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NATURALLY ATOMIC ER-NOMINALIZATIONS *

ABSTRACT

German *er*-nominalizations, as *er*-nominalizations in other languages, productively denote the external argument of the underlying verb. I show that German has one further type of *er*-nominalizations which does not denote entities but events. These event-denoting *er*-nominalizations turn out to be restricted to one specific type of verbal base, namely semelfactives which have been characterized in the literature as expressing ‘naturally atomic’ events. Crucially, within the class of semelfactives, the derivation of event-denoting *er*-nominalizations is fully productive. The goal of the paper is twofold: on the one hand, it presents the relatively unknown case of event-denoting *er*-nominalizations in German and, on the other hand, it investigates the relation between the *er*-morpheme building external argument denoting nominalizations and the *er*-morpheme building event-denoting nominalizations. Specifically, it explores the semantic and syntactic consequences of the hypothesis that the two types of *er*-nominalizations involve one and the same nominalizer albeit in different syntactic contexts.

KEYWORDS

er-nominalization, semelfactive verb, natural atomicity, event denoting, entity denoting.

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1. Introduction: Entity-denoting *-er* nominalizations

The literature on *er*-nominalizations has established the so-called ‘external argument generalization’: These nominals typically denote the external argument of the underlying verb irrespectively of the specific θ -role which this argument has (Rappaport Hovav & Levin 1992; Fabb 1984; Keyser & Roeper 1984; van Hout & Roeper 1998 among others). That is, we find agent and instrument *er*-nominalizations but also *er*-nominalizations denoting other types of external arguments such as causer, holder or experiencer as illustrated in (1) for English.¹

(1)	a. He is a teacher.	(agent)
	b. This is a can-opener.	(instrument)
	c. Anger is a great diffuser of pent-up emotions.	(causer)
	d. He is a holder of a Visa or Master card	(holder)
	e. He is a lover of French cuisine.	(experiencer)

Across Germanic and Romance languages, the formation of external argument-denoting *er*-nominalizations is a fully productive derivational process. It was observed, however, that not all *er*-nominalizations obey the external argument generalizations. The examples in (2) seem to denote the theme, *i.e.* the internal argument of the underlying predicate.

(2)	a. baker	(a baked potato)
	b. broiler	(a broiled chicken)
	c. scratcher	(a lottery ticket that is scratched)
	d. bestseller	(something that sells well)

Nominals such as in (2) have an interpretation that is close to the interpretation that the base verb receives in the middle construction. Thus, it was proposed that these nominals are in fact derived from the middle versions of the underlying verbs where the theme (the argument denoted by the *er*-nominals in (2)) is the (either base generated or derived) subject of the verb (Booij 1986; Rappaport Hovav & Levin 1992; Heyvaert 1998; 2003).

Besides object-denoting *er*-nominals, we also find *er*-nominals denoting the complement of a preposition modifying the verb (where the preposition is often locational). For these types of *er*-nominals, it was also proposed

1. I leave aside the difference between [+eventive] and [-eventive] *er*-nominals and its relation to the presence of complement structure that was established by Rappaport Hovav & Levin (1992). See Alexiadou & Schäfer (2010) for some further discussion.

that they can be subsumed under a middle-kind of analysis (at least in Dutch, Heyvaert 1998; 2003).

(3)	a. diner	(a place to dine in)
	b. sleeper	(a train where one can sleep in)
	c. toploader	(a washing machine)

While examples as in (2) and (3) can be found in English and Dutch, they seem to be quite rare in German.² A reason for this difference could be that English and Dutch form morphologically unmarked middles while German marks its middles with the reflexive pronoun '*sich*' (cf. Schäfer 2006; 2008 for a proposal which correlates this difference in morphological marking with a difference concerning the syntactic position of the theme in middles; in Dutch and English middles, the theme is a (derived) external argument in Spec,vP, while in German middles, it remains in its VP-internal base position).³ It should, however, be noted that even in languages that allow the kind of *-er* nominalizations in (2) and (3), their formation is certainly not fully productive but such a nominal has to be accepted in the language community in order to be understood in the right way.⁴ A speaker cannot arbitrarily form an *er*-nominal with the intention that this nominal denotes the object of the underlying verb (or the object of a verbal preposition) while this is always possible if the *er*-nominal is ought to denote the external argument of a verb. That is, while virtually every verb projecting an external argument allows an *er*-nominal denoting this external argument, only a small subset of verbs allows *er*-nominals to denote the internal argument. This suggests that object-denoting *er*-nominals are (in fact need to be) lexicalized.

Finally, we can also find *er*-nominals with adjectival stems (*foreigner*, *loner*), prepositional stems (*upper*, *downer*, *insider*), denominal stems (*porker*, *Londoner*, *villager*) or derived from measure words (*fiver*) (see Ryder (1999) for a collection of such examples).⁵ Once again, it should be noted that such

2. Some examples exist such as the German counterpart of (3c) and loanwords like 'bestseller'.

3. But see Cabredo Hofherr (2000) who argues that the theme in German middles is an external argument.

4. Many of the object-denoting *er*-nominals in English are from specific verbal subclasses (cooking verbs or clothing verbs).

5. The literature sometimes provides examples of *er*-nominals derived from alleged unaccusative verbs. But these examples involve verbs that can be reanalyzed as unergatives in the right contexts. Such contexts typically assign control to the only argument of the verb as in the examples below (from Ryder 1999), where the *er*-nominals are paired with professional nouns or adjectives.

derivations are not fully productive in that we cannot use any adjective, preposition or noun to form a corresponding *er*-nominal. This does not mean that there are no interesting generalizations to be made about what kind of non-verb derived *er*-nominals are possible or not. As an example, noun-derived *er*-nominals are clearly restricted by the semantics of the noun; while some noun classes do not allow *er*-formation at all (e.g. animals: **doger*, **cater*, **birdier*), other noun classes are persistently compatible with *er*-formation and then, the reading these nouns receive is clearly determined by a stereotypical pattern. For example, *er*-nominals derived from nouns denoting civilizing places (cities, villages, countries ...) denote people who live at this place (but not people who just work there, or have any other relation to the place).⁶ Similarly, German *er*-nominals derived from company names denote the employees but not the people who, for example, buy the products of this company (e.g. *Bank-er*, *BMW-ler*, *IBM-er*, ...).

