Predicting the Semantics of English Nominalizations: A Frame-Based Analysis of *-ment* Suffixation

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Abstract It has long been known that derivational affixes can be highly polysemous, exhibiting a range of different, often related, meanings. To account for this problem, it is commonly assumed that polysemy arises through the interaction of affix semantics with the meaning of the base (e.g. Plag I, The polysemy of -ize derivatives: the role of semantics in word formation. In: Booij G, van Marle J (eds) Yearbook of morphology 1997. Foris, Dordrecht, pp 219–242, 1998). This paper investigates the relationship between input semantics and output readings using the English nominal suffix *-ment* as a test case. From a sample of deverbal neologisms dating from the past 100 years, we investigate the largest semantic subclass of base verbs in the data set, i.e. PSYCH VERBS (Levin B, English verb classes and alternations: a preliminary investigation. University of Chicago Press, Chicago, 1993). The analysis employs common semantic categories such as EVENT, STATE, RESULT and STIMULUS and formalizes the results with the help of frames (Barsalou LW, Cognitive psychology: an overview for cognitive sciences. Erlbaum, Hillsdale, 1992a; Frames, concepts, and conceptual fields. In: Lehrer A, Kittay EF (eds) Frames, fields and contrasts. Erlbaum, Hillsdale, pp 21–74, 1992b; Löbner S, Understanding semantics, 2nd edn. Arnold, London, 2013). It is shown that *-ment* almost exclusively attaches to verbs from two clearly defined sub-classes of PSYCH VERBS, i.e. AMUSE VERBS and MARVEL VERBS. Within these sub-classes, *-ment* derivatives can be merely transpositional in meaning (denoting EVENTS or STATES, depending on the kind of base verb), or the suffix can induce a metonymic shift to the participants STIMULUS and RESULT STATE, but not to EXPERIENCER. In the light of the frame analysis it becomes clear that, if the base verb denotes a complex PSYCH CAUSATION EVENT, shifts to the two sub-events are also possible, which calls into question the traditional concept of transposition. Our findings support an approach in which the semantics of a derivational process is conceptualized as its potential to induce particular metonymic shifts in the semantic representation of its bases.

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1 Introduction   33

In recent years, the semantics of derivational processes has attracted considerable 34
attention, both as a special theme of conferences (e.g. International Morphology 35
Meeting, Vienna 2012; Mediterranean Morphology Meeting, Dubrovnik 2013), and 36
in major studies and collections (e.g. Trips 2009; Uth 2011; Bauer et al. 2013; 37
Rainer et al. 2014), especially since the publication of the seminal *Morphology and* 38
lexical semantics by Lieber (2004). However, a workable model of word-formation 39
semantics is still under debate. Bauer et al. (2013, 641) formulate the problem 40
as follows: "we must be able to account for the substantial evidence that affixes 41
(or morphological processes, if the theorist prefers) are frequently semantically 42
underspecified, and subject to polysemy and meaning extensions of various sorts." 43
In spite of attempts in the literature to develop a systematic theory of polysemy in 44
word-formation, a number of issues are still unresolved. How can we account for 45
existing meaning extensions or those encountered in new formations? What is the 46
role of encyclopaedic knowledge in the semantic interpretation of complex words? 47
And how do the semantics of base and derivative interact in order to produce the 48
reading of a given derivative?   49

   With regard to the predictability of the readings of EVENT/STATE/RESULT 50
nominalizations, Bauer et al. (2013, 213f.) observe that there is a non-arbitrary rela- 51
tionship between the semantics of the base and possible readings of its derivative. 52
For example, they find that STATE nominalizations most frequently derive from 53
verbs denoting psychological states such as *exasperate* or *excite*. Unfortunately, 54
these authors do not provide a general account of the input-output relationships. 55

   In this paper we will study the relationship between base semantics and derivative 56
readings in a systematic way by investigating a sample of deverbal neologisms 57
derived with the suffix *-ment*. Our sample consists of 86 neologisms extracted from 58
the *Oxford English Dictionary Online* (OED 2013) and the *Corpus of Contemporary* 59
American English (COCA, Davies 2008).   60

   In particular, we will first describe the semantics of the input verbs, using the 61
semantic classes developed by Levin (1993) and extended in the VerbNet project 62
(Kipper et al. 2008). Second, we will describe the output semantics by applying 63
common semantic categories such as EVENT, STATE, RESULT, STIMULUS etc. Then, 64
we will investigate the relationship between input semantics and output readings in 65
the derivatives found in our sample. The analysis will be restricted to the largest 66
semantic subclass of base verbs in the data set, that is, PSYCH VERBS (Levin 67
1993). The semantic categories will then be implemented in a frame-based approach 68
(Barsalou 1992a,b; Löbner 2013). Frames are recursive attribute-value structures 69
which serve to model mental representations of concepts as well as linguistic 70
phenomena (cf. Petersen 2007), similar to formalisms known from frameworks such 71
as HPSG (Pollard and Sag 1994) or LFG (Bresnan 1982).   72

   It will be shown that, for the data in our sample, the polysemy of *-ment* derivatives 73
can be described as a highly restricted set of shifts operating on the semantic 74

representations of the bases. At a more abstract level, we demonstrate that frame ₇₅ theory provides a framework that can elegantly account for flexible, but restricted, ₇₆ interpretations of derived words. ₇₇

2 Background ₇₈

2.1 Affix Polysemy ₇₉

One of the central problems in word-formation research is the problem of polysemy, ₈₀ that is, why and how a given affix can create different types of meaning in its ₈₁ derivatives. An oft-cited case are AGENT, PATIENT, INSTRUMENT and INHABITANT ₈₂ nouns in *-er*, as in *writer*, *loaner*, *opener* and *Londoner*, respectively. ₈₃

For further illustration of the issues involved, let us consider the different ₈₄ interpretations of nominalizations based on verbs. Apart from EVENT readings (e.g. ₈₅ *production* 'the act of producing'), Bauer et al. (2013, ch.10) list the following ₈₆ readings (see, for example, Roßdeutscher 2010; Roßdeutscher and Kamp 2010; Uth ₈₇ 2011 for similar problems in German and French nominalizations): ₈₈

(1)   a. RESULTS (the outcome of VERB-ing): acceptance, alteration ₈₉
      b. PRODUCTS (the thing that is created by VERB-ing): pavement, growth ₉₀
      c. INSTRUMENTS (the thing that VERB-s): seasoning, advertisement ₉₁
      d. LOCATIONS (the place of VERB-ing): dump, residence ₉₂
      e. AGENTS (people or person who VERB-s): administration, cook ₉₃
      f. MEASURE TERMS (how much is VERB-ed): pinch, deceleration ₉₄
      g. PATHS (the direction of VERB-ing): decline, direction ₉₅
      h. PATIENTS (the thing affected or moved by VERB-ing): catch, acquisition ₉₆
      i. STATES (the state of VERB-ing or being VERB-ed): alienation, disappoint- ₉₇
         ment ₉₈
      j. INSTANCES (an instance of VERB-ing): belch, cuddle ₉₉

Although this list is already quite long it does not seem to be exhaustive. It seems ₁₀₀ that still other readings, such as the MANNER reading in (2), are possible. ₁₀₁

(2)   She would shiver with cold, then sweat. Her **walk** became strange, first bent ₁₀₂ forward as she went, then all the way backward (COCA_MAG_2006)[1] ₁₀₃

That (1) lists examples from different morphological categories such as *-ance,* ₁₀₄ *-ation* or conversion is not a coincidence. The different types of meaning extension ₁₀₅

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[1]All attestations are referenced in the following way: Corpus, genre (if available), year of attestation (if available). In COCA, the following genres are distinguished: spoken (SPOK), fiction (FIC), academic (ACAD), magazine (MAG) and news (NEWS). For GloWbE, WebCorp and Google, the following additional categories are relevant: Online articles and blog posts (BLOG), comments and Facebook posts (COMM).

occur within and across morphological categories and seem not to be restricted to 106
particular categories, and even a single word can have more than one interpretation. 107
Bauer et al. (2013) show, however, that certain types of interpretation are likely 108
to occur with certain types of base verb. For example, instrument nominalizations 109
derive from verbs denoting actions that require instruments of various sorts. These 110
authors also demonstrate that deverbal nominalizations may reference not only 111
syntactic arguments (i.e. subjects and objects), but also non-argumental entities. 112
They demonstrate this by contrasting the nouns *embroidery* and *purchase* (p. 212). 113
Purchase can denote the entity that is transferred by the action of purchasing. It 114
represents the object argument of the verb, more precisely, the THEME. In contrast, 115
the derivative *embroidery* refers to a PRODUCT that is created by the action of 116
embroidering, and does not denote the object argument of the verb. 117

Another example of derivational polysemy is the suffix *-ize*. Existing formal 118
accounts have managed to explain the polysemy of the large set of forms that 119
express different kinds of causative meanings (e.g. 'locative', *put (in)to X* or 120
'resultative', *make into X*, cf. Plag 1999, 125). Lieber (1998) and Plag (1999) 121
used the decompositional framework of Lexical Conceptual Structures (Jackendoff 122
1983, 1990, 1991), Lieber (2004) applied her own framework. However, in neither 123
approach was there a satisfactory solution for what has been labeled 'performative' 124
and 'similative' formations (*anthropologize*, *powellize*). It seems that a more flexible 125
formalism is needed. 126

Cases like the ones just described raise the question of which kinds of interpre- 127
tation are principally possible, given the meaning of the base and that of the affix. 128
Is there a restricted set of semantic mechanisms that can account for derivational 129
readings in a principled way? In general, it depends on the power of the analytical 130
tools at hand whether the limits of what can be considered compositional can be 131
determined. Lieber's (2004) theory is currently the most advanced in addressing 132
these questions. This theory operates with a highly restricted set of semantic features 133
('skeleton') and conceptual knowledge representations ('body') that allow for 134
meaning extensions and also for some flexibility in incorporating world knowledge. 135
It is, however, not entirely clear how meaning extensions of affixes (or derivatives) 136
come about in the first place, and how they could be formalized in this framework. 137
Furthermore, the theory does not have a straightforward answer to the question 138
of which kinds of meaning extensions are possible and which ones should be 139
impossible. This is all the more so for deverbal derivation, where Lieber explicitly 140
leaves open "exactly what the verbal body looks like" (Lieber 2004: 72). 141

In Lieber's theory, polysemy chiefly emerges through the mechanism of 142
co-indexation and violations of co-indexation. The details of how such an approach 143
tries to solve the polysemy problem are, however, problematic. First, it is not so 144
clear under which circumstances violations of co-indexation may or may not occur. 145
Second, in addition to co-indexation, some further mechanisms are needed, which 146
are not clearly spelled out. Semantic features of the affix are introduced rather ad 147
hoc (e.g. 'collective') and these features then interact with the meaning of the base 148
to arrive at a particular interpretation. Metonymy is explicitly mentioned as part 149

of this process, but the process itself is not formally modeled, but assumed as a ₁₅₀ given. In more general terms, Lieber postulates highly abstract skeletal features ₁₅₁ that often do not straightforwardly translate into the specification of the particular ₁₅₂ readings of individual derivatives. To spell out this translation mechanism would, ₁₅₃ however, be crucial for a better understanding of the semantic processes at work in ₁₅₄ the interpretation of complex words. ₁₅₅

