

The *-ing* dynasty: Rebuilding the semantics of nominalizations *

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Abstract The nature of *-ing* nominals has been widely debated since the early days of generative grammar (e.g. Lees 1960, Chomsky 1970), and at least since Vendler (1967), *-ing* forms also have played a central role in debates over natural language ontology for abstract objects. This paper attempts to simplify the ontology and account for the uses and interpretations a wide range of *-ing* forms using only a distinction between event types and event tokens. A core insight will be that the different constructions reflect different paths by which the *-ing* form may come to have type or token reference. A central contrast present among these different paths involves whether the event types/tokens are individuated through nominal morphology or through temporal anchoring.

Keywords: nominalization, gerunds, event types

1 Introduction

The nature of *-ing* nominals has been widely debated since the early days of generative grammar (e.g. Lees 1960, Chomsky 1970). This paper, part of a larger project investigating the syntax and semantics of nominalizations, will focus on the constructions given in (1) along with labels for each construction, which have been at the center of theoretical discussions of *-ing* nominals, such as Abney (1987).

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|-----|------------------------------|---------------------------------------|
| (1) | a. raking the leaves | (VP- <i>ing</i> aka PRO- <i>ing</i>) |
| | b. Al raking the leaves | (ACC- <i>ing</i>) |
| | c. Al's raking the leaves | (POSS- <i>ing</i>) |
| | d. the raking of the leaves | (- <i>ing</i> _{of}) |
| | e. Al's raking of the leaves | (POSS- <i>ing</i> _{of}) |

Part of the interest in *-ing* nominals is no doubt due to the large variation in syntactic and morphological behavior they manifest. Marchand (1969) gives eight derivational

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processes that produce *-ing* words, such as deverbal adjectives (*charming, fascinating*) or denominal nouns of material (*planking, roofing*), while Pullum & Zwicky (1999) list twenty-five distinct syntactic constructions that use an *-ing*-inflected verb. A full account of *-ing* forms in their syntax, morphology, and semantics remains a challenge for the future. Yet even the syntactic and semantic analysis of just those *-ing* forms in (1) has given rise to much controversy.

Since at least Vendler (1967), interpretive differences between the forms have been treated by appeal to different sorts of abstract objects and, as such, *-ing* forms have played a central role in debates over natural language ontology. While there has traditionally been agreement that the nominal gerund forms in (1d)-(1e) refer to events, there has been far less consensus as to what sort of semantic object is at issue in the verbal gerund forms in (1a)-(1c). Vendler (1975) argues that the POSS-*ing* form in (1c) designates a *fact*, which is distinct from a propositional entity. Zucchi (1993), disagreeing with some of the empirical claims put forth by Vendler, takes the POSS-*ing* form to designate a *state of affairs*, which in turn is a primitive object in the subdomain of propositional entities.¹ Portner (1992) recasts the propositional analysis of verbal gerund *-ing* forms in a system that defines propositions terms of situations rather than possible worlds. Finally, a completely different perspective is given by van Lambalgen & Hamm (2005), working within their own particular event calculus. They argue that the ACC-*ing* (1b) and POSS-*ing* (1c) forms denote *fluents*, which are primitive time-dependent properties, while *-ing*_{of} (1d) and POSS-*ing*_{of} (1e) may denote either event types or tokens.

Despite the merits these accounts, additional ontological objects such as facts, states of affairs as Zucchi defines them, and fluents are not otherwise motivated and have not been widely integrated elsewhere in semantic theory. This paper attempts to simplify the ontology and account for the different uses and interpretations of all of the *-ing* forms in (1) using only a distinction between event types and event tokens. A core insight will be that the different constructions in (1) reflect different paths by which the *-ing* form may come to have type or token reference. A central contrast present among these different paths involves whether the event types/tokens are individuated through nominal morphology or through temporal anchoring.

This investigation also parts ways with previous accounts in its empirical focus. Despite the heterogeneous theoretical views manifest in the accounts of *-ing* nominals, the data employed have largely been similar, following the original discussion in Vendler (1967), namely single sentences with the *-ing* form typically in subject or direct object position. Our study points to importance of examining these constructions in other sentential functions and in discourse.