To conclude, while the class of *er*-nominalizations which do not denote the external argument of a verb is certainly interesting and amenable to specific generalizations, it seems fair to say that only the formation of external argument-denoting *er*-nominalizations is really a productive derivational process within and across languages.⁷

In the next section, I turn to a further type of verb-derived *er*-nominals in German. While this type is restricted in productivity in that it is possible only with verbs from a very specific class, it turns out that, within this class, its formation is highly productive.

-
- (i) a. I swear, the moment I need to talk to Max, he's suddenly gone. I'm beginning to think he is a professional *vanisher*, not a lawyer.
 - b. So many old melodramas end in deathbed scenes that the actors who played in them had to be good *dyers*.

The German examples below suggest the same analysis:

- (ii) a. 'Umfaller' (fall down-er) is not someone who is fainting but someone who agentively gives up his old opinion.
- b. 'Abfaller' (fall away-er) is not something which physically falls apart, but again someone who agentively changes his affiliation with a group, party or idea.

6. Again, languages differ in productivity. English allows it only with nouns denoting cities or villages (*London-er*, *New York-er*, ...), German allows it also with many nouns denoting countries (*Engländ-er*, *Italien-er*, ...).

7. Therefore, Alexiadou & Schäfer (2010) propose to relate the difference between external argument-denoting *er*-nominalizations and the other *er*-nominalizations to the difference between root-derived and non-root-derived nominals in the framework of Distributed Morphology.

2. Event-denoting *er*-nominals

In this section, I discuss a further type of *er*-nominalizations which I call ‘event-denoting *er*-nominalizations’. Event-denoting *er*-nominalizations are, as far as I know, restricted to German. While the existence of this type of nominalizations has been acknowledged sometimes in the literature in passing (*e.g.* Fanselow 1985), it has (once again, to my knowledge) never been discussed in detail. Especially, the restrictions on the formation of event-denoting *er*-nominalizations have not been discussed.

As an illustration, look at the two examples in (4) and (5). These examples are ambiguous between a reading where the nominal denotes the external argument of the underlying verb (a) and a reading where the nominal denotes the event of the underlying verb (b). Importantly, the event reading expresses something like a ‘minimal event’: (4b) describes one single jumping cycle which starts when a person’s feet leave the ground and stops as soon as the feet touch the ground again. Similarly, (5b) expresses one short beeping sound. Note that English *er*-nominalizations only have the external argument-denoting reading while the event-denoting reading surfaces with zero-morphology.

- (4) ein Hüpfen
 - a. a jumper (a person who jumps)
 - b. a jump (a/one jumping event)

- (5) ein Piepsen
 - a. a beeper (an agent who beeps)
 - b. a beep (a/one beeping event)

The formation of event-denoting *er*-nominals is not an idiosyncratic phenomenon restricted to a small number of verbs.⁸ Instead, it turns out that it is highly productive within a specific, well-defined class of verbs. As a first approximation, we find them within the following semantic verb classes (using the terminology of Levin 1993).

- (6) a. Verbs of contact by impact
- b. Verbs of (light/sound/substance) emission
- c. Verbs of manner of motion and body internal motion

However, being a member of these classes is not sufficient. A closer inspection of the verbs within these three classes reveals that a verb must have a ‘semelfactive’

8. I identified more than 100 verbs that form event-denoting *er*-nominals.

use in order to be able to form an event-denoting *er*-nominal. Before I show this, I shortly introduce one proposal in the literature to characterize semelfactives.

2.1. Semelfactives

According to Rothstein (2007; 2008), semelfactives are verbs denoting ‘single occurrence’ events. In addition, these verbs are homonymous with activity verbs denoting iterations of the single event. For example, the verb ‘*knock (on the door)*’ can either have a semelfactive reading where an object is brought in contact sharply with a door once, or it can have an activity reading which expresses an iteration of the single event, *i.e.* an object is brought in contact sharply with a door a number of times. More specifically, Rothstein proposes that activities are derived from semelfactives by the operation of s(ingular)-summing below.

- (7) S-summing (Rothstein 2007): (singular summing) sums activity events with no temporal gap between them and forms a new singular event out of this sum.

S-summing is the operation forming activities. All semelfactive predicates have in addition an activity reading but not all activity predicates have a semelfactive reading. Rothstein (2008: 46) explains the differences and similarities between semelfactives and activities on the basis of a comparison of the two predicates *skip* and *walk* (the highlighting is mine):

Events in the denotation of the activity predicates *skip* and *walk* are formed by S-summing from minimal events of *skipping* and *walking*. These predicates denote, respectively, the set of skipping and walking events closed under S-summing. The difference between them is that minimal events of skipping are **naturally indivisible** or **naturally atomic**, while minimal events of walking are not. [...] When the minimal events in the denotation of an activity predicate P are naturally atomic, or naturally indivisible, then they are lexically accessible. [...] A predicate P is naturally atomic if what counts as one instance of P is given as part of the meaning of P and is thus not context dependent. [...] A naturally atomic entity is one whose unit structure is perceptually salient and given by the world.

As mentioned, all semelfactive predicates have, in addition, an activity use but not all activities also have a semelfactive use. The property of semelfactives to be naturally atomic allows us to identify systematic differences between the two types of predicates (*cf.* Rothstein 2007).

Semelfactives (8a, b) can be counted in two ways: counting adverbials can count either the single event (the semelfactive version) or the s-summed iterations of the predicate (the activity version). With pure activities (8c) only extended events can be counted because the single event is not naturally atomic, *i.e.* it is not lexically accessible.

- (8) a. John knocked twice. (ambiguous)
 b. John jumped three times. (ambiguous)
 c. She walked three times. (not ambiguous)

Semelfactives can be iterated in two ways: *Again and again* can modify either the single event or the activity predicate. In the case of activities, only the extended event can be iterated. This leads to different implications about the time course of the iterated events. Naturally atomic events can be iterated without a break between the individual events. (9a) can, therefore, be understood as process which is ongoing for some time. With activities, which do not involve naturally atomic events, the iteration implies that there must be a temporal gap between the individual activity phases. (9b), therefore, cannot be understood as a process ongoing for some time.