There is a vast literature on the syntax of English nominalizations (e.g. Lees ₁₅₆ 1963; Chomsky 1970; Pullum 1991; Yoon 1996; Grimshaw 1990; Alexiadou 2001; ₁₅₇ Baker 2003; Heyvaert 2003; Lieber and Baayen 1999 among many others) but ₁₅₈ this literature is largely restricted to syntactic properties arising from the argument ₁₅₉ structure of the base verb. But as shown, for example, by Lieber and Baayen (1999) ₁₆₀ and Bauer et al. (2013), the semantic possibilities of such nominalizations go much ₁₆₁ beyond the referencing of arguments, and a satisfactory account of the full range of ₁₆₂ the semantics of nominalizations is still not available. Bauer et al. (2013) describe ₁₆₃ and illustrate many patterns and classify large amounts of pertinent data accordingly, ₁₆₄ but there is no study available yet which comprehensively systematizes and formally ₁₆₅ models the referencing properties of each of these morphological processes. Such ₁₆₆ an account would also answer the question of how the meaning of potential bases ₁₆₇ interacts with these referencing properties in principled ways. This paper addresses ₁₆₈ these questions using a small data set from one morphological category as a case ₁₆₉ study. ₁₇₀

2.2 The Suffix -ment   ₁₇₁

This suffix was very productive between the fifteenth and seventeenth centuries ₁₇₂ (see Marchand 1969; Lindsay and Aronoff 2013). While -ment is held by many ₁₇₃ researchers to be unproductive in contemporary English (e.g. Bauer 1983, 55; Bauer ₁₇₄ 2001, 8f.; Schmid 2011, 112), a recent corpus study has shown that numerous "novel ₁₇₅ or low-frequency words" (Bauer et al. 2013, 199) can indeed be identified in COCA ₁₇₆ and the BNC (*British National Corpus*). This finding strongly suggests that even ₁₇₇ today speakers make use of this suffix to coin new nouns. ₁₇₈

The suffix mainly attaches to verbs, but we find it also on other categories, such ₁₇₉ as adjectives (*foolishment*), nouns (*illusionment*), and bound roots (*compartment*, ₁₈₀ see Bauer et al. 2013, 198). ₁₈₁

What are possible interpretations of -ment derivatives? Using the terminology ₁₈₂ of Bauer et al. (2013), we find a large range of readings attested: events (*assess-* ₁₈₃ *ment*), results (*containment*), states (*contentment*), products (*pavement*), instruments ₁₈₄ (*entertainment*) and locations (*embankment*). ₁₈₅

3   Methodology   186

3.1   Data   187

Because of *-ment's* high productivity between the fifteenth and seventeenth cen- 188
turies, contemporary English derivations in this suffix are very frequent. However, 189
these are mostly long since established words such as *government* (first attested 190
in 1484 according to the OED), *development* (1756) or *department* (c.1450). 191
Lexicalized words such as these are well-known to show all kinds of idiosyncrasies 192
which are not related to actual speaker knowledge or intuition (see Plag 1998). 193
In our study, however, we seek to investigate the productive derivational process 194
of affixation with *-ment*. In other words, we want to know how speakers of 195
contemporary English employ the suffix to form new words. This is why we 196
investigate neologisms instead of established formations.   197

In order to identify neologisms, we used both the OED and corpora. The OED 198
is an exceptional resource for identifying neologisms since it gives dates of first 199
citation for every meaning nuance of every listed lemma. Furthermore, with a 200
database of currently 600,000 words and 3 million quotations (OED 2013, accessed 201
April 17, 2014), the OED attempts universal coverage. Thus, those neologisms 202
which have come to some noticeable use in the English language also appear in 203
this dictionary. The *OED Online* (2013) is updated regularly and is thus a beneficial 204
tool for the investigation of current language development.   205

Neologisms were obtained using the interface provided by the OED (2013). 206
We extracted all words ending in the orthographic string <ment>. In order to 207
reach a sizable number of attestations, we included neologisms with first citations 208
dating from 1900 to today (see, for example, Plag 1999 for a similar procedure). 209
The categories *Headword* and *Lemma* were searched. This way, also nouns which 210
are listed only under their corresponding base verb could be identified. From the 211
resulting list of raw data, all those words were removed which did not contain the 212
suffix *-ment* (e.g. *bioelement*). In a second step, we eliminated all forms which were 213
derived by any word-formation process other than suffixation (e.g. prefixation on a 214
lexicalized base with *-ment* as in *disempowerment*, or blends such as *edutainment*). 215
Thirdly, we restricted ourselves to verbal bases, which is the base type *-ment* most 216
frequently attaches to, and eliminated all non-deverbal nominals from our dataset 217
(e.g. *foolishment*). Lastly, those neologisms were excluded which can be considered 218
to be highly lexicalized. These were identified by surveying their frequency in the 219
Corpus of Global Web-Based English (GloWbE), which contains 1.9 billion words. 220
For instance, *bemusement* is first attested in 1907 and is now highly frequent, 221
especially in British English, listing a total of 469 tokens in GloWbE, which 222
is far beyond the frequency range of the other derivatives (between 0 and 10 223
tokens).   224

After these revisions of the data, 18 deverbal nouns remained which were coined 225
by means of derivation with *-ment* between 1900 and 1961. The fact that there are 226

no new attestations after 1961 gives rise to the interpretation that *-ment* may have become completely unproductive. However, a different image presents itself when looking at large contemporary corpora such as COCA.

A second method to find neologisms is to extract *hapax legomena* from a large corpus such as COCA (Davies 2008). Hapax legomena (or *hapaxes*, for short) are words which occur only once in a given corpus. It has been shown that the greatest number of neologisms in a corpus appears precisely among these hapaxes (see Plag 2003, 68). In our context this means that the number of hapaxes with *-ment* correlates with the number of neologisms formed with this affix, indicating its productivity. This measure has been termed the *hapax-conditioned degree of productivity* (Baayen 1993). Note that we do not claim that every hapax actually is a neologism: they can also represent very rare forms, archaisms, non-transparent ad hoc inventions and typing errors. The size of the corpus is crucial in this respect; it has been shown that the larger the corpus, the more reliably hapaxes can help predict the probability of new forms (see Baayen and Renouf 1996; Baayen 2009). In other words, the larger the corpus, the higher the proportion of neologisms among the hapaxes.

With more than 450 million words written and spoken between 1990 and 2012, COCA is an appropriately large corpus for the identification of hapaxes as potential neologisms. Using the web interface we searched for all those words which end in the strings <ment> or <ments> and which have a frequency of 1–3. The reason why we not only included hapaxes but also dis and tris legomena in this initial search is that results may be corrupted due to various reasons. For instance, *musement* is listed with a frequency of 2 in COCA, but one of the attestations is actually *bemusement* with a wrongly placed space. By initially including dis and tris legomena we increased the chances of finding all pertinent forms. After filtering the raw data according to the four criteria already listed above for the OED neologisms, it was necessary to examine the context of each hapax. This way, we excluded attestations which were not English, such as French quotations within an otherwise English text, as well as obvious mistakes. Finally, we excluded those formations from our analysis which cannot be regarded as neologisms. For instance, *concernment* is a dis legomenon in COCA, but its first appearance, according to the OED, is attested in the year 1621, while the most recent attestation dates to 1879. That this derivative can be regarded as an archaism is supported by the type of attestations, which were found mostly in Bible verses and philosophical treatises.

After filtering the corpus data, we arrived at 68 usable hapaxes which were produced between 1990 and 2012 (the complete range of the corpus). From this number we can deduce two things: First, *-ment* is not as unproductive today as has recently been stated, and as is indicated by the last attestation date given in the OED as 1961. Secondly, the OED can contribute valuable data but should not be seen as an exhaustive resource for neologisms. The data set resulting from the corpus study presents a list of types which are understandable in context, but cannot (yet) be regarded as established enough to be recorded in a dictionary. The complete, filtered dataset, consisting of both OED neologisms and COCA hapaxes, amounts to 86 types. Next, these were categorized semantically.

3.2   Semantic Classification   272

We were interested to see which output readings are possible given the 86 attested   273
base verbs in combination with *-ment*. Therefore, both input verbs and output nouns   274
were categorized semantically. This way, we were able to generalize over the data   275
as well as cluster it. We will discuss each classification in turn.   276

3.2.1   Categorization of Base Verbs   277

For English verbs, the most comprehensive classification can be found in the   278
VerbNet project (version 3.2,[2] Kipper et al. 2008), which continues the work of   279
Levin (1993). We decided to use these classification systems because they are   280
comprehensive, well-established and have been shown to be very useful in research   281
on the semantics and syntax of verbs and their derivatives.   282

Levin (1993) and VerbNet are based on the assumption that a verb's meaning   283
influences its syntactic behavior. Levin classifies over 3,000 English verbs applying   284
both semantic and syntactic criteria. All verb classes are described by a listing of   285
members, the syntactic alternations these verbs allow, and additional comments on   286
their semantic and syntactic peculiarities.   287

In VerbNet, the Levin classes have been extended and partly revised, both   288
qualitatively and quantitatively. VerbNet currently covers 6,088 verbs in 109 major   289
verb classes, many of them featuring further subclasses. Compared to Levin (1993),   290
the added classes have allowed researchers to reclassify or cross-list a number of   291
verbs more adequately, as for instance *convince*, an AMUSE VERB which is now also   292
listed in a new class named 'FORCE VERBS'. In VerbNet, each class is described as   293
follows (see Kipper et al. 2008): a list of members, thematic roles for their predicate-   294
argument structure, selectional restrictions on the arguments (e.g. an [+animate]   295
EXPERIENCER),[3] as well as so-called 'frames', which in VerbNet consist of both   296
syntactic descriptions and semantic predicates. These frames in part correspond to   297
the alternations listed in Levin (1993). For instance, the following frame "NP V   298
ADV-Middle" for AMUSE VERBS goes back to the property "Middle Alternation"   299
in Levin (1993, 190):

NP V ADV-Middle (VerbNet)

Example	"Little children amuse easily."
Syntax	EXPERIENCER V ADV
Semantics	PROPERTY(EXPERIENCER, PROP) ADV(PROP)

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[2] Accessible at http://verbs.colorado.edu/~mpalmer/projects/verbnet/downloads.html

[3] While traditionally (see Saeed 2009, 154; Taylor 2002), EXPERIENCERS are [+animate] per definition, in VerbNet there are classes which allow for EXPERIENCERS to be either [+animate] or [+organization].

Middle Alternation (Levin)

a.   "The clown amused the little children."

b.   "Little children amuse easily."

Most base verbs in our data set could be assigned straightforwardly to a class since they were listed in the VerbNet database in their relevant senses ($\approx$54 %). For the remaining verbs ($\approx$46 %), we relied on suitable synonyms listed in VerbNet. For instance, the word *bumfuzzle* is not listed, but its synonym *confuse* is a member of the AMUSE class. Since *bumfuzzle* matches the semantic and syntactic descriptions given for verbs in this class, we coded it as a member as well. Those verbs from the dataset which could be assigned to any of the VerbNet classes were subsequently coded for their thematic roles, as these roles feature prominently in the nominalizations.