¹ States of affairs, according to Zucchi (1993: 207) differ from propositional entities in that they do “not have the property of truth or falsehood” and cannot be “objects of belief”, but are objects of which one can be aware or informed.

The organization of the paper is as follows. In section 2, we re-examine the empirical characterization of *-ing* nominals based on an extensive corpus search. Section 3 provides analyses of the constructions given in (1), showing how they are related to each other and discussing some of the predictions made by our reconstruction of the family of *-ing* constructions. We take stock in section 4 and point to connections between our analysis and recent treatments of nominalization phenomena in Spanish and Romanian.

2 The landscape of *-ing* forms

Although the investigation of *-ing* form has a distinguished history, the empirical study of the use and occurrence of *-ing* forms has been rather restricted. In re-examining the syntax and semantics of nominalizations, we have endeavoured to achieve a more global understanding of the usage patterns, with the hope that this would provide further insight into the semantic foundations of nominalization. Through systemantic corpus work, we found that indeed there are a far wider range of uses of *-ing* forms than treated in the literature.

We examined all uses of the *-ing* forms in 40 different verbs in the Brown Corpus (Francis & Kucera 1979). The verbs were chosen to represent a sample of different argument realization types. In particular, we culled verbs from the list used in The Leipzig Valency Classes Project (http://www.eva.mpg.de/lingua/valency/files/database_manual.php). We excluded from consideration *-ing* forms appearing in the progressive (*is singing*) or as a prenominal modifier (*the singing nuns*). Table 1 displays a summary of the distribution of 869 tokens of *-ing* nominalizations in the Brown Corpus.²

Several distributional asymmetries are visible in the data. First, the vast majority (82%) of *-ing* forms occurred with no overt determiner or subject. This is in contrast to much greater attention which has been given to configurations as in (1b)-(1e), where a determiner or possessive “subject” is present. One of the literature’s central concerns is understanding how “subjects” are realized in nominalizations, whether in ACC-*ing* or POSS-*ing* configurations. Yet the combined total of these forms is only 8%. Second, 85% of the naturally-occurring examples in our sample occurred **outside** of argument positions: mainly with prepositions (*by reading the letter*) or connectives (*while raking*), or as adverbial adjuncts as in (2) or (3).

² The table provides a simplified version of our data analysis in order to permit better readability. For instance, we further distinguished between *-ing* forms occurring with determiners or possessives with and without an *of*-phrase. Note that we also counted bare *-ing* forms (*singing*) separately; cf. the **Bare** column. Similarly, several minor syntactic contexts have been excluded here, such as when an *-ing* form follows a semi-auxiliary or verbs like *start* or *help*.

- (2) He saw Mose squatting by the hearth, **breaking up hardtack into a pan**. (Brown K11)
- (3) Isaac Pitt, one of the men from Lincoln, had taken a musket ball in his belly; and though he had found the strength to run with us, now he collapsed and lay on the ground, dying, **the Reverend holding his head and wiping his hot brow**. (Brown K09)

Again, this contrasts with most of the literature on nominalizations, which has focused on *-ing* nominals in argument positions. For instance, all of the examples of nominalization in Kratzer (1996) are in argument position. Finally, while verbal gerund forms (1a)-(1c) and nominal gerund forms (1d)-(1e) have received roughly equal attention in the nominalization literature, there is far greater use of verbal gerund forms as opposed to nominal gerund forms, which only constitute 10.6% of the total (excluding bare forms as well as .4% of the POSS forms which are clearly verbal, possessing direct arguments).

This preliminary investigation of the distribution of *-ing* forms revealed a range of ways in which the different constructions in (1) contrast, which in turn provide crucial, and to our knowledge novel, indications of the semantic content of *-ing* forms. We detail two of these contrasts to which we will return in our analysis of *-ing* forms in section 3.