- (9) a. She jumped again and again. → She jumped for several minutes.
 b. He ran again and again. ↗ He ran for several minutes.

In the next section, I apply such tests to the verbal classes identified in (6). As it turns out, only semelfactive verbs within these classes allow the formation of event-denoting *-er* nominalizations.

2.2. Event-denoting *-er* nominalizations denote semelfactive events

Table I lists a number of *er*-nominalizations derived from ‘verbs of contact by impact’. All the examples in the left column have two interpretations; they either denote the external argument of the underlying verb or the (minimal) event expressed by the verb (only the latter reading is indicated in the table). The examples in the right column, on the other hand, are not ambiguous. They only allow for the external argument-denoting interpretation but lack the event-denoting reading (indicated by the asterisks in front of the examples in the table).

<i>Semelfactives</i>		<i>Activities</i>	
Klopfen	(a knock)	*Hämmerer	(hammering-event)
Aufprallen	(a bounce)	*Prügler	(a birching event)
Piekser	(a prick)	??Stampfer	(stamping event)
Schubser	(a jostle)	*Drücker	(pressing-event)
Stupser	(a nudge)	??Beisser	(a biting event)
Rempler	(a jostle)	*Schieber	(pushing-event)
Anrempler	(a jostle)	*Quetscher	(a squeezing event)

Table I: Verbs of contact by impact

A closer inspection of table I reveals that the verbs underlying the nominals in the left column are semelfactives while the verbs underlying the nominals in the right column are activities. This is illustrated with two verbs, ‘*klopfen*’ (to knock) and ‘*hämmern*’ (to hammer) which clearly differ with respect to the tests introduced above.

If we count the event as in (10), we get an ambiguous result with ‘*klopfen*’ (either an atomic event or an extended event is counted) but not with ‘*hämmern*’ (only an extended event can be counted).

- (10) a. Er klopfte dreimal. (ambiguous)⁹
 He knocked three-times
 b. Er hammertoe dreimal. (not ambiguous)
 He hammered three-times

If we add iterative adjuncts like ‘*immer wieder*’ (lit.: always again) or ‘*wieder und wieder*’ (again and again), ‘*klopfen*’ is again ambiguous (11a); either the atomic event or the extended activity is iterated. The verb ‘*hämmern*’ in (12a) does not show this ambiguity; only the extended event can be iterated. This difference between ‘*klopfen*’ and ‘*hämmern*’ is stressed by the fact that only the iterated semelfactive event in (11a) is logically compatible with (11b) which involves an atelic temporal modifier. The iterated activity event in (12a) is logically not compatible with (12b) which again involves an atelic temporal modifier. The reason is that the atelic modifier suggests that the agent acts without a break but only a naturally atomic event can be iterated without an interruption. If we want to iterate an extended event, we have to assume that there is a break between the

9. The verb ‘*anklopfen*’ (at-knock), in contrast, is an activity and, in turn, the *er*-nominalization does not allow for the event-denoting interpretation.

(i) *Anklopfer (a knocking-at (the door) event)

individual extended events, as otherwise we could not identify the beginning or the end of the individual extended events; but this interrupted scenario cannot be described with a ‘for some time’-adverbial. The c-examples show the same (in)compatibility between iterated events and modifiers which suggest that the agent acted without a break; again, the semelfactive verb in (11c) gives much better results than the pure activity verb in (12c).

- (11) a. Er klopfte wieder und wieder. (ambiguous)
 He knocked again and again (→)
 b. Er klopfte eine Zeit lang (am Stück/ohne Pause).
 He knocked some time long (at a stretch/without interruption)
 c. Er klopfte wieder und wieder ohne Unterbrechung.
 He knocked again and again without interruption
- (12) a. Er hämmerte wieder und wieder. (not ambiguous)
 He hammered again and again (↔)
 b. He hämmerte eine Zeit lang (am Stück/ohne Pause).
 He hammered some time long (at a stretch/without interruption)
 c. #Er hämmerte wieder und wieder ohne Unterbrechung.
 He hammered again and again without interruption

Table II lists a number of *er*-nominalizations derived from (different types of) ‘verbs of emission’. Again, the examples in the left column are ambiguous, denoting either the external argument of the underlying verb or the event expressed by the underlying verb, while the examples in the right column only allow for the external argument-denoting reading but lack the event-denoting reading.

<i>Semelfactives</i>		<i>Activities</i>	
?Aufblitzer	(flashing-event)	*Leuchter	(a shining event)
Piepser	(a beep)	*Blinker	(a flashing event)
Klopfer	(a knock)	*Funkeler	(a sparkling event)
Rülpser	(a belch)	*Pieper	(a puling event)
Quietscher	(a jar)	*Schreier	(a shouting event)
Krächzer	(a caw)	*Rauscher	(a swoosh)
Juchzer	(a crow)	*Summer	(a buzzing)
Träufler/Tropfer	(a drop)	*Rassler	(a rattling)
Spritzer	(a splash)	*Bluter	(a bleeding event)

Table II: Verbs of emission

Once again, the verbs underlying the nominalizations in the left column but not the verbs underlying the nominalizations in the right column are semelfactives. This is illustrated exemplarily below. The examples in (13)–(15) show that the sound-emission verb ‘*piepsen*’ (to beep) is a semelfactive verb while ‘*summen*’ (to buzz) is an activity verb.