Categorization turned out to be problematic for two base verbs in the data set. *Outplace* and *trace* (as base for the first constituent of the compound *tracement oils*) could not be assigned to any of the verb classes. Apart from these two individual cases, a more general issue is also worth pointing out. Thus, many verbs are polysemous and listed in more than one category. In our subset of PSYCH VERBS, this was the case with *worry*. It can be used both transitively and intransitively. Therefore, Levin (1993) cross-lists it in two sub-categories of PSYCH VERBS, namely as an AMUSE and as a MARVEL VERB (see Table 2 for definitions of both). Furthermore, it is also listed in another major category which is introduced in VerbNet, that of CARE VERBS. In actual language use, the semantic differences resulting in such cross-listings are often too fine-grained to be identifiable in an attested derivative. Thus, it most often remains unclear whether *worry* as a base verb for *-ment* should be analyzed as a MARVEL, AMUSE or CARE VERB in a given specific context. However, generalizing over corpus data from additional corpora (see also Sect. 3.2.2), it can be concluded that *worriment* behaves like other *-ment* derivatives on AMUSE VERB bases, so that *worry* will be treated as an AMUSE VERB in the following. This is a case which shows that it is indispensable to gather as much corpus data as possible in order to make sensible statements about a lexeme's behavior.

The 86 attested base verbs in our dataset belong to 24 major classes. The two largest classes are PSYCHOLOGICAL VERBS (16 types, here PSYCH VERBS) and VERBS OF CHANGE OF STATE (11 types). The number of types in the other classes ranges between 1 and 7. In this study, we will concentrate on the analysis of the 16 PSYCH VERBS and their corresponding derivatives, which we will call PSYCH NOUNS.

3.2.2   Categorization of Derived Nouns

For the classification of the semantics of the derivatives we have made use of categories established in previous research. However, there is a great variety of approaches around with quite diverse terminology, so some clarification is in order.

In deverbal nominalization, EVENTS are often distinguished from RESULTS (see e.g. Grimshaw 1990), or from STATES on the one hand and OBJECTS on the other (see Barque et al. 2011). Moreover, it has been observed that EVENTS and STATES share certain semantic and syntactic properties (see, for example, Filip 1999). Therefore, these two have been subsumed under the hyperonym EVENTUALITY (see Bach 1986; Ehrich and Rapp 2000). This seems to be the category that has been described as the default semantics for many deverbal nominalizations, including all -*ing* nominals (see e.g. Bauer et al. 2013, 207; Roy and Soare 2012 for some general discussion). Further distinctions between different kinds of eventualities are frequently drawn on grounds of conclusivity, agentivity and durativity, introducing notions such as PROCESS and ACTION (see Sil et al. 2010). Elsewhere, a distinction has been made between simple and complex EVENTS (see e.g. Grimshaw 1990).

The suffix -*ment* has been described as a transpositional affix, attaching to verbs and yielding a semantically equivalent noun (see Lieber 2004, 38). According to Beard (1995, 165–8, see Spencer 2010 for a more recent treatment), lexical derivation is transpositional if it only changes the syntactic category without inducing a meaning change. As was mentioned before, the most easily accessible reading for deverbal nominalizations is often an EVENT formed with -*ing* such as, for instance, *cheering*. Here, the grammatical category is changed from verb to noun but the (EVENT) semantics remains. Likewise, a STATE verb can be transposed into a STATE noun such as *suffering*. In these two cases, the same affix -*ing* yields two different readings, which can both be described as results of transposition. For the output of -*ment* derivation we can also assume that dynamic PSYCH VERBS would standardly lead to EVENT readings and stative PSYCH VERBS as bases would lead to STATE readings of the derivative.

For the analysis of the transpositional readings we will make use of the standard semantic categories EVENT and STATE. The term EVENT very generally designates phenomena which are observable and take place at a specific time and place (see Sil et al. 2010, 108). EVENTS exhibit a temporal extension which is clearly delineated by a starting point and an end point. We furthermore adopt the category of ACTION for those EVENTS with a conscious, possibly intentional, AGENT. STATES, on the other hand, are regarded as non-dynamic and homogeneous. They can have a temporal extension, but without natural boundaries. For now, we will assume that transposition constitutes a mere category shift, but see Sect. 6 for some further discussion of this assumption.

Apart from the transpositional categories, further possible meanings for deverbal nominalizations include the (semantic and/or syntactic) arguments of the base verb (see, for example, Bauer et al. 2013, 38). In VerbNet, four roles are applied in the PSYCH VERB category to describe these: EXPERIENCER, STIMULUS, RESULT and ATTRIBUTE. ATTRIBUTE is only applied in the subcategory of ADMIRE VERBS, of which none is attested in our dataset. Therefore, we can disregard this role. The three remaining categories are listed in Table 1 with their definitions as given in the VerbNet Annotation Guidelines (pp. 20–21) and examples from VerbNet frames for MARVEL, APPEAL and AMUSE verbs (the latter incorporated by *bore$_V$*).

Table 1 Semantic categories applied in the semantic description of PSYCH NOUNS

Semantic role	Definition	Example	
EXPERIENCER	Patient that is aware of the event undergone	We marveled at the magnificence of her gifts. (COCA_MAG_2012)	t9.2
STIMULUS	Cause in an event that elicits an emotional or psychological response	That's why folk art appeals to me (COCA_MAG_2012)	t9.3
RESULT	Goal that comes into existence through the event	[. . .] the campaign bored me silly. (GloWbE_BLOG_2011)	t9.4

For our purposes, we can take over these definitions with one modification. The category of RESULT can be further specified as RESULT STATE, as RESULT STATES are generally defined as states which come into existence through an event (see, for instance, Osswald 2005; Brandtner 2011; Ehrich and Rapp 2000 for discussion and application of this term).

For our study, semantic classification proceeded in two steps. First, the meaning of each attestation was subsumed under the definition of one of the categories defined above. Second, substitution tests were applied to substantiate the classification, taking into account the differing syntax of OBJEXP and SUBJEXP VERBS. *V-ment* was thus considered to express a certain semantic category if it could be replaced by one or more of the following expressions, respectively:

- EVENT: *V-ing someone, event in which something V-s someone*, or *event in which something causes someone to V PREP something*
- STATE (for SUBJEXP nouns): *State of V-ment or V-ing PREP something*
- RESULT STATE (for OBJEXP nouns): *State of V-ment, being V-ed* or *having been V-ed*
- STIMULUS: *V-ing influence, something which V-s someone*, or *something someone V-s PREP*
- EXPERIENCER: *Someone who is being V-ed, Someone who has been V-ed*, or *someone who has been caused to V (PREP something)*

PREP indicates the respective preposition which has been defined as obligatory for MARVEL VERBS (for instance, *marvel **over***). Some of the substituting expressions are, admittedly, a bit clumsy. This way, however, they are general enough to be appropriate in very different contexts. It is important to note that the substitution does of course not only have to work syntactically, but also semantically – the sentence still has to make sense.

A general problem that occurred when trying to assign a given derivative to one of the semantic classes is ambiguity. For instance, *abusement* is defined in the OED with the following senses: "The action or an act of abusing or being abused, abuse; deception. Also: a source of abuse or deception." Such ambiguity is problematic when investigating hapaxes, which are by definition attested only once in a given corpus. Two scenarios are conceivable. In one scenario, the hapax is unambiguous in the given context. In this case, it is impossible to know which further readings

exist. In another scenario, the hapax can be ambiguous due to a context that allows 415
different interpretations, so that it remains unclear which meaning the speaker 416
intended. 417

In order to deal with this problem we extracted further attestations of each 418
type from other corpora such as WebCorp (Renouf et al. 2006), GloWbE (Davies 419
2013), or Google. While web-search tools such as Google unarguably exhibit certain 420
shortcomings for serious linguistic investigation (e.g. unlimited corpus size, no data 421
organization, no annotation), it has also been shown that they can be a convenient 422
indicator for innovative language use (see Diemer 2011, and the papers in Hundt 423
et al. 2006). By including further corpora, we were able to investigate a wider range 424
of usages for each type, covering a larger range of possibilities. The problem of 425
ambiguity and the identification of actual speaker intention is of course a general 426
issue when working with corpus data. In this study, when several readings were 427
possible for any given attestation, all of these were regarded as conceivably valid 428
usages of the given noun. 429

A similar problem presents itself with the dictionary data. Although the OED 430
aims at wide coverage, for obvious reasons it does not include every meaning variant 431
ever attested. Therefore, our OED-based data was also supplemented with corpus 432
data from the corpora listed above. This way, a number of innovative usages were 433
also identified. 434

4 The Semantics of Psych Verbs   435

According to Levin (1993, 189), PSYCH VERBS typically take two arguments: 436
EXPERIENCER and STIMULUS. Traditionally, the projection of these participant 437
roles as either subject or object of the verb serves as a basis to subdivide English 438
PSYCH VERBS further.[4] Levin (1993) arrives at a fourfold distinction based on this 439
criterion in combination with transitivity (see Table 2). Table 3 summarizes the 440
thematic roles which are represented in the predicate-argument structure of these 441
different types of PSYCH VERBS in VerbNet. Note that not all of these roles describe 442

Table 2 Types of PSYCH VERBS according to Levin (1993, 188–193)

	Experiencer is the subject	Experiencer is the object	t12.1
Transitive verbs	ADMIRE VERBS: *The tourists admired the paintings*	AMUSE VERBS: *The clown amused the children*	t12.2
Intransitive verbs with PP complements	MARVEL VERBS: *Megan marveled at the beauty of the Grand Canyon*	APPEAL VERBS: *This painting appeals to Malinda*	t12.3

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[4]In languages that are morphologically richer than English, this subdivision is often based on case, see e.g. Klein and Kutscher (2005) for German, and Varchetta (2010) for Italian.

Table 3 Semantic roles for PSYCH VERBS in VerbNet

	EXPERIENCER	STIMULUS	RESULT	ATTRIBUTE	
AMUSE VERBS	+	+	+	−	t15.1
ADMIRE VERBS	+	+	−	+	t15.3
MARVEL VERBS	+	+	−	−	t15.4
APPEAL VERBS	+	+	−	−	t15.5

syntactic arguments. The ATTRIBUTE in constructions with ADMIRE VERBS is not
an argument, and the RESULT STATE indicated by AMUSE VERBS is not syntactically
represented.

As has been indicated above, there are 16 base verbs in the dataset which can
be categorized as PSYCH VERBS. These are the AMUSE VERBS *affright, bumfuzzle,*
confound, dumbfound, endull, enrage, enrapture, nonplus, perturb, reassure, upset,
soothe, stagger, and the MARVEL VERBS *approve (of)* and *muse (over)*. As discussed
above, the verb *worry (about)* is cross-listed in both subcategories in VerbNet and
will be treated as an AMUSE VERB.

AMUSE VERBS are characterized in Levin (1993, 191) as describing "the
bringing about of a change in psychological or emotional state". Furthermore,
following the widely employed terminology introduced in Pesetsky (1995), AMUSE
VERBS can be described as OBJECT EXPERIENCER (henceforth OBJEXP) verbs.
This entails that they are transitive verbs which realize the EXPERIENCER as object
and the STIMULUS as subject. As can be seen in Table 3, this is the only subgroup
of PSYCH VERBS the description of which includes the thematic role RESULT in
VerbNet.

MARVEL VERBS belong to the SUBJECT-EXPERIENCER class and comprise
verbs describing mental states (see Levin 1993, 192). It seems, however, that some
members such as *rhapsodize* or *muse over* are more akin to ACTIONS. All members
are intransitive and express the STIMULUS in a prepositional phrase headed by
different prepositions. Some verbs in this category, such as *worry*, can be used
transitively and are therefore cross-listed in VerbNet.