First, we found a variety of *-ing* forms in prepositional phrases accompanying nouns with very specific selectional preferences. For instance, while *capable* systematically accepts VP-*ing* forms, it accepts definite *ing*_{of} only in very specific contexts, as shown in (4). The definite form *the raking of the leaves* in (4b) is only possible when the task of raking leaves is already established in the discourse. This is not unique to *capable*, but rather is visible in a range of other cases such as *the technique of*, *his way of*, or *has the effect of*.

- (4) a. Al is capable of **raking leaves**
 b. ??Al is capable of **the raking of the leaves**

A second contrast is that only VP-*ing* and ACC-*ing* appear as sentential adjuncts. For example, the substitution of other *-ing* forms in 2 results in infelicity.

- (5) a. ??He saw Mose squatting by the hearth, **the breaking up of hardtack into a pan**.
 b. ??...he...lay on the ground..., **the Reverend's/the holding (of) his head and wiping (of) his hot brow**.

In sum, despite the deep literature on nominalizations, a range of uses of nominalizations and distributional contrasts have been left unexamined, providing a

Function	VP- <i>ing</i>	ACC- <i>ing</i>	Bare	Det- <i>ing</i>	Poss	Total
Nominative Subject	0.012	0.003	0.016	0.021	0.002	0.054
Accusative Object	0.026	0.022	0.003	0.030	0.006	0.087
Adverbial Adjunct	0.274	0.016	0.001	0.003	0.000	0.294
Following Unselected Prep.	0.244	0.014	0.037	0.014	0.003	0.312
Following Selected Prep.	0.105	0.006	0.013	0.016	0.004	0.144
Following Connective	0.032	0.002	0.005	0.001	0.000	0.040
Nominal Modifier	0.033	0.000	0.000	0.000	0.000	0.033
Secondary Predicate	0.015	0.001	0.000	0.000	0.000	0.016
Predicate Nominal	0.001	0.001	0.001	0.010	0.000	0.013
Purpose Clause	0.003	0.000	0.000	0.000	0.000	0.003
Total	0.745	0.065	0.076	0.095	0.015	0.996

Table 1 Distribution (in %) of *-ing* Construction Type by Syntactic Context

number of puzzles. As we proceed we will build up an analysis which will address nominalizations in these contexts, as well as connect with the semantic contrasts previously observed in the literature.

3 Analysis

3.1 The foundation: Event kinds and tokens

Our analysis divides *-ing* forms into two large categories: those built up from nouns (nominal) and those built up from verbs (verbal). We refer to as *nominal* all and only those *-ing* forms whose theme participant is never expressed with a direct DP, but rather appears introduced by *of*; we refer to as *verbal* those *-ing* forms that take DPs not flagged by any preposition.³ That is, we group together *-ing_{of}* and *POSS-ing_{of}* as nominal, and *PRO-ing*, *ACC-ing*, and *POSS-ing* as verbal. Note that some forms will not be easily identifiable as belonging to the nominal or verbal subcategory, e.g. those with no complements at all; however, we do not consider this a problem.

Our analysis builds on two key ingredients. The first is the idea, going back at least to Carlson (1977), that natural language ontology includes both kinds (or types

³ We do not discard the possibility of a more elegant analysis that unifies the two *-ing* forms in some way. However, as our main goal here is to put order in the relationship between the constructions in (1), for lack of space we set aside the logically prior issue of how an *-ing* form ends up being licensed for use both with *of*-introduced DPs and with directly introduced DPs, and simply assume ambiguity.

- we use the terms interchangeably here) and tokens.⁴ Crucially, this distinction is relevant across the subsorts of the entity domain: in addition to being able to refer to kinds of objects alongside token objects, we can refer in an analogous fashion to kinds of events alongside token events, where we use the term *event* in a maximally general way, to include not only e.g. processes and telic changes but also states. This should not be surprising insofar as kinds correspond to abstract categories that we form in our experience with the world, and we arguably categorize eventualities just as we categorize other sorts of individuals such as cups or fire fighters (including into categories as specific as e.g. the category of eventualities of Eric Clapton playing the guitar, which will include many tokens that have occurred in many places at many times).