- (13) a. Er piepste dreimal. (ambiguous)
 He beeped three-times
 b. Er summte dreimal. (not ambiguous)
 He buzzed three-times
- (14) a. Er piepste wieder und wieder. (ambiguous)
 He beeped again and again (→)
 b. Er piepste eine Zeit lang (am Stück/ohne Pause).
 He beeped some time long (at a stretch/without interruption)
 c. Er piepste ohne Unterbrechung wieder und wieder.
 He beeped without interruption again and again
- (15) a. Er summte wieder und wieder. (not ambiguous)
 He buzzed again and again (→)
 b. Er summte eine Zeit lang (am Stück/ohne Pause).
 He buzzed some time long (at a stretch/without interruption)
 c. #Er summte ohne Unterbrechung wieder und wieder.
 He buzzed without interruption again and again

The same contrast can be found with the light-emission verbs in (16)–(18).¹⁰ ‘(Auf-) *blitzen*’ (to flash) which allows for the formation of an event-denoting *er*-nominalization is a semelfactive while ‘*leuchten*’ (to shine) which does not allow for an event-denoting *er*-nominalization is an activity.

- (16) a. weil die Lampe dreimal (auf-)blitzte. (ambiguous)
 as the lamp three times flashed
 b. weil die Lampe dreimal leuchtete. (not ambiguous)
 as the lamp three times shined

10. A reviewer has problems with the categorization of the light-emission verb ‘*blinken*’ (to blink/flash) in Table II as an activity lacking a semelfactive use. I admit that ‘*blinken*’ is a tricky case but, nevertheless, I claim that it necessarily involves iterated light emission. If I am wrong and the verb ‘*blinken*’ generally allows for a semelfactive use then I cannot explain why the *er*-nominalization ‘*Blinker*’ lacks an event-denoting use. Note, however, that this would weaken only one direction of my generalization. There would still be no event-denoting *er*-nominalization from a verb that lacks a semelfactive use.

- (17) a. weil die Lampe wieder und wieder (auf-)blitzte. (ambiguous)
 as the lamp again and again flashed (→)
 b. weil die Lampe eine Zeit lang (ohne Pause) (auf-)blitzte.
 as the lamp some time long (without stop) flashed
 c. weil die Lampe ohne Pause wieder und wieder (auf-)blitzte.
 as the lamp without stop again and again flashed
- (18) a. weil die Lampe wieder und wieder leuchtete. (not ambiguous)
 as the lamp again and again shined (→)
 b. weil die Lampe eine Zeit lang (am Stück/ohne Pause) leuchtete.
 as the lamp some time long (at a stretch/without stop) shined
 c. #weil die Lampe ohne Pause wieder und wieder leuchtete.
 as the lamp without stop again and again shined

Finally, table III lists *er*-nominalizations from ‘verbs of manner of motion’ and ‘verbs of body internal motion’. Again, the examples in the left column are ambiguous, denoting either the external argument of the underlying verb or the event expressed by the underlying verb, while the examples in the right column only allow for the external argument-denoting reading but lack the event-denoting reading.

Semelfactives		Activities	
Wackeler	(a wiggling event)	*Schütteler	(shaking event)
?Stakser	(a stalker)	*Torkler	(a tottering event)
Hüpfer	(a hopper)	*Rutscher	(a slip)
Hopser	(a hopper)	*Schlitterer	(a sliding event)
?Stolperer	(a stumble)	*Gleiter	(a sliding event)
?Schlenkerer	(a swing)	*Roller	(a rolling event)
?Schwenker	(a swing)	??Wirbler	(a spinning event)
Dreher	(a turn)	??Schaukeler	(a swinging event)

Table III: Verbs of manner of motion and body internal motion

Again, what is relevant for the event-denoting reading is the semelfactive nature of the underlying verb. ‘*Hüpfen*’ (to jump) occurs in the left column and shows semelfactive behaviour while ‘*rollen*’ (to roll) occurs in the right column and shows activity behaviour.

- (19) a. Er hüpfte dreimal. (ambiguous)
He hopped three-times
b. Er rollte dreimal (not ambiguous)
He rolled three-times
- (20) a. Er hüpfte wieder und wieder. (ambiguous)
He hopped again and again (→)
b. Er hüpfte eine Zeit lang (am Stück/ohne Pause).
He hopped some time long (at a stretch/without interruption)
c. Er hüpfte ohne Unterbrechung wieder und wieder.
He hopped without interruption again and again
- (21) a. Er rollte wieder und wieder. (not ambiguous)
He rolled again and again (↔)
b. Er rollte eine Zeit lang (am Stück/ohne Pause).
He rolled some time long (at a stretch/without interruption)
c. #Er rollte ohne Unterbrechung wieder und wieder.
He rolled without interruption again and again

To conclude, *er*-nominalizations in German can denote events if their source is a semelfactive predicate, *i.e.* if its event is **atomic/individuable**.^{11/12}

3. The syntax of (event-denoting) *er*-nominalizations

Above, I identified two productive types of *er*-nominalizations in German. A number of theoretical questions follow from this result:

11. Antje Rossdeutscher (p.c.) suggests that besides being semelfactive, the events in event-denoting *er*-nominals must be *non-intentional*. While some event-denoting *er*-nominals do not obviously fit this description (*e.g.*, ‘Jodler’, yodeler) this further restriction would explain why the VoiceP level can be missing in the structures of event-denoting *-ers* (see below). Further, *er*-nominals such as ‘Jodler’ (yodeler) and ‘Kratzer’ (scratcher) might be better analyzed as objects of result instead of events. In fact, sometimes it is hard to keep ontologically apart the event itself from the object or product coming about through the event (‘beep’ – an event *vs.* a sound).

12. Sometimes the eventive *er*-nominal is doubled or blocked by a morphologically zero-derived event nominal (*ein Sprung*/**ein Springer* (a jump); *ein Stoss*/?*ein Stosser* (a hit); *ein Blitz*/?*ein Blitzler* (a flash)). I propose that instances of blocking in German are special cases of a more general phenomenon discussed below for English.

- Q1** Are external argument-denoting *-ers* and event-denoting *-ers* formed by one and the same (derivational) morpheme?

This should be the null hypothesis as long as we do not have clear (empirical or theoretical) arguments against it.¹³ The goal of the second part of this paper is to investigate the consequences of (as well as some problems for) exactly this hypothesis. If we assume, therefore, that the answer to the above question is yes, then the following questions arise:

- Q2** Why are event-denoting *er*-nominals restricted to German?
Q3 Why can't we form event-denoting *er*-nominals from all verb classes but only from semelfactives?
Q4 Where do the different interpretations (external argument vs. event) come from?
Q5 Does *-er* have any meaning?
Q6 Is *-er* a nominalizer or an argument?