Is seems uncontroversial that OBJEXP PSYCH VERBS can be regarded as
causatives and thus as complex events. However, there has been a debate in the
literature whether SUBJEXP PSYCH VERBS also fall into this category (Grimshaw
1990; Pustejovsky 1995; Geuder 2000; Härtl 2001). Empirical research has shown
that also SUBJEXP PSYCH VERBS can indeed be regarded as (implicit) causatives.
Thus Härtl (2001) presents evidence that the STIMULUS is regarded as equally
causative in both OBJEXP and SUBJEXP VERBS. In VerbNet, the problem is
addressed in the frames describing the verb classes: The STIMULUS in the AMUSE
VERB class is introduced with the predicate CAUSE, while for MARVEL VERBS we
find IN REACTION TO. In the present study, we assume that AMUSE VERBS can
be considered as a type of causative, while conceding that they might differ in the
degree or kind of causality from prototypical causatives such as *push* or *kick*. As will
be discussed below (see Sect. 6), some MARVEL VERBS imply a causation event,
while others don't.

5   Semantic Analysis   480

This section presents the results of our corpus and dictionary study, discussing the   481
semantic categories attested in our dataset. The semantics of the base verbs and of   482
the derivatives will be considered in turn.   483

5.1   Input Semantics   484

With respect to input semantics it is quite striking that, in our dataset, *-ment* has a   485
preference for AMUSE VERBS (14 types, including the cross-listed *worry*). ADMIRE   486
and APPEAL VERBS are not attested as bases for neologisms, and MARVEL VERBS   487
are represented by two types. This raises the question whether this behavior of *-ment*   488
neologisms is peculiar to our newly coined forms or whether it is of a more general   489
nature. We tested this by counting how many of all the PSYCH VERBS listed in   490
VerbNet are attested in combination with *-ment* in COCA. As can be seen in Fig. 1,   491
the observation does indeed reflect a general tendency for *-ment* on PSYCH VERB   492
bases. In this bar chart, numbers of PSYCH base verbs attested with and without   493
-ment in COCA are given by subcategory. The ratio between "attested" and "not   494
attested" is indicated by the differently shaded areas (dark gray for number of   495
attestations, light gray for number of unattested combinations). While a rounded   496
21 % of all AMUSE VERBS listed in VerbNet are attested with the suffix in COCA,   497
the ratio is much lower for ADMIRE, MARVEL and APPEAL VERBS (5 %, 7 % and   498
0 %, respectively). Raw numbers are given in boxes inside the bars.   499
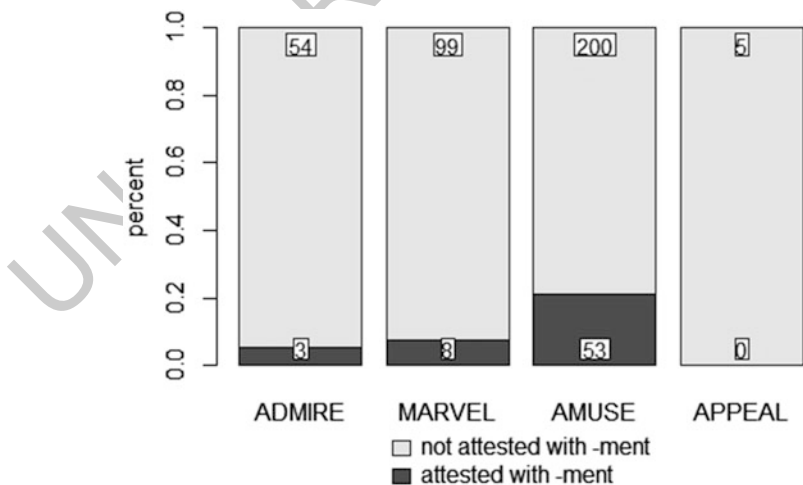

Fig. 1 COCA attestations of PSYCH VERB bases with *-ment* by verbal sub-category

AMUSE verbs have a significantly higher proportion of *-ment* formations than the three other categories (e.g. AMUSE vs. MARVEL verbs: $\chi^2 = 9.7$, $df = 1$, $p = 0.002$). This preference of *-ment* for AMUSE VERBS may have several different reasons. First of all, the class of APPEAL VERBS is very small. It contains only five verbs, three of which are extremely rare or not attested at all in COCA. It is therefore not surprising that no *-ment* attestations can be found, especially since this suffix shows only little productivity. Secondly, an exploration of other derivatives with these bases suggests that both MARVEL and ADMIRE VERBS exhibit a preference for other nominalization processes. A large proportion of MARVEL VERBS form nouns by conversion (*sorrow, freakout*) and ADMIRE VERBS seem to prefer *-ation* (*reaffirmation, adoration, detestation*), but are also found in V→N conversion (*mistrust, grudge*).

5.2   *Output Semantics*

With regard to AMUSE VERB bases, our dataset can be described as uniform since all derivatives end up in the same semantic categories: EVENT (transposition), RESULT STATE or STIMULUS. No attestations for EXPERIENCER could be identified. Among the attested categories, RESULT STATES exhibit a much higher token frequency than the other two. Example (3) gives an attestation for this semantic category, while (4) and (5) exemplify STIMULUS and EVENT, respectively. Example (6) can be categorized as an ACTION.

(3)   RESULT STATE
      I know a lot of our compatriots also feel the same angst, consternation and **confoundment**. (GloWbE_ART_2012)
(4)   STIMULUS
      The Education Secretary arrived having just..made her first big policy declaration – dressed up as a **reassurement** to Middle England that A-levels will be retained and that other exams may be made harder. (OED_NEWS_2005)
(5)   EVENT
      Don Thomas has been spending quite a bit of time there lately–offering autographed catalogs to outdoorsy, ideally ultimate playing, [. . .], handles **bumfuzzlements** in stride, [. . .] genus femininum. (Google_BLOG_2010)
(6)   ACTION
      On apartheid South Africa, he called for the "constructive **enragement**" of economics sanctions (COCA_NEWS_2010)

It has been noted above that not all attestations can be unambiguously assigned to one semantic category only. Especially the distinction between EVENT and STIMULUS has proved to be challenging, with many ambiguous attestations (cf. example (5)). We will address this issue in Sect. 6.

In contrast to the homogeneous group of AMUSE VERBS, the case is not as clear with MARVEL VERBS. First of all, the verb class itself is heterogeneous with regard

to the semantics of its members. Thus, as was mentioned above, it includes mostly 540
stative verbs, but also a number of dynamic ones. The two attested verbs in our 541
dataset represent both categories: While *approve of* is stative, *muse over* can be 542
paraphrased both as 'to be pensive' (STATE) and as 'to ponder' (ACTION), with 543
an inclination toward the second reading.[5] This polysemy is also indicated by the 544
derivatives *muse* forms with *-ment*. Both a STATE reading and an EVENT (ACTION) 545
reading are attested (see examples (7) and (8), respectively), and both readings are 546
transpositional. The latter seems to be more frequent, especially in blog titles such 547
as "Musements and ponderations of a neurofool [sic]".[6] 548

(7) A cock was crowing in the distance. He studied the countryside with **muse-** 549
  ment. # Here forms were gentle on the eye. (GloWbE_BLOG_2012) 550
(8) In his maturity, Royce also installed the Will to Interpret at the heart 551
  of his new method of philosophizing by "interpretive **musement**." 552
  (COCA_ACAD_1991) 553

Apart from these transpositional readings, *musement* is also attested in a 554
STIMULUS reading. While no context could be identified that unambiguously 555
exhibits this reading, there are a number of examples which can be interpreted as 556
either STIMULUS or ACTION, especially in puns including some combination of 557
amusement and *musement*, such as in example (9). 558

(9) Passage des perles Style over fifty; delights, (a)**musements** and resources for 559
  women (WebCorp_BLOG_2014) 560

Approvement, the other attested derivative of a MARVEL VERB, can also express 561
the transposed sense of STATE, as can be seen in example (10). The noun can 562
furthermore be found in ACTION readings (see (11)); however, it is more likely that 563
the base verb for these attestations is the transitive *approve* in the sense paraphrased 564
in the OED as "To pronounce to be good, commend". No attestations for STIMULUS 565
could be found for this noun. 566

(10) What happened is people who were looting, and thieves and hooligans, once 567
  they receive the **approvement** from the press, they will just draw the V sign 568
  and then continue their looting. (COCA_NEWS_2003) 569
(11) Apparently in lack of experts willing to support their ideas they rephrase 570
  comments of critics in such a way that it sounds like **approvements**. 571
  (WebCorp_BLOG_2004) 572

Table 4 summarizes our findings for output readings attested for the different 573
base verb types. 574

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[5]That *muse over* does possess an ACTION reading can be tested with *Aktionsart* tests, for instance, its use in an imperative construction ("Muse over this!").

[6]http://neurofoolishmusings.blogspot.de/

Table 4 Readings attested in derivations with *-ment* on PSYCH VERB bases

	Transposition					t18.1
	EVENT	STATE	STIMULUS	RESULT STATE	EXPERIENCER	t18.2
AMUSE VERBS	+	−	+	+	−	t18.3
MARVEL VERBS						t18.4
Approve of	(?)	+	−	−	−	t18.5
Muse over	+	+	+	−	−	t18.6

How can we interpret our results? It does not come as a surprise that RESULT STATE readings are much more common than STIMULUS and EVENT readings in nouns based on AMUSE VERBS. In fact, it is unexpected that STIMULUS and EVENT are attested at all, since it has been claimed that OBJEXP nominalizations "uniformly lack all causative force" (Pesetsky 1995, 71). Pesetsky (1995, 72) gives two examples, stating that *annoyance* and *amusement* both denote 'the state of being annoyed/amused', while not being able to express 'the process of making annoyed' and 'something amusing someone', respectively. These two readings would correspond to our EVENT and STIMULUS categories. Pesetsky admits that some OBJEXP nominalizations are used to refer to something else than STATES, namely objects, but puts these readings aside as being "sharply distinct" from those with a STATE reading (p. 72). However, especially for such frequent derivations as *amusement* and *annoyance*, STIMULUS and EVENT readings can easily be found by identifying plurals of the pertinent lexemes in large corpora. Example (12) exemplifies an (object) STIMULUS reading of *amusement* such as acknowledged by Pesetsky, while (13) presents the noun as an EVENT, contra Pesetsky. *Bumfuzzlements*, from our dataset, can be interpreted both as an EVENT and as a STIMULUS in (14), repeated from (5). Pluralization, as Pesetsky claims, is a property OBJEXP PSYCH NOUNS may resist (p. 72). Nevertheless, in our research, it has turned out to be a convenient means to easily identify EVENT and STIMULUS readings.

(12) No federal agency regulates portable **amusements**, and no state employee inspects mobile rides. (COCA_NEWS_2012)

(13) Today's evangelicals dance, listen to popular music, partake in public **amusements** and diversions, and attend the theater (COCA_ACAD_2010)

(14) Don Thomas has been spending quite a bit of time there lately–offering autographed catalogs to outdoorsy, ideally ultimate playing, [. . .], handles **bumfuzzlements** in stride, [. . .] genus femininum. (Google_BLOG_2010)

While RESULT STATES are very common in nominalizations based on AMUSE VERBS, we do not find them at all for MARVEL NOUNS. This can be explained by the semantics of the base verbs. Naturally, both classes can produce a STATE reading in their nominalizations. However, the nature of this output as well as the way to get there are different: For AMUSE VERBS, the STATE is the RESULT which is brought forth by their nature as causatives. For prototypical MARVEL VERBS, the STATE is merely the result of transposition; no causation as such is involved (but see Sect. 6 on less prototypical MARVEL VERBS).