Carlson developed his ontology as part of an analysis of kind reference and genericity in English. However, since then, kinds, and event kinds, have come to play a role in the analysis of a variety of other linguistic phenomena. The notion of event kind is close to the notion of situation type developed in Situation Semantics (e.g. Barwise & Perry 1983), which was driven in part by the goal of providing an alternative to possible worlds-based accounts of propositional attitudes. More recently, event kinds have been appealed to extensively in the analysis of different kinds of nominal and verbal modification (see e.g. Landman & Morzycki 2003, Gehrke & McNally 2011, Gehrke 2012, and references cited in these works). In short, though space precludes extended argumentation for the notion of event kinds, we consider the notion sufficiently well motivated to be used here.

A second key ingredient to the analysis is an extension of the approach to the syntax/semantics interface of kind vs. token-level expressions within the determiner phrase (DP) proposed in Zamparelli (1995). Zamparelli proposed that common nouns denote Carlsonian kinds, rather than sets of entities, as is commonly assumed. Common nouns come to denote sets only through type-shifting processes licensed by different sorts of functional structure or morphology. We will use a version of this analysis both for nominal and verbal *-ing* forms.

3.2 Nominal *-ing* forms

With these elements in hand, we turn to the analysis of nominal gerunds. As mentioned above, following Zamparelli (1995) we take common nouns, including *-ing* forms, to denote kinds, a sort of atomic entity. We represent these logically as fully spelled out constants (e.g. **raking**). We posit here that the type shifters that Zamparelli proposed to convert kinds to either token-level descriptions or

⁴ Following Carlson, we model kinds as atomic entities, though see McNally (2014) for discussion of how to connect the formal semantic notion of kind to notions in more conceptual approaches to meaning and to literature on concepts.

descriptions of subkinds (cf. e.g. *three wines* to refer to three varieties of wine) are introduced via number morphology. Thus, a singular-marked *-ing* form like *raking* will have the representations in (6), where NumP stands for Number Phrase, i.e. a number-marked expression, and e_k in (6b) stands for an event kind.

- (6) a. $[\text{NumP raking}] : \lambda e [\mathbf{R}(e, \mathbf{raking})]$
 b. $[\text{NumP raking}_{\text{subkind}}] : \lambda e_k \forall z \square [\mathbf{R}(z, e_k) \rightarrow \mathbf{R}(z, \mathbf{raking})]$

Note that in (6) we do not assign any arguments to the *-ing* form that would correspond to the participants in the event it describes. In this we depart from much of the syntax literature, which attributes argument structure to at least certain kinds of event nominalizations (e.g. Grimshaw 1990, Alexiadou 2001, among many others). Rather, based on results of a study reported in Grimm & McNally (2013), we adopt Dowty's 1989 conjecture that all nouns have a neo-Davidsonian denotation on which they denote 1-place properties of eventualities and all participants are treated as *adjuncts* (see also Zucchi 1993).⁵ Grimm & McNally (2013) provides corpus-based evidence showing that for *-tion* and *-ment* nominalizations, the empirical claims in the literature for treating theme-expressing *of*-phrases as arguments do not withstand scrutiny. For example, the putative obligatoriness of the *of*-phrase in (7a) in fact reflects discursal, rather than syntactic, requirements, as shown by the existence of attested examples such as (7b).

- (7) a. The destruction *(of Rome) by Caesar
 b. How does a country recover from **40 years of destruction by an unchallenged tyrant?** (Newsweek)

Similarly, though it has been claimed that the possibility of adverbial modifiers in examples like (8a) supports the presence of a verbal projection within *-ing* nominals, Payne, Huddleston & Pullum (2010) demonstrate that adverbials can post-modify non-eventive nouns, as in (8b).

- (8) a. The shutting of the gates regularly
 b. The **unique role globally** of the Australian Health Promoting Schools Association ...

Thus, on our account, *-ing_{of}* sub-phrases such as *raking of the leaves* are simply NumPs with *of*-PP adjuncts. These NumPs may be event-token denoting or event-(sub)kind denoting, as (9a) and (9b) respectively illustrate.