Starting with the last question, if external argument-denoting *er*-nominals and event-denoting *er*-nominals involve the same *er*-morpheme, we cannot follow the recent proposal in Baker & Vinokurova (2009) and assume that *-er* is the nominal version of Kratzer's Voice head with the semantics in (22a) and the syntax in (22b).¹⁴ This is so because Voice heads introduce (θ -roles for) external arguments but they do not introduce events (the latter is introduced by *v* or *V* below Voice).

- (22) a. *-er*: $\lambda P \lambda x \text{ Gen } e (P(e) \ \& \ \text{agent } (e, x))$
 b.

13. A reviewer asks why this is the null hypothesis since we find *-er* also in other uses, for example as a plural marker (*ein Kind*, *zwei Kind-er*/one child, two children). In the latter case, we clearly have a morpheme fulfilling a completely different job. But the *er*-morpheme producing external argument-denoting *er*-nominals and the one producing event-denoting *er*-nominals fulfil the same job in that they both derive a nominal out of a verbal stem. Furthermore, both types of *er*-nominals behave alike with respect to gender (masculine) and plural formation (zero-derived plurals). The proposal that we have only one *er*-nominalizer is the null hypothesis because it is the only interesting hypothesis that we can formulate. The alternative that there exist two different nominalizers which have, by chance, the same form and the same number and gender properties is interesting only insofar as it would refute the null hypothesis.

14. I find this proposal suspicious because it forces us to duplicate all the different Voice heads that we need for the thematically different external arguments (agent, causer, experiencer, holder...) under the conception of Voice in Kratzer (1996).

Similarly, we cannot follow van Hout & Roeper (1996) who propose a structure as in (23) where « *-er* in nominalizations is base-generated in the Specifier of Voice and moves up with the verb to an empty N head, rather than being base-generated as the nominal head ». ^{15/16}

For an alternative analysis, I follow Alexiadou & Schäfer (2010) and assume that *-er* is a nominalizer. I illustrate this proposal first for external argument-denoting *er*-nominalizations and turn, afterwards, to event-denoting *er*-nominalizations. Alexiadou & Schäfer (2010) propose the structure in (24) for external argument-denoting *er*-nominalizations. The verbal event <e> is introduced by the v-head (see Alexiadou & Schäfer (2010) for arguments that an event is present in all types of external argument-denoting *er*-nominalizations). Voice introduces the external argument of the verbal event (Kratzer 1996) which I assume to be realized by a variable <x> in the present structure. (I leave it open here whether this variable is a PRO or some other element (*cf.* Roy & Soare to appear)). I also assume that an aspect head on top of VoiceP is present in these *er*-nominalizations though this is not relevant for the present discussion (see Alexiadou & Schäfer (2010) for motivation; see Ntelitheos (2006) for a slightly different perspective). Finally, a nominalizing n-head realized by *-er* takes the verbal structure as its complement. This n-head introduces a referential operator <R> which binds the closest variable (in an argument position; but see below). This is the external argument variable <x> which was introduced in Spec,VoiceP. Therefore, the *er*-nominalization denotes the external argument

15. This proposal violates the head-movement constraint.

16. The alternative that *-er* is a complementizer or a linker in a relative clause structure and that a reduced small clause underlies all *er*-nominals would force us to stipulate that the event in semelfactives (and only in semelfactives) is realized (or duplicated) by a covert NP which can be relativized, *i.e.* can be moved to Spec,CP (*cf.* Ntelitheos (2006) for event-denoting nominalizations in Malagasy.)

of the verbal event. I assume that *v*, Voice and *N* combine morphologically by some process (head- or XP-movement) that I do not further investigate here.

Turning to event-denoting *er*-nominalizations, I propose the structure in (25). Voice is missing in this structure (and probably aspect, too).¹⁷ The absence of Voice is corroborated by the lack of control into purpose clauses illustrated with the examples in (25a-d) involving the semelfactive verb ‘*piepsen*’ (to beep). Active semelfactives (25a), their impersonal passive counterparts (25b) but also nominalized infinitives denoting the verbal event (25c) allow control into purpose clauses (see Alexiadou et al. (2011) for further arguments that German nominalized infinitives involve Voice). The event-denoting *er*-nominal in (25d), on the other hand, does not license control suggesting that it lacks Voice.¹⁸

17. Some semelfactives are transitive. The corresponding event nominals do not license complements. Note that these German event-denoting *-ers* behave thereby as their English zero derived counterparts. If the licensing of internal arguments is related to the presence of Aspect (*cf.* Ntelitheos 2006 among others) this suggests that event-denoting *-ers* do not involve aspect.

- (i) Er schubste den Peter.
He pushed the Peter
- (ii) Der Schubser (*des Peters)
The hustle (*of Peter)
- (iii) Er gab dem Peter einen Schubser.
He gave the Peter a push

18. The licensing of *by*-phrases or possessors which are both o.k. with event-denoting *er*-nominals is not decisive as they are possible also in the context of non-eventive nouns (*a book by Chomsky*). A reviewer points out examples of agentive adjectives modifying event-denoting *er*-nominals (ia-b). Although these data are hard to evaluate, they seem marked to me, especially if the clausal subject cannot be understood as identical with

- (25) a. Ich hörte [wie er_i piepste] [um PRO_i die Oma zu schockieren].
 I heard how he beeped in-order the grandma to shock
 'I heard how he beeped in order to shock the grandma.'
- b. Ich hörte [wie (von ihm_i) gepiepst wurde]
 I heard how (by him) beeped was
 [um PRO_i die Oma zu schockieren].
 in-order the grandma to shock
 'I heard how a beep was emitted (by him) in order to shock the grandma.'
- c. ?Ich hörte [sein_i Piepsen] [um PRO_i die Oma zu schockieren].
 I heard his beeping in order the grandma to shock
 'I heard his beeping in order to shock the grandma.'
- d. *Ich hörte [seinen_i Piepser] [um PRO_i die Oma zu schockieren].
 I heard his beep in-order the grandma
 to shock
 'I heard his beep in order to shock the grandma.'