The finding that EXPERIENCER readings cannot be derived from PSYCH VERBS 610
with -*ment* may have different reasons. First of all, in English this reading is usually 611
formed with the suffix -*ee* (or -*er* for SUBJEXP verbs). We might therefore be 612
dealing with a simple blocking effect. Furthermore, said restriction may originate 613
either in the properties and preferences of PSYCH VERBS, or in those of -*ment*. 614
The first option can easily be tested by investigating whether PSYCH VERBS 615
can in principle be the basis for derived EXPERIENCER nouns. In English, the 616
usual suffix for PATIENT and EXPERIENCER nominalizations is -*ee*. While the 617
combination AMUSE VERB + -*ee* may not be described as a highly productive 618
derivational process, it is nevertheless possible to generate EXPERIENCER readings 619
by applying this process, as example (15) demonstrates. This formation is mostly 620
attested in a direct juxtaposition with its STIMULUS counterpart V + -*er*. In the case 621
of MARVEL VERBS, the arrangement is exactly converse: -*er* is used to express 622
the EXPERIENCER, while -*ee* can express the STIMULUS. This behavior, which 623
can be seen in example (16), is due to the fact that -*er* and -*ee* are not actually 624
"agent" and "patient" suffixes, as might be intuitively assumed. Rather, they are 625
much better described as "subject-" and "object-referencing", respectively (see 626
Bauer et al. 2013, 38). 627

(15)   What often happens is that individuals often reciprocate these roles so that 628
       at one time a partner may, for example be the "soother" and at another time 629
       assume the role of the "**soothee**". (WebCorp_BLOG_2014) 630
(16)   The word sufferee actually exist [sic] and psychologists and counsellors do 631
       use it often to denote the causative agent of the **sufferer**. Hope this helps! 632
       (Google_COMM_2011) 633

To summarize, PSYCH VERBS in principle allow EXPERIENCER semantics in 634
their nominalizations, so that the constraint cannot be traced back to the properties 635
of the verbal bases alone. 636

The question thus remains whether the constraint may be part of the represen- 637
tation of -*ment*. In the pertinent descriptive accounts of English derivation (e.g. 638
Marchand 1969), there is no mention of -*ment* evoking EXPERIENCER semantics 639
with any type of verbal base. Likewise, in a random corpus search (including 640
different base verbs + -*ment* in COCA, WebCorp, GloWbE and Google) no 641
positive evidence for -*ment* deriving an EXPERIENCER reading could be found. 642
In fact, no reading which is typically associated with a [+human], or even just 643
[+animate], referent (such as AGENT or RECIPIENT) could be identified. This 644
leads to the conclusion that the constraint prohibiting a shift to EXPERIENCER 645
readings when nominalizing PSYCH VERBS with -*ment* may be due to the suffix 646
disallowing [+animate] formations. Melloni (2011, 115 & 237) observes the same 647
for Italian nominalizations in -*mento*: a shift to an EXPERIENCER reading is not 648
possible since the target has to be inanimate and non-sentient. Instead, Italian 649
makes use of its present participle suffix to express sentient categories such as 650
AGENT and EXPERIENCER. With regard to PSYCH VERBS in English, however, a 651

putative constraint against [+animate] readings does not seem to hold so easily: 652
The STIMULUS can be instantiated by anything, including [+animate] entities, as 653
exemplified in (17). 654

(17)   I'm awfully sorry to be such a **disappointment** to you.... please believe 655
       that you can't possibly want for me to be a winner more than I do. 656
       (WebCorp_BLOG_1992) 657

This issue may be related to the question of what actually is the cause, or the 658
STIMULUS, of a given RESULT STATE. In example (17), it is apparently not the 659
person itself who is a disappointment, but rather their behavior, a character trait, 660
some state of mind, etc. While it could be speculated that this might always be the 661
case with seemingly [+animate] STIMULI, in a corpus study such as the present one 662
this is not unambiguously deducible from the contexts of the attestations. In any 663
case, animacy is clearly required in the semantic category EXPERIENCER, while 664
with STIMULUS this does not seem to be so clear. It can therefore only be said that 665
-*ment* exhibits a strong preference for [-animate] referents, and further research is 666
needed to clarify the status of this preference. 667

The third interesting issue is the shift to STIMULUS readings. With Italian -*mento* 668
derivatives, this output category is limited to a small number of PSYCH nominals, 669
namely those which usually only transpose into a STATE (and not an EVENT) 670
reading (see Melloni 2011, 115). Melloni gives *divertimenti* ('amusements') as 671
an example. This seems to be similar to our findings: Although AMUSE VERB 672
nominalizations are attested as EVENTS, too, there is a strong prevalence of STATE 673
readings. MARVEL VERBS, on the other hand, are per se STATE verbs which produce 674
STATE nominalizations. The question then arises why *approvement* is not attested in 675
a STIMULUS reading, while *musement* is. While this finding may simply be a data 676
issue, it could also be speculated that it is related to the heterogeneous behavior of 677
the verbs in this class, including the question of causation and the difficult nature of 678
the STIMULUS argument as mentioned above. As has been mentioned above, *muse 679
over* is polysemous between a STATE and an ACTION reading, while *approve of* is 680
purely stative. Moreover, the class is diverse with regard to causation; de facto, more 681
active readings seem to involve more causative STIMULI. Consider examples (18) 682
and (19). While in (18) *muse over* appears caused and active, it is harder to argue 683
that, in (19), 'punishment' caused the EXPERIENCER to approve. Punishment just 684
resulted in approval. This finding is also not absolute, however, as example (20) 685
seems to indicate. 686

(18)   That monumental display of remorse and penitence made me **muse over** the 687
       circumstances that necessitated the open apology. (WebCorp_BLOG_2014) 688
(19)   The issue about punishment is not whether Dante **approved of** it but whether 689
       his attitude to it is one of inflexible bigotry. (COCA_ACAD_2011) 690
(20)   The news **caused approval** in some quarters and concern in others 691
       (WebCorp_BLOG_2013) 692

It seems that corpus data is inconclusive in this matter, especially given the fact 693
that our dataset only includes two types. Expanding the dataset would therefore be 694
the next step in order to shed light on this issue. 695

6   A Frame-Based Model of *-ment* Suffixation   696

It has been frequently argued that nominalization can be explained on the basis of 697
metonymy (see, for example, Radden and Kövecses 1999; Panther and Thornburg 698
2002; Martsa 2013; Schulzek 2014). In this sense, metonymy can be defined as 699
a meaning shift which involves that "the reference of a lexeme is shifted from the 700
potential referents of the lexeme to something that is in the broadest sense part of, or 701
thematically linked to, these potential referents" (Schulzek 2014, 222). Based on this 702
central insight we will model the observed readings as shifts in a frame as introduced 703
by Barsalou (1992a,b) and further developed in, for example, Petersen (2007) and 704
Löbner (2013). In this approach, frames are attribute-value structures which serve to 705
model mental representations of concepts as well as linguistic phenomena, similar 706
to the attribute-value formalisms known from frameworks such as HPSG (Pollard 707
and Sag 1994) or LFG (Bresnan 1982). The specific formalisms will be introduced 708
and explained as we go along. 709

In this frame-based approach, attributes are functional in the mathematical sense. 710
The attribute-value structures are recursive and they allow for structure sharing 711
(value identities of attributes). A frame can be given as an attribute-value-matrix 712
or as a frame graph with directed arcs (i.e., arrows) representing attributes, and 713
nodes representing their respective values. For instance, a frame for the concept 714
'car' could include an attribute labeled ENGINE which can be specified by a value 715
such as *4-cylinder*. This example also shows that the values by which an attribute 716
can be specified are subordinate concepts of this attribute (Barsalou 1992b, 43). 717
In Petersen's frame approach, the resulting taxonomy is incorporated in the type 718
signature underlying each frame (cf. Petersen 2007, Def. 8 and Fig. 9). 719

In order to model the process of nominalization with *-ment* on AMUSE and 720
MARVEL VERB bases, we apply an approach in which the semantics of the base 721
verbs and that of the resulting nouns are modeled in separate frames. The semantics 722
of a morphological process can then be described as its potential to alter the frame 723
of the base verb, which results in the noun frame. As mentioned above, we adopt 724
the view pertinent in the literature that OBJEXP PSYCH VERBS can be regarded as 725
causatives. The representations given in Figs. 2–4 build on earlier work on causation 726
frames (e.g. Kallmeyer and Osswald 2013; Osswald and Van Valin 2014). These 727
figures depict partial frames for AMUSE VERBS and their possible nominalizations 728
(exemplified in Fig. 4 by *bumfuzzlement*). Each frame should be read from top to 729
bottom: From the complex causation event via its sub-events to their participants. In 730
the following, we will refer to attributes and their labels in small caps and to nodes 731
and their labels in italics. 732

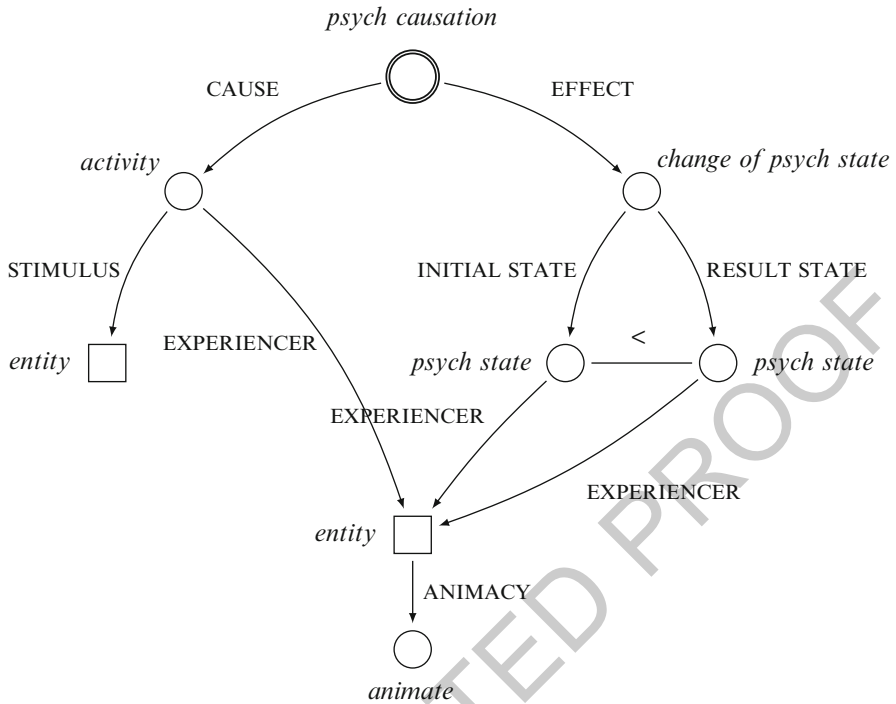**Fig. 2** Partial causation frame for AMUSE VERBS

6.1 **AMUSE VERBS**   733

Figure 2 presents a partial frame for the semantic interpretation of AMUSE VERBS.   734
In this frame, the referent node is labeled *psych causation*. This indicates that   735
AMUSE VERBS refer to the whole, complex event of psychological causation, which   736
is modeled here as consisting of two sub-events: a CAUSE and an EFFECT.   737