⁵ As we discuss in the next section, we will *not* make this assumption for verbal *-ing* forms, again following Dowty.

- (9) a. **The changing of the diaper** was definitely the funniest. I laughed the whole time. (Comment on a video of a specific diaper changing event at https://www.youtube.com/watch?v=r-UUK76fX_I)
- b. **The changing of diapers** will occur in a space that contains a hand washing facility. (Part of the Diapering Policy at <http://www.nelsd.org/Diapering.aspx>)

Accordingly, we treat the *of*-phrase as an adjunct which introduces an underspecified relation R_i , e.g. $\lambda x[R_i(x, \iota y[\mathbf{R}(y, \text{leaves})])]$, following Partee (1997) among others. The value for this relation will be picked up from the relations made available by the descriptive content of the *-ing* form, which we will notate through subscripting.

As set-denoting expressions, nominal *-ing* forms combine straightforwardly with determiners, as shown in (10), where we treat the definite article as contributing the iota operator. The *-ing_{of}* form is thus represented as in (10b).

- (10) a. *the*: $\lambda P \iota x[P(x)]$
- b. $[\text{DP} [\text{D}' \text{ the } [\text{NumP raking (of the leaves)}]]]:$
 $\iota e[\mathbf{R}(e, \text{raking}) \wedge R_{\text{theme}}(e, \iota y[\mathbf{R}(y, \text{leaves})])]$

The derivation of *POSS-ing_{of}* is exactly parallel. For the possessive construction, we use the analysis of extrinsic possession in Barker (1995), which he proposed for cases where the possessee noun was not relational. Barker proposed that possessive constructions were DPs headed by a null possessive morpheme ($\emptyset_{[\text{poss}]}$), which introduced a contextually-valued possession relation $\pi(x, y)$ as shown in (11a); his syntactic rules ensured that the output of $\emptyset_{[\text{poss}]}$ applied to some nominal would then combine with an 's-marked DP, where 's is semantically empty. Thus, a phrase like *Al's raking of the leaves* is represented as in (11b).

- (11) a. $\emptyset_{[\text{poss}]}$: $\lambda P \lambda x \lambda y[\pi(x, y) \wedge P(y)]$
- b. $[\text{DP Al's } [\text{D}' \emptyset_{[\text{poss}]} [\text{NumP raking (of the leaves)}]]]:$
 $\lambda e[\pi(\mathbf{a}, e) \wedge \mathbf{R}(e, \text{raking}) \wedge R_{\text{theme}}(e, \iota y[\mathbf{R}(y, \text{leaves})])]$

On this analysis, (11b) is analogous to an ordinary possessive DP like *Al's hat*.

3.3 Verbal *-ing* forms

We now turn to verbal *-ing*. While, under the account here, the path taken by nominal *-ing* forms to becoming referring expressions involves Number, the path that can be taken by verbal gerunds is not uniform: it may involve interaction with tense or, alternatively, combination with certain determiners. Like nominal *-ing* forms, the verbal forms may be both kind- and token-referring. Before we illustrate these distinct paths, however, we first lay out our basic assumptions about the verbal forms.

As mentioned in footnote 5, we adopt Dowty’s (1989) conjecture that verbs, unlike nouns, do have an ordered argument denotation.⁶ Accordingly, the representation of verbal *-ing* forms will be more complex, as illustrated in (12a) using *singing the song*. Specifically, we shift the type of **singing** from that of an event kind to a description of event kinds, using a version of Chierchia’s (1998) predicativizing \cup functor, of type $\langle e_k, \langle e_k, t \rangle \rangle$, in order to make it possible to add the arguments. The saturation of the theme argument results in a property of event kinds that is applicable to whatever bears the role of the external argument, as shown in (12b) (note that here and afterwards we abbreviate the representation of definite DPs that are not crucial to our main point, such as *the song*, with single letter constants such as **s**).