Once again, the <R> operator introduced by *-er* needs to bind a variable. Crucially, in the absence of Voice, the verbal event variable <e> introduced in v is the closest variable which <R> can bind (see also fn. 21). Therefore, the nominal denotes the verbal event.

The structures in (24) and (26) suggest that there exists only one *-er* affix which is present in all *er*-nominalizations. *-er* is the realization of an n-head which

the agent of the semelfactive event (ia vs. ib) and, more importantly, if compared to nominalized infinitives (ic).

- (i) a. Er machte einen (?!absichtlichen/?!begeisterten/?!widerwilligen) Hüpfen.
 He made an intentional/ enthusiastic/ reluctant jump
 Ich sah seinen (?!absichtlichen/*begeisterten/ *widerwilligen) Hüpfen.
 I saw his intentional/ enthusiastic/reluctant jump
 Ich beobachtete sein (absichtliches/begeistertes/widerwilliges) Hüpfen.
 I observed his intentional/enthusiastic/reluctant jumping

introduces a referential argument slot $\langle R \rangle$ for the nominal it produces. This $\langle R \rangle$ is an operator which needs to bind a variable under minimality (closest c-command). The different meanings result from different binding relations which, in turn, result from different structures (basically the presence vs. absence of Voice). This provides an answer to Q4 above.

Let's turn to Q5. Obviously, $\langle R \rangle_{ER}$ cannot be sensitive to the difference between entities and events. If $\langle R \rangle_{ER}$ has any meaning, this meaning must be applicable in both, the domain of events and the domain of entities.¹⁹ But as we saw above not every type of event can be bound by $\langle R \rangle_{ER}$. The event must be semelfactive, i.e. naturally atomic. It seems reasonable to take this as a selectional restriction of $\langle R \rangle_{ER}$.²⁰ As a slight alternative, I assume that $\langle R \rangle_{ER}$ carries this semantic property and transfers it to the bound variable; a variable bound by $\langle R \rangle_{ER}$ is forced to be interpreted as naturally atomic. Crucially, natural atomicity is a property that cuts across the nominal domain (the domain of entities) and the verbal domain (the domain of events). Natural atomic events are semelfactives (as well as change-of-state events (see below)). Natural atomic entities are count nouns (but see Rothstein (2010) and references there for refinements). As an answer to Q3 above I propose, therefore, that the meaning of $\langle R \rangle_{ER}$ enters the derivation as follows:

- (i) $\langle R \rangle_{ER}$ binds the closest variable.
- (ii) $\langle R \rangle_{ER}$ has as its meaning the property to be inherently 'naturally atomic'.
- (iii) This denotation is assigned to/transferred to the bound variable. At LF, the 'lexical-conceptual restriction' of the variable bound by *-er* must be semantically/conceptually compatible with this property.

19. The existence of a derivational morpheme such as *-er* under the above characterization is not expected under Lieber's lexicalist approach, as in her system «we should not expect to find an affix which creates nouns some of which are concrete and others of which are abstract (that is, some of which bear the feature [+material] and others [-material]) » (Lieber 2004: 41). In Lieber's system, *-er* builds only concrete nouns, i.e. has the skeleton [+material, dynamic]. But the above event-denoting nouns are [-material, dynamic] (where the type of dynamic event is highly restricted, i.e. semelfactive). Lieber would, therefore, have to assume two *-ers*, one forming [+material] and one forming [-material] nouns.

20. This could be implemented if activities and semelfactives involve different types of little *v*. A reviewer proposes that Russian suggests exactly this because Russian semelfactives bear a special morpheme *-nu* when denoting an atomic event.

(i) a. *stuchat'* (to knock) vs. *stuknut'* (to knock one knock)
 b. *khrukhat'* (to oince) vs. *khrukhnut'* (to oince once)

As an alternative, one could hypothesize that the *v*-heads in activities and in semelfactives get combined with different types of aspectual projections which trigger the different morphology in Russian. I leave these questions open here, mentioning that the reviewer's proposal would be a viable alternative.

As a result, the *er*-nominal denotes either a count noun or a semelfactive event. If the event expressed by a verb cannot be conceptualized as semelfactive (e.g. with activities like ‘to run’), a semantic mismatch occurs. More specifically, assume that such events can be bound in the syntax by $\langle R \rangle_{ER}$. Therefore, the $\langle R \rangle_{ER}$ operator assigns to $\langle e \rangle$ the property to be naturally atomic. But since the lexical core of the verb ‘run’ cannot be conceptualized as naturally atomic, such a nominalization is semantically deviant: $\langle R \rangle_{ER}$ wants to bind an atomic event but the event associated with verbs such as ‘run’ cannot be conceptualized as atomic and, therefore, the two do not fit in their interpretations. The resulting structure, while syntactically well-formed, is filtered out as incomprehensible due to a semantic mismatch at the conceptual level.²¹

What about *er*-nominals derived from anticausatives expressing a change of state? Why don’t the examples in (27) denote the change-of-state events expressed by the underlying verbs? This is especially striking as change-of-state events are typically assumed to be atomic, i.e., similarly to an atomic or minimal jumping event we know quite well what an atomic or minimal change-of-state event would be like.

- (27) a. *Brecher (break-er)
 b. *Schmelzer (melt-er) (under the intended event-reading)

However, change-of-state verbs are bi-eventive, involving a process-part followed by a resultant state (cf. (28) using the terminology of Ramchand (2008)).

21. As mentioned, object-denoting *er*-nominalizations are not (productively) available across languages. The present approach has to make very specific assumptions about the position of internal arguments in order to derive this result. Specifically, objects must necessarily be base-generated in a position c-commanded by the verbal head introducing the event variable. If this is the case, the $\langle R \rangle_{ER}$ operator will always bind the event variable and never the object variable because the former is structurally closer. If the verbal event is conceptualized as naturally atomic, the result is grammatical; if the verbal event cannot be conceptualized as naturally atomic, the result is filtered out as incomprehensible due to a semantic mismatch. While the assumption that internal arguments are necessarily c-commanded by the verb has been standard for many years, it should be noted that the recent literature has found arguments that this is not always the case. Dobler (2008) and Alexiadou & Schäfer (to appear) argue that the internal argument of change-of-state verbs is actually base-generated in the specifier of the head introducing the verbal event. If this is correct, it is not clear how to exclude *er*-nominals denoting the internal argument of change-of-state verbs under the present approach. This could, therefore, be seen as an argument that German must have two *er*-nominalizers which are just homophonous. I must leave the investigation of this complication for future research.