The CAUSE is an *activity* which has two participants, the STIMULUS and the   738
EXPERIENCER, and the EFFECT is a *change of psych state* in the EXPERIENCER   739
entity. Note that, in contrast to the ACTION category, the *activity* type does not   740
stipulate an AGENT attribute but rather a more general ACTOR. "Activity" is regarded   741
here as a subtype of EVENT, alongside MOTION and CAUSATION (cf. Kallmeyer and   742
Osswald 2013, Fig.16). In the case of PSYCH VERBS, the involved ACTOR is, more   743
concretely, a STIMULUS. The STIMULUS and EXPERIENCER attributes both have   744
the value *entity*. This type should be considered as a very general concept, basically   745
denoting 'anything'. The STIMULUS *entity* is not specified any further since   746
anything (a person, an action, a smell. . .) can stimulate the EXPERIENCER. For the   747
EVENT subcategory of ACTION as defined above, the STIMULUS would by definition   748
be specified as an *agent*. The value used to describe EXPERIENCER is an *entity* which   749
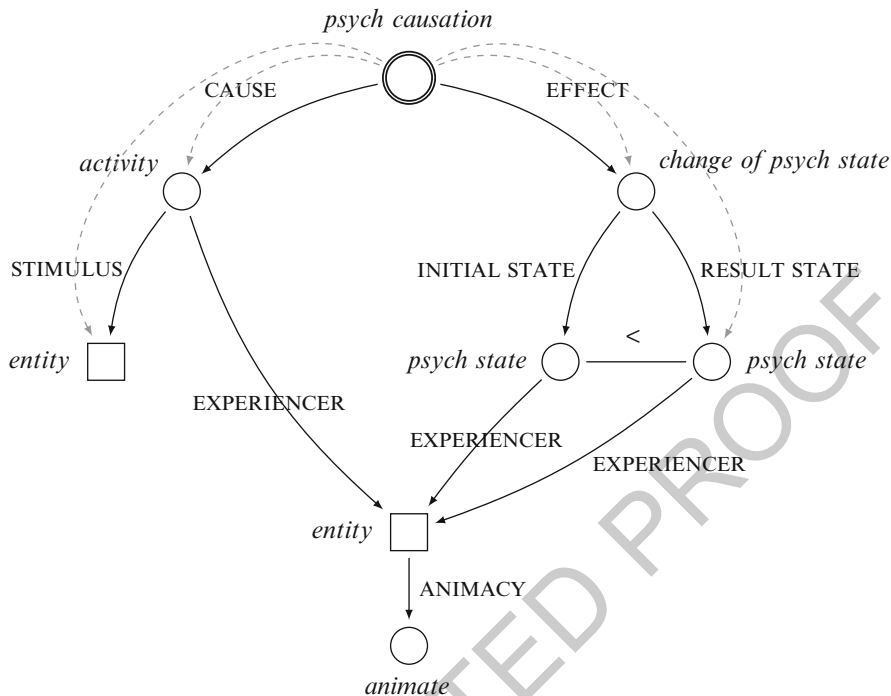
Fig. 3 Partial frame for *-ment* nominalizations based on AMUSE VERBS

is further specified as [+animate]. Both the STIMULUS and the EXPERIENCER *entity* 750
are arguments of the verb and therefore depicted as rectangular nodes. 751

The EFFECT of the *psych causation* is that a *change of psych state* occurs, 752
from an INITIAL STATE to a RESULT STATE. The fact that these two states exist 753
consecutively is represented by the relational operator "<". It should be noted that 754
the RESULT STATE must not be identical to the initial one. Not only do they occur 755
consecutively, but they are also of a different type (in a type-theoretical sense). This 756
relation is not depicted in the frame itself but must be determined by means of an 757
additional constraint that RESULT STATE is P while the INITIAL STATE is $\neg\ P$. 758
For instance, the RESULT STATE is *bumfuzzled*, while the INITIAL STATE is *not* 759
bumfuzzled. Lastly, it should be noted that the frames depicted here are only partial, 760
as they omit all information that is not immediately relevant for our discussion. For 761
example we omit arcs that straddle nodes, as these arcs are taken to be implied. For 762
example, we omit the arc from *change of psych state* to the EXPERIENCER *entity* to 763
avoid unnecessary clutter. 764

Figure 3 presents a frame for possible shifts during the process of nominalization 765
of AMUSE VERBS with *-ment*. The noun frame in Fig. 3 does not differ from the 766
verb frame if the output reading is purely transpositional. In this case, reference 767
stays on the same node. If the new reading is non-transpositional, we see shifts of 768

the reference node, as indicated by the dashed arrows in Fig. 3. The reader may ₇₆₉
note that this frame includes not only the shifts to STIMULUS and RESULT STATE as ₇₇₀
discussed so far, but also shifts to the two sub-events *activity* and *change of psych* ₇₇₁
state. To understand this, consider the following example (21), repeated from (6): ₇₇₂

(21)   On apartheid South Africa, he called for the "constructive **enragement**" of ₇₇₃
       economics sanctions (COCA_NEWS_2010) ₇₇₄

In this attestation, *enragement* can have an activity interpretation, which means ₇₇₅
that the referential node has shifted from the top node denoting the whole psych ₇₇₆
causation event with its cause and effect to the *activity* node below it.[7] Similarly, ₇₇₇
it is possible to identify attestations which represent shifts to the *change of psych* ₇₇₈
state, such as (22). ₇₇₉

(22)   In her own case, Miss Reuben said, the **enragement** began when a professor ₇₈₀
       told her that it really wouldn't matter if she finished her doctoral thesis. ₇₈₁
       (Google_Mag_1972) ₇₈₂

To sum up our results in the light of this analysis, we find clear evidence for shifts ₇₈₃
to the event participants STIMULUS and RESULT STATE as well as to the causing ₇₈₄
and the caused subevents, labeled *activity* and *change of psych state*, respectively. ₇₈₅
Transposition in the classical sense, on the other hand, seems to be attested only ₇₈₆
when the context underspecifies possible shifts. This ties in very well with a recent ₇₈₇
observation by Lieber that, as soon as the specific semantic characteristics of a ₇₈₈
syntactic category are represented in a formal framework (such as Lieber's skeleton ₇₈₉
and body model, or the frame-based model presented in this paper), the notion of ₇₉₀
'transposition' cannot be maintained (Lieber 2014). She argues that affixes "can ₇₉₁
never be purely transpositional in the traditional sense: the very fact of changing ₇₉₂
category invariably presupposes some non-trivial semantic change." (p. 1) ₇₉₃

Figure 4 applies our frame representation to a specific example, namely the noun ₇₉₄
bumfuzzlement in a RESULT STATE reading. This frame differs from that in Fig. 3 ₇₉₅
in two respects: Firstly, it is more specifically labeled. Secondly, the meaning shift ₇₉₆
from the verb to the noun is indicated by a shift from the original referential node, ₇₉₇
labeled *bumfuzzle event*, to the node specifying the RESULT STATE as *bumfuzzled*. ₇₉₈

The frame-based implementation of shifts raises the question if there are any ₇₉₉
principled restrictions as to which nodes can be targeted by shifts. And indeed such ₈₀₀
restrictions have been proposed. Importantly, in order for a shift of reference to ₈₀₁
be successful, a condition which has been termed *bidirectional functionality* has ₈₀₂
to be fulfilled (see Schulzek 2014, 229). This restriction entails that there have ₈₀₃
to be directed arcs in both directions between the original and the target referent ₈₀₄
node. In other words, the relation between two nodes has be functional in both ₈₀₅
directions. Note that the original and the target node do not have to be adjacent to ₈₀₆

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[7]It will have to be determined in further research whether all ACTION NOUNS based on PSYCH
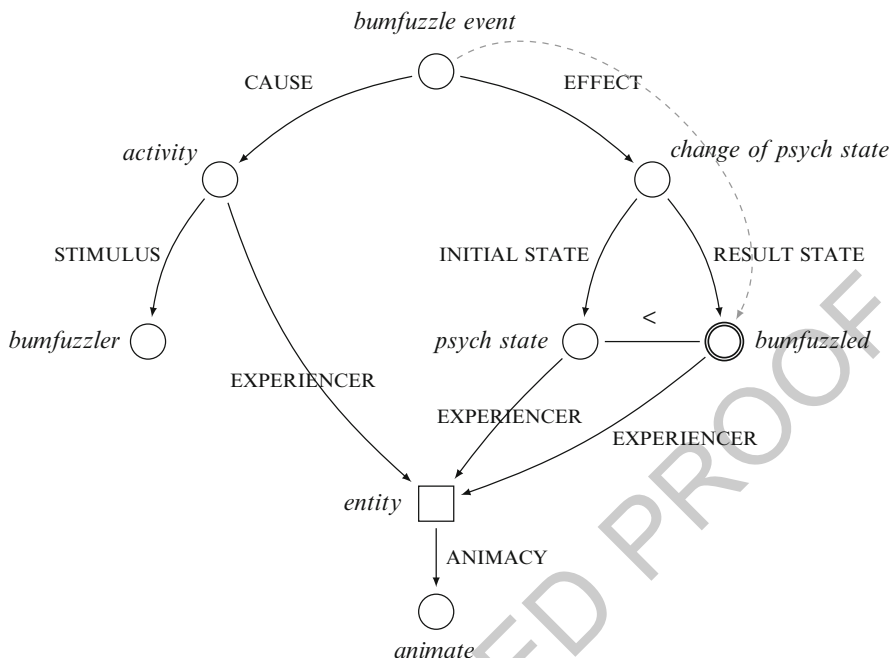VERBS behave like this.

Fig. 4 Partial frame for the nominalization *bumfuzzlement* in a RESULT STATE reading

one another. The path between them can span more than one arc, and bidirectional 807
functionality has to apply to every step on the way if this is the case. The need for 808
this restriction results from the fact that, by definition, each node in the frame has to 809
be reachable from the central node. If reference is shifted metonymically in a given 810
utterance, it is important for understanding that the shift can be uniquely identified. 811
For instance, unique reference would not be given if a speaker referred to a student 812
as *the university*, since there is more than one student at a university, and thus more 813
than one *student* node in a university frame. Note that bidirectional functionality 814
can also be generated by a context which is sufficiently restricted (see Löbner 1985, 815
316). Schulzek (2014, 230) gives as an example a student who competes in a race as 816
a representative of his university's team. Since all other students are thus excluded 817
as possible referents, a sentence such as (23) is interpretable. 818

(23)   Heinrich-Heine-University won the race. 819

The context of a psych causation event is quite restricted. Staying with the example 820
of the clown amusing the children, we are "zooming in" to just part of the situation, 821
excluding other factors such as a walking action in which the clown may be 822
involved, or the one child which is scared by the clown. In this psych causation, 823
we would argue that bidirectional functionality is indeed given for every relevant 824
node in the frame, that is, every node we do find a shift to. For instance, there is 825
exactly one STIMULUS involved in this activity, and while it may be involved in 826

further activities, these are excluded here by context. On the other hand, a shift to the INITIAL STATE may not be possible because it is not bi-uniquely linked to the original central node. While the *change of psych state* has some INITIAL STATE which is defined as "not bumfuzzled", there is no functional relation in the other direction. The "not bumfuzzled" state does not imply any change of psych state since it only exists as such in retrospect. Likewise, the EXPERIENCER in our psych causation event will be in more than one psych state before. Again, there is no bi-unique link between both nodes. Thus, our frame analysis may explain why *-ment* cannot produce an INITIAL STATE reading in PSYCH VERBS.[8]

Given the absence of any EXPERIENCER readings with *-ment*, it is obvious that shifts are not possible to all of the nodes which are bi-uniquely connected to the central node in the verb frame. As has also been observed by Schulzek (2014, 236), further restrictions are bound to exist. In the case of EXPERIENCER readings, we have argued that *-ee* and *-er*, being more salient in this semantic category, may exert some kind of blocking effect. In a frame approach, this could be modeled by weighting the attributes in frames which depict the properties of affixes. For instance, a frame for *-ee* would contain primary attributes for PATIENT and THEME and secondary attributes for AGENT, EXPERIENCER and STIMULUS (see Bauer et al. 2013, 231 for an overview of the primary and secondary domains of nominal suffixes in English). With such a frame for each nominal suffix of English, predictions could be made about which affix is most likely to form certain semantics. Combined with base verb frames, these predictions would be even more accurate. Apart from the potential blocking effect of *-ee* for EXPERIENCER readings we speculated that, depending on how the STIMULUS is defined, *-ment* may indeed completely disallow [+animate] referents. If this were the case, which would have to be asserted in future research, this fact could be incorporated by a general type restriction on *-ment*, again represented in a frame which describes this suffix.

