Moens, Marc & Mark Steedman. 1988. Temporal ontology and temporal reference. *Computational Linguistics* 14. 15–28.
- Neset, Tore. 2013. The history of the Russian semelfactive: the development of a radial category. *Journal of Slavic Linguistics* 21. 123–169.
- Parsons, Terence. 1990. *Events in the semantics of English*. Cambridge: MIT Press.
- Piñango, Maria Mercedes & Ashwini Deo. 2016. Reanalyzing the complement coercion effect through a generalized lexical semantics for aspectual verbs. *Journal of Semantics* 33. 359–408.
- Rothstein, Susan. 2004. *Structuring events: an essay on the semantics of lexical aspect*. Oxford: Blackwell.
- Rothstein, Susan. 2008. Two puzzles for a theory of lexical aspect. In Johannes Dölling, Tatjana Heyde-Zybatow & Martin Schäfer (eds.), *Event structures in linguistic form and interpretation*, 175–197. Berlin: de Gruyter.
- Smith, Carlota. 1991. *The parameter of aspect*. Dordrecht: Reidel.
- Sokolova, Svetlana. 2015. “rabotnul na slavu-gul’ni smelo!”: -*nu*-as a universal aspectual marker in non-standard russian. In Mitsushi Kitajo (ed.), *Aspektual’naja semanticheskaja zona: tipologija sistem i scenarii diakhronicheskogo razvitija. Sbornik statej V Mezhdunarodnoj konferencii Komissii po aspektologii Mezhdunarodnogo komiteta slavistov*, 271–277. Kyoto: Tanaka Print.

- Talmy, Leonard. 1985. Lexicalization patterns: semantic structure in lexical forms. In Timothy Shopen (ed.), *Language typology and syntactic description vol. 3: Grammatical categories and the lexicon*, 55–149. New York: Cambridge University Press.
- Vendler, Zeno. 1967. Verbs and times. In Z. Vendler (ed.), *Linguistics in philosophy*, 97–121. New York: Cornell University Press.

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