Crucially, only the combination of these two sub-events makes change-of-state events atomic. If we add $\langle R \rangle_{ER}$ on top of the structure in (28) it will bind the closest $\langle e \rangle$ in the process v-head; however, this event on its own is not naturally atomic and the structure is, therefore, filtered out as incomprehensible similar to cases involving mono-eventive activities such as ‘*to run*’ discussed above.

- (28) $[_{ProcessP} \langle e \rangle [_{ResultP} \langle s \rangle]]$ (e.g. Alexiadou et al. 2006, Ramchand 2008)

Next, I try to account for Q2 above, *i.e.* for the question why languages other than German lack event-denoting *er*-nominals? I will concentrate my discussion on English. As mentioned, while English does not have event-denoting *er*-nominals, it nevertheless has event-denoting nouns that correspond to the semelfactive *er*-nominals in German. These English nouns are zero-derived.

- (29) a bounce, a knock, a beep, a jump, ...

I propose that the nouns in (29) have exactly the same syntactic structure as the corresponding event-denoting *er*-nominals in German, *i.e.* the structure in (26) above. However, in English the n-head is spelt out in a different way in such a constellation. The framework of Distributed Morphology allows us to formulate that the Spell-Out of the n-head forming naturally atomic nouns can be realized differently depending on the syntactic context. Following Embick (2003), insertion of Vocabulary items is sensitive to locality. That is, the Spell-Out rules for *n* can make reference to its c-command domain as suggested by the two rules in (30). That is while German realizes the naturally atomic nominalizer as *-er* in any context, English realizes it as *-er* if it is located on top of Voice as in (24) but it realizes it as zero morpheme if it is located on top of an eventive v-head as in (26).

- (30) a. Spell-out of n: Voice-Cycle
 $n \leftrightarrow -er / \{ \sqrt{BEEP}, \sqrt{JUMP}, \dots \}$
 b. Spell-out of n: v-Cycle
 $n \leftrightarrow -\emptyset / \{ \sqrt{BEEP}, \sqrt{JUMP}, \dots \}$

3.1. ‘Products’: an argument against just one *er*-nominalizer?

In this section, I want to discuss a potential challenge for the central hypothesis of this article that external argument-denoting *er*-nominalizations and event-denoting *er*-nominalizations in German are derived by one and the same nominalizer. A clear prediction of this hypothesis as it was developed in the

previous section is that both types of *er*-nominalizations should always be naturally atomic. I argued that this is the case for all event-denoting *er*-nominalization; they only denote semelfactive events. But we also need to investigate whether the same holds for external argument-denoting *er*-nominalization. Is it correct that external argument-denoting *er*-nominals are always naturally atomic, i.e. count? The answer seems to be no. There exists a set of *er*-nominals which denote what seem to be mass expressions, typically artificial liquids. Following Sleeman & Verheugd (2004), I call these *er*-nominals ‘products’. The German examples of this type of *er*-nominals in (31a-c) are doubled by their English counterparts in (32a-c):²²

22. Sleeman & Verheugd (2004) discuss French products as in (ia-c).

- (i) a. un durcisseur d’ongles
‘a product which hardens fingernails’
- b. un régulateur de la tension nerveuse
‘a product regulating nervous tension’
- c. un révélateur
‘a developer’

They propose that product-ers neither denote external arguments nor do they involve an event. They argue (Sleeman & Verheugd 2004 : 149) that « only instruments can be used as external arguments, whereas products cannot ». In (iib), the product-er can only occur as a locatum-argument, not as an external argument. The examples in (ii) are designed after Levin & Rappaport (1988). These authors discuss verbs undergoing the spray/load alternation in order to prove the external argument generalization (iii) :

- (ii) a. A spray gun sprayed the weedkiller on the grass.
- b. *The weedkiller sprayed on the grass.
- (iii) a. John loaded hay onto the truck.
- b. John loaded the truck with hay with a crane.
- c. A crane loaded the truck with hay.
- d. *The hay loaded the truck.
- e. loader -> crane, not stuff

I do not think that the argumentation around (ii) is fair. One would have to show that the denotation of weed-killer cannot be a subject in an event of ‘killing weed’. The example in (iib) just shows that it is not allowed to call a chemical like weedkiller a ‘sprayer’. Constructing fair examples in German suggest that products do, in fact, obey the external argument generalization.

- (iv) a. Peter entfernte die Flecken mit dieser Flüssigkeit/diesem Mittel.
Peter removed the stain with this fluid/chemical
- b. Diese Flüssigkeit entfernte die Flecken rasch. (Fleckenentfern-er)
This fluid/chemical removed the stain rapidly (stain remov-er)
- (v) a. Peter reinigte den Topf mit dieser Flüssigkeit.
Peter cleaned the pot with this chemical
- b. ?Diese Flüssigkeit reinigte den Topf rasch. (Reinig-er)
this chemical cleaned the pot rapidly (clean-er)

(31)	a. (Nagellack-)entfern-er
b. (Essig-/Teppich-)reinig-er
c. (Foto-)entwickl-er/fixier-er | (32) | a. (nail polish) remov-er
b. (vinegar/carpet) clean-er
c. (photo) develop-er/fix-er |
|------|---|------|---|

Is this then an argument that there must be two *er*-nominalizers in German, one denoting external arguments which can be mass or count (this *er*-nominalizers would also exist in other Germanic and Romance languages) and one denoting naturally atomic events, *i.e.* events that are count? This would mean that German has two different nominalizers which are, by accident, both realized as *-er* (see also fn. 13). However, some observations argue in favour of the idea developed above that German has only one *er*-nominalizer. These observations give us a hint about how external argument-denoting *-ers* can sometimes circumvent the semantic restriction to be naturally atomic.