6.2 MARVEL VERBS

The frame introduced in Fig. 2 for AMUSE VERBS can, in a slightly modified form, be used to represent a subset of the MARVEL VERBS, namely those that are considered to result from causation (see again our above discussion and the findings in Härtl 2001).

Reference in this frame (shown in Fig. 5), is on the node representing the value of the RESULT STATE attribute. This indicates that MARVEL VERBS are state verbs. The entities representing STIMULUS and EXPERIENCER are, again, arguments of the verb and thus given with rectangular shape. For the sake of clarity, we have abstained

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[8]In fact, both in English and in any language the authors can think of, these cannot be marked morphologically. In English, the initial state can be expressed in the semantics of a lexeme (e.g. *deactivate*) or clarified by context ("The clown managed to amuse the scared children").
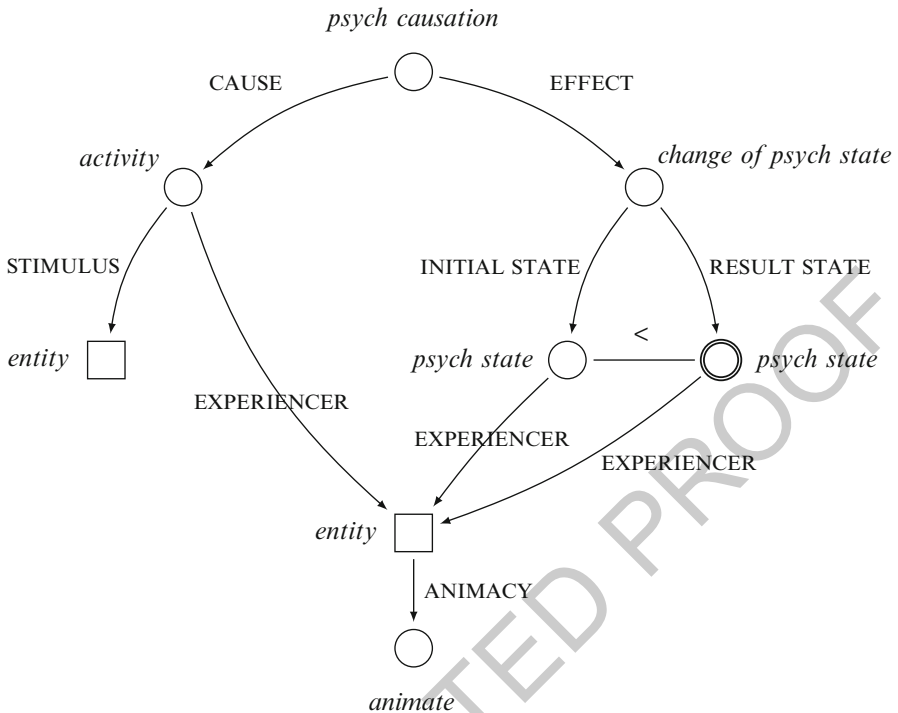
Fig. 5 Partial frame for MARVEL VERBS presupposing a causative event

from sketching the respective arcs from the *psych state* node towards these. It is ⁸⁶³ interesting to note that the frame representation of the passive forms of AMUSE ⁸⁶⁴ VERBS (such as *being amused, being aroused* or *being upset*) would correspond to ⁸⁶⁵ the one in Fig. 5. ⁸⁶⁶

As already hinted at above, not all MARVEL VERBS listed in VerbNet fit into this ⁸⁶⁷ causation frame. Verbs which do not seem to presuppose causation are, for instance, ⁸⁶⁸ *approve of* or *beware of*. These need to be depicted in a different frame, such as the ⁸⁶⁹ one in Fig. 6. ⁸⁷⁰

This frame differs from the causation frames in Figs. 2 and 5 in several points. ⁸⁷¹ First, no causation is depicted. Instead, we find a simple event, which we have ⁸⁷² termed 'psych reaction'. This label reflects the terminological distinction between ⁸⁷³ the predicates CAUSE and IN REACTION TO in VerbNet. Note that the STIMULUS is ⁸⁷⁴ still present in the semantics of the verb and thus part of the frame. ⁸⁷⁵

An interesting question would be whether there is an empirically provable ⁸⁷⁶ difference between caused and non-caused SUBJEXP PSYCH VERBS. A testable ⁸⁷⁷ indicator may be the presence or absence of a STIMULUS reading in nominalizations ⁸⁷⁸ with *-ment*, assuming that the two verbs in our dataset actually reflect more general ⁸⁷⁹ patterns. Accordingly, the presence of a STIMULUS would indicate a stronger, ⁸⁸⁰ causative bond, while its absence would reflect the fact that the bond is weaker, and ⁸⁸¹
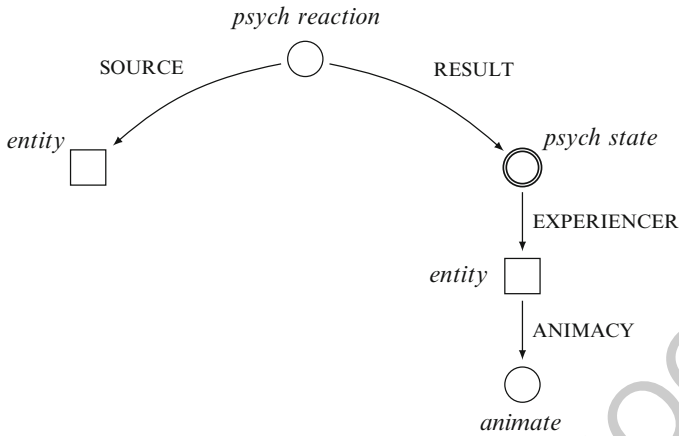
Fig. 6 Partial frame for stative MARVEL VERBS

of the type 'psych reaction'. Further research will be needed in order to determine 882
whether this is the case, and whether such a 'psych reaction' frame is indeed 883
justified, or just a relic of the limited MARVEL VERB data in our dataset. 884

Starting from the two different frames we depicted for the two groups of 885
MARVEL VERBS (caused/complex vs. non-caused/in-reaction-to/simple), we can 886
now discuss the frames of their respective nominalizations. One problem with this 887
is that we do not know whether the behavior of the two only forms in our data set, 888
musement and *approvement*, reflects general tendencies found in nominalizations 889
based on MARVEL VERBS. Therefore, the following statements merely refer to 890
the *approvement* frame and the *musement* frame, with the prospect that these 891
may correspond to more general caused and non-caused MARVEL-nominalization 892
frames. 893

Since *approvement* is only attested in a transpositional STATE reading, its noun 894
frame is identical to the frame of the base verb (see Löbner 2013), and as such is 895
in accordance with Fig. 6. The apparent constraint that prohibits a shift to the entity 896
representing the STIMULUS is not inherent in the frame as it is, since bi-unique 897
relations can be assumed between this node and the central node. Ad hoc, one could 898
assume that the type of frame ('psych reaction') generally precludes such a shift. 899
This would have to be tested with further data, that is, more MARVEL VERBS, or 900
other verb classes which feature a similar semantics (e.g. FLINCH VERBS). 901

If the frames for AMUSE VERBS and for causative *muse over* are indeed identical, 902
the same shifts should be possible in nominalizations on both base types. This does 903
seem to be the case for *musement*. There is a shift to the entity representing the 904
STIMULUS, and we also find this noun in an EVENT/ACTION reading. Above, we 905
speculated that this is due to the polysemous nature of the verb, which can be 906
interpreted both statively and actively, depending on the context. Further research 907
will show whether only these polysemous MARVEL VERBS can also be regarded 908

as caused. If in this class there are unambiguously attested stative verbs which 909
presuppose causation but do not allow shifts to the event node, we would have to 910
find a way how to formalize this in frames. 911

7 Conclusion   912

In this paper we have investigated a small subset of productively formed *-ment* 913
derivatives of the twentieth and twenty-first centuries to see how the polysemy 914
found in this morphological category can be better understood. The analysis of the 915
semantics of input and output has shown that *-ment* has clear preferences for certain 916
types of base verb, and that the resulting derivatives show a well restricted set of 917
possible readings. 918

Thus, among PSYCH VERBS the suffix *-ment* has a clear preference to attach 919
to AMUSE VERBS, which may be best explained by base-driven morphological 920
restrictions of the other sub-classes (e.g. ADMIRE VERBS prefer *-ation*). 921

On the output we find transpositional readings, i.e. from STATE verb to STATE 922
noun and from EVENT verb to EVENT noun. We also find RESULT STATE readings 923
and STIMULUS readings, but no EXPERIENCER reading is attested. Notably, these 924
shifts are not restricted to the arguments of the base verbs, i.e. STIMULUS and 925
EXPERIENCER in the case of AMUSE verbs, but can also target non-argumental 926
components of the semantic representation. 927

The frame-based analysis has demonstrated how these readings result from 928
clearly defined shifts in the semantic structure of the respective base words. The 929
differences between different (sub-)classes of verbs thus arise naturally from the 930
differences in the verbal frames. 931

Future work will have to show whether this kind of formal approach can be 932
extended to larger data sets of *-ment* derivatives and to other kinds of nominal- 933
izations, or indeed all kinds of derivational morphological processes. 934

References   940

Alexiadou, Artemis. 2001. *Functional structure in nominals: Nominalization and ergativity*, 941
    Linguistik aktuell/Linguistics today, vol. 42. Amsterdam/Philadelphia: J. Benjamins. 942
Baayen, R. Harald. 1993. On frequency, transparency, and productivity. In *Yearbook of morphology* 943
    1992, ed. Geert Booij and Jaap van Marle, 181–208. Dordrecht: Kluwer Academic. 944

Baayen, R. Harald. 2009. Corpus linguistics in morphology: Morphological productivity. In *Corpus linguistics*, ed. Anke Lüdeling and Merja Kytö, 900–919. Berlin: Mouton de Gruyter.

Baayen, R. Harald, and Antoinette Renouf. 1996. Chronicling the times: Productive lexical innovations in an English newspaper. *Language* 72(1): 69–96.

Bach, Emmon. 1986. The algebra of events. *Linguistics and Philosophy* 9: 5–16.