While products have unequivocal mass-readings as shown in (33), it should be noted that the very same nominals can easily be used as count nouns as the use of the determiners *ein* (a), *jeder* (every), *zwei* (two) or *diese* (these) in (34a-c) indicates.

- (33) Ich habe Wasser/Bier/Essigreiniger/Nagellackentferner verschüttet
I have water/beer/vinegar cleaner/nail polish remover poured
- (34) a. **Ein/Jeder** Teppichreiniger kann verwendet werden.
A/Every carpet-cleaner can used be
b. **Zwei** (verschiedene) Essigreiniger
Two different vinegar-cleaners
c. **Diese** Teppichreiniger ähneln sich in ihrer Wirkungsweise.
These carpet cleaners are-similar in their mode-of-action

It is well known that the mass-count distinction is not entirely clear-cut. Nouns which are basically count can be shifted to a mass-reading and nouns which are basically mass can be shifted to a count-reading (*e.g.* Chierchia 2010). The former shift, illustrated in (35), can be brought about by a process called ‘universal grinder’; the latter shift, illustrated in (36a, b) can be brought about by a process called ‘universal packager’.

- (35) a. There is chicken in the soup
b. There is apple on the floor
- (36) a. I drank three beers.
b. I like only three wines: Chardonnay, Pinot and Chianti.

The question is which process is responsible for the mass and count uses of products seen in (33) and (34). Are their count-uses derived from a basic mass interpretation via universal packager, or are their mass-uses derived from a basic count interpretation via universal grinder? Under the analysis developed in the previous section we would predict the latter direction to be correct. This view would be confirmed if products would not show all properties of clear instances of mass nouns. This seems to me to be the case, although judgements are very subtle: while unequivocal mass-nouns can be modified with quantifiers like *all* and *most* (37a, b), products slightly resist such modification (38a, b); thereby, they are similar to coerced count nouns (39a, b).

- (37) a. Ich habe alles Wasser/alle Zahnpasta/ allen Sand weggewischt.
 I have all water/ all toothpaste/ all sand wiped-away
 b. Das meiste Wasser/Die meiste Zahnpasta/Der meiste Sand wurde
 The most water/ the most toothpaste/the most sand was
 weggewischt.
 wiped-away
- (38) a. (?)Ich habe allen Teppichreiniger/allen Kleber weggewischt.
 I have all carpet-cleaner/ all glue wiped-away
 b. (?)Der meiste Teppichreiniger/Der meiste Kleber wurde
 The most carpet-cleaner/ the most glue was
 weggewischt.
 wiped-off
- (39) a. ??Der meiste Apfel/Das meiste Hühnchen wurde weggewischt.
 The most apple/The most chicken was wiped-away
 b. ??Ich habe allen Apfel/alles Hühnchen weggewischt.
 I have all apple/ all chicken wiped-away

These data tentatively suggest that products are external argument-denoting (instrumental) *er*-nominalizations that are basically naturally atomic. More specifically, I propose that they start with a basic interpretation as a sort or a kind. Furthermore, as all count nouns, products can be coerced into mass. The special thing about products seems to be that, due to the fact that products are fluids, this shift from count to mass happens with less effort than with other count nouns.

4. Conclusions

In this article, I discussed German event-denoting *er*-nominalizations and showed that these can be formed only from semelfactive verbs, i.e. they denote only semelfactive events. Similar to external argument-denoting *er*-nominals, the formation of event-denoting *er*-nominals is fully productive in that it is possible with every semelfactive verb in German.

The existence of two productive types of *er*-nominalizations (external argument-denoting and event-denoting) poses a number of theoretical questions which I discussed in the second part of the article. Specifically, I investigated the hypothesis that there is only one *er*-nominalizer which introduces an $\langle R \rangle$ -operator that binds the closest variable. The meaning of this operator cuts across the verbal and the nominal domain: $\langle R \rangle_{\text{ER}}$ has as its meaning the property to be inherently naturally atomic. This denotation is transferred to the bound variable and, at LF, the variable must be conceptually compatible with this property. The two readings (external argument-denoting and event-denoting) are the result of a structural difference; if Voice is present, then the $\langle R \rangle$ operator located in the n-head binds the external argument in Spec,Voice, if Voice is absent, $\langle R \rangle$ binds the event in v.

To answer the question why only German but not English or Dutch have event-denoting *er*-nominalizations, I proposed that different Spell Out rules are at work in these languages. These rules are sensitive to the syntactic context in which a head occurs and, in the case of event-denoting nominals, the Spell Out rule of English (and Dutch) chooses a zero exponent for the n-head that is spelt out as *-er* in the context of Voice. German, on the other hand, spells out the relevant n-head as *-er* in both contexts.

Finally, I discussed potential counterexamples to the claim that all *er*-nominalizations are atomic. I argued that *er*-nominals denoting products are basically external argument (instrument) denoting count nominals which can, however, be easily coerced to nominals with a mass-interpretation.

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RÉSUMÉ

Les nominalisations en *er-* en allemand, tout comme leur correspondant dans d'autres langues, dénotent de façon productive l'argument externe du verbe sur lequel elles sont formées. Je montre, dans cet article, que l'allemand a un type supplémentaire de nominalisations en *er-* qui ne dénotent pas des entités mais des événements. Ces nominalisations en *er-* événementielles s'avèrent restreintes à un type spécifique de base verbale, à savoir les semelfactifs qui ont été caractérisés dans la littérature comme exprimant des événements 'naturellement atomiques'. De façon cruciale, dans la classe des semelfactifs, la dérivation des nominalisations en *er-* événementielle est tout à fait productive. Le but de cet article est double : d'une part, présenter le cas peu connu de ces nominalisations événementielles en *er-* de l'allemand et, d'autre part, examiner la relation entre le morphème *er-* qui construit les nominalisations dénotant l'argument externe et le morphème en *er-* qui construit des nominalisations événementielles.

MOTS-CLÉS

nominalisations en *-er*, allemand, verbe semelfactif, atomicité naturelle, dénotation, événement, entité.