Baker, Mark. 2003. *Lexical categories: Verbs, nouns, and adjectives*. Cambridge: Cambridge University Press.

Barque, Lucie, Antonio Fábregas, and Rafael Marín. 2011. On the (un)countability of stative deverbal nouns. Chronos X. 18.04.-20.04.2011.

Barsalou, Lawrence W. 1992a. *Cognitive psychology: An overview for cognitive sciences*. Hillsdale: Erlbaum.

Barsalou, Lawrence W. 1992b. Frames, concepts, and conceptual fields. In *Frames, fields and contrasts*, ed. Adrienne Lehrer and Eva Feder Kittay, 21–74. Hillsdale: Erlbaum.

Bauer, Laurie. 1983. *English word-formation*. Cambridge: Cambridge University Press.

Bauer, Laurie. 2001. *Morphological productivity*. Cambridge: Cambridge University Press.

Bauer, Laurie, Rochelle Lieber, and Ingo Plag. 2013. *Oxford reference guide to English morphology*. Oxford: Oxford University Press.

Beard, Robert. 1995. *Lexeme-morpheme base morphology: A general theory of inflection and word formation*. Albany: State University of New York.

Brandtner, Regine. 2011. *Deverbal nominals in context: Meaning variation and copredication*. Stuttgart: Universitätsbibliothek der Universität Stuttgart dissertation. http://elib.uni-stuttgart.de/opus/volltexte/2011/6359.

Bresnan, Joan. 1982. *The mental representation of grammatical relations*, MIT press series on cognitive theory and mental representation. Cambridge, MA: MIT.

Chomsky, Noam. 1970. Remarks on nominalization. In *Readings in English transformational grammar*, Roderick Jacobs, and Peter Rosenbaum, 184–221. Waltham: Blaisdell.

Davies, Mark. 2008. The Corpus of Contemporary American English: 450 million words, 1990-present. http://corpus.byu.edu/coca/.

Davies, Mark. 2013. Corpus of Global Web-Based English (GloWbE). http://corpus2.byu.edu/glowbe/.

Diemer, Stefan. 2011. Corpus linguistics with Google? In *Proceedings of ISLE 2 Boston 2008*

Ehrich, Veronika, and Irene Rapp. 2000. Sortale Bedeutung und Argumentstruktur: ung-Nominalisierungen im Deutschen. *Zeitschrift für Sprachwissenschaft* 19(2): 245–303.

Filip, Hana. 1999. *Aspect, eventuality types, and nominal reference*. New York: Garland Pub.

Geuder, Wilhelm. 2000. *Oriented adverbs: Issues in the lexical semantics of event adverbs*. Tübingen: Universität Tübingen dissertation.

Grimshaw, Jane Barbara. 1990. *Argument structure*, Linguistic inquiry monographs, vol. 18. Cambridge, MA: MIT.

Härtl, Holden. 2001. Mapping conceptual onto grammatical structures: The case of psych verbs. In *Structural aspects of semantically complex verbs*, ed. N. Dehé and A. Wanner. Frankfurt/New York: Lang.

Heyvaert, Liesbet. 2003. *A cognitive-functional approach to nominalization in english*, Cognitive linguistics research, vol. 26. Berlin/New York: Mouton de Gruyter.

Hundt, Marianne, Nadja Nesselhauf, and Carolin Biewer, eds. 2006. *Corpus linguistics and the web*, Language and computers – Studies in practical linguistics, vol. 59. Amsterdam: Rodopi.

Jackendoff, Ray. 1983. *Semantics and cognition*. Cambridge, MA: MIT.

Jackendoff, Ray. 1990. *Semantic structures*. Cambridge, MA: MIT.

Jackendoff, Ray. 1991. Parts and boundaries. *Cognition* 41(1–3): 9–45.

Kallmeyer, Laura, and Rainer Osswald. 2013. Syntax-driven semantic frame composition in lexicalized tree adjoining grammars. *Journal of Language Modelling* 1(2): 267–330.

Kipper, Karin, Anna Korhonen, Neville Ryant, and Martha Palmer. 2008. A large-scale classification of English verbs. *Language Resources and Evaluation* 42(1): 21–40. doi:10.2307/41217861.

Klein, Katarina, and Silvia Kutscher. 2005. Lexical economy and case selection of psych-verbs in German. Ms.

Lees, Robert B. 1963. *The grammar of English nominalizations*. Bloomington: Indiana University.

Levin, Beth. 1993. *English verb classes and alternations: A preliminary investigation*. Chicago: University of Chicago Press.

Lieber, Rochelle. 1998. The suffix -ize in English: Implications for morphology. In *Morphology and its relation to phonology and syntax*, ed. S. G. Lapointe, D. K. Brentari, and P. M. Farrell, 12–34. Stanford: CSLI Publications.

Lieber, Rochelle. 2004. *Morphology and lexical semantics*, Cambridge studies in linguistics, vol. 104. Cambridge/New York: Cambridge University Press.

Lieber, Rochelle. 2014. The semantics of transposition. Paper presented at the "Semantics of Derivational Morphology" workshop, June 30–01 July, Heinrich-Heine-Universität Düsseldorf.

Lieber, Rochelle, and Harald Baayen. 1999. Nominalizations in a calculus of lexical semantic representations. In *Yearbook of morphology 1998*, ed. Geert Booij and Jaap van Marle, 175–198. Dordrecht: Springer.

Lindsay, Mark, and Mark Aronoff. 2013. Natural selection in self-organizing morphological systems. In *Morphology in Toulouse*, ed. Fabio Montermini, Gilles Boyé, and Jesse Tseng. Muenchen: Lincom Europa.

Löbner, Sebastian. 1985. Definites. *Journal of Semantics* 4(4): 279–326.

Löbner, Sebastian. 2013. *Understanding semantics*, 2nd ed. London: Arnold.

Marchand, Hans. 1969. *The categories and types of present-day English word-formation*. Munich: Beck.

Martsa, Sándor. 2013. *Conversion in English: A cognitive semantic approach*. Cambridge: Cambridge Scholars Publishing.

Melloni, Chiara. 2011. *Event and result nominals: A morpho-semantic approach*. Bern/New York: Peter Lang.

OED. 2013. *The Oxford English dictionary online*. Oxford: Oxford University Press. http://www.oed.com/.

Osswald, Rainer. 2005. On result nominalization in German. In *Proceedings of sub9*, ed. Emar Maier, Corien Bary, and Janneke Huitink, 256–270. Nijmegen: Radboud University.

Osswald, Rainer, and Robert D. Van Valin. 2014. Framenet, frame structure, and the syntax-semantics interface. In *Frames and concept types*, ed. Thomas Gamerschlag, Doris Gerland, Rainer Osswald, and Wiebke Petersen. Dordrecht: Springer.

Panther, Klaus-Uwe, and Linda L. Thornburg. 2002. The roles of metaphor and metonymy in English -er nominals. In *Metaphor and metonymy in comparison and contrast*, ed. René von Dirven and Ralf Pörings, 279–322. Berlin/New Jersey: De Gruyter.

Pesetsky, David. 1995. *Zero syntax: Experiencers and cascades*. Cambridge, MA: MIT.

Petersen, Wiebke. 2007. Representation of concepts as frames. In *The Baltic international yearbook of cognition, logic and communication*, vol. 2, ed. Jurgis Skilters, 151–170. Kansas: New Prairie Press.

Plag, Ingo. 1998. The polysemy of -ize derivatives: The role of semantics in word formation. In *Yearbook of morphology 1997*, ed. Geert Booij and Jaap van Marle, 219–242. Dordrecht: Foris.

Plag, Ingo. 1999. *Morphological productivity: structural constraints in English derivation*. Berlin/New York: Mouton de Gruyter.

Plag, Ingo. 2003. *Word-formation in English*. Cambridge/New York: Cambridge University Press.

Pollard, Carl, and Ivan A. Sag. 1994. *Head-driven phrase structure grammar*. Chicago: University of Chicago Press.

Pullum, Geoffrey K. 1991. English nominal gerund phrases as noun phrases with verb-phrase heads. *Linguistics* 29(5): 763–799.

Pustejovsky, James. 1995. *The generative lexicon*. Cambridge: Cambridge University Press.

Radden, Günter, and Zoltán Kövecses. 1999. Towards a theory of metonymy. In *Metonymy in language and thought*. Human cognitive processing, vol. 4, ed. Klaus-Uwe Panther and Günter Radden, 17–60. Amsterdam/Philadelphia: J. Benjamins.

Rainer, Franz, Wolfgang U. Dressler, Francesco Gardani, and Hans Christian Luschützky. 2014. Morphology and meaning: An overview. In *Morphology and meaning*, vol. v. 327, 3–48. Amsterdam: Benjamins.

Renouf, Antoinette, Andrew Kehoe, and Jayeeta Banerjee. 2006. Webcorp: an integrated system for web text search. In: *Corpus linguistics and the web*, Language and computers, vol. 59, ed. Marianne Hundt, Nadja Nesselhauf, and Carolin Biewer, 47–67. Amsterdam: Rodopi.

Roßdeutscher, Antje. 2010. German -ung-nominalization. An explanation of formation and interpretation. *Linguistische Berichte Sonderheft* 17: 101–132.

Roßdeutscher, Antje, and Hans Kamp. 2010. Syntactic and semantic constraints in the formation and interpretation of ung-nouns. In *The semantics of nominalizations across languages and frameworks*, Interface explorations, vol. 22, ed. Monika Rathert and Artemis Alexiadou, 169–214. Berlin/New York: De Gruyter Mouton.

Roy, Isabelle, and Elena Soare. 2012. *Event-related Nominalizations. 2012.* Ms. <hal-00723654v1>. https://hal.archives-ouvertes.fr/file/index/docid/723654/filename/Nom_event_.pdf

Saeed, John I. 2009. *Semantics*, Introducing linguistics, vol. 2, 3rd ed. Malden: Wiley-Blackwell.

Schmid, Hans-Jörg. 2011. *English morphology and word-formation: Second revised and translated edition*. Berlin: Erich Schmidt Verlag.

Schulzek, Daniel. 2014. A frame approach to metonymical processes in some common types of German word formation. In *Frames and concept types*, ed. Thomas Gamerschlag, Doris Gerland, Rainer Osswald, and Wiebke Petersen, 221–242. Dordrecht: Springer.

Sil, Avirup, Fei Huang, and Alexander Yates. 2010. Extracting action and event semantics from web text. In *Proceedings of the AAAI 2010 fall symposium on commonsense knowledge*, Arlington, 108–113.

Spencer, Andrew. 2010. *Lexical relatedness: A paradigm-based model*. Oxford: Oxford University Press.

Taylor, John R. 2002. *Cognitive grammar*. Oxford: Oxford University Press.

Trips, Carola. 2009. *Lexical semantics and diachronic morphology: The development of -hood, -dom and -ship in the history of English*. Tübingen: Niemeyer.

Uth, Melanie. 2011. *Französische Ereignisnominalisierungen: Abstrakte Bedeutung und regelhafte Wortbildung*, Linguistische Arbeiten, vol. 540. Berlin: De Gruyter.

Varchetta, Nicola. 2010. Psych-verbs: A locative derivation. In *University of Venice working papers*, vol. 20, ed. Laure Brugè, 113–155.

Yoon, James Hye Suk. 1996. Nominal gerund phrases in English as phrasal zero derivations. *Linguistics* 34: 329–356.

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