- (12) a. $[\text{V singing}]: \lambda y \lambda x \lambda e_k [\cup \text{singing}(e_k) \wedge \text{Theme}(y, e_k) \wedge \text{Agent}(x, e_k)]$
 b. $[\text{VP singing the song}]: \lambda x \lambda e_k [\cup \text{singing}(e_k) \wedge \text{Theme}(\mathbf{s}, e_k) \wedge \text{Agent}(x, e_k)]$

The representation in (12b) will serve as the basis upon which we illustrate the various verbal *-ing* forms. We first give an analysis for forms where the subject is not realized, i.e. VP-*ing*, then turn to the forms where the subject is realized by an accusative DP (both in section 3.3.1). We address cases where the VP combines with different determiners, notably possessives, in section 3.3.2.

3.3.1 Temporal anchoring of verbal *-ing*

VP-*ing* permits multiple uses; here we focus on two uses in subject position, illustrated in (13). We first discuss the derivation of the example in (13a) before turning to the generic-flavored (13b).

- (13) a. Singing the song upset Mary.
 b. Singing the song is a patriotic duty.

Singing the song begins as a property of event kinds, but the resulting interpretation in (13) is that a *particular event* of singing the song upset Mary. We propose that the entailment of a token singing event is achieved through the entailments that arise from it serving as the subject of the past-tense episodic predicate. (14) provides the denotations for *singing the song* and *upset Mary*, before the addition of tense.

- (14) a. *singing the song*: $\lambda e_k [\cup \text{singing}(e_k) \wedge \text{Theme}(\mathbf{s}, e_k) \wedge \text{Agent}(y_i, e_k)]$
 b. *upset Mary*: $\lambda x \lambda e'_k [\cup \text{upset}(e'_k) \wedge \text{Theme}(\mathbf{m}, e'_k) \wedge \text{Agent}(x, e'_k)]$

⁶ The arguments for making this assumption go beyond the scope of this work. For present purposes, we limit ourselves to observing that it is the predominant assumption concerning verb semantics, and in any case arguably less controversial than the position we take on nominal argument structure.

Three comments on (14) are necessary. First, we treat the main predicate *upset Mary* as a property of event kinds.⁷ Second, the variable representing the subject argument, x , ranges over ordinary entities and events, both tokens and types. Finally, we assume that the subject variable of VP-*ing*, y_i , may be left free to be contextually valued, as opposed to being obligatorily controlled. Although e.g. Kratzer (1996) claims that in examples like (15a) Maria must be interpreted as the agent, therefore suggesting obligatory control, examples like (15b) show that control is not obligatory: the misunderstander in this case need not be Maria.

- (15) a. Killing her cat upset Maria.
b. Misunderstanding Gödel's/her proof upset Maria.

It is not possible to directly compose the two representations in (14), for the main predicate *upset Mary* requires an individual (be it eventive or not), while *singing the song* provides a *property* (in this case, of event kinds). Though there is more than one way to solve this mismatch, here we use Chierchia's (1998) \cap -operator to turn the property into its entity correlate.

$$(16) \quad \cap(\lambda e_k[\cup \mathbf{singing}(e_k) \wedge \mathbf{Theme}(s, e_k) \wedge \mathbf{Agent}(y_i, e_k)])]$$

(16) can combine directly with the representation for *upset Maria* as follows:

$$(17) \quad \lambda x \lambda e'_k[\cup \mathbf{upset}(e'_k) \wedge \mathbf{Theme}(m, e'_k) \wedge \mathbf{Agent}(x, e'_k)](\cap(\lambda e_k[\cup \mathbf{singing}(e_k) \wedge \mathbf{Theme}(s, e_k) \wedge \mathbf{Agent}(y_i, e_k)])) \\ = \lambda e'_k[\cup \mathbf{upset}(e'_k) \wedge \mathbf{Theme}(m, e'_k) \wedge \mathbf{Agent}(\cap(\lambda e_k[\cup \mathbf{singing}(e_k) \wedge \mathbf{Theme}(s, e_k) \wedge \mathbf{Agent}(y_i, e_k)]), e'_k)]]$$

At this point in the derivation, *upset Mary* and *singing the song* still pick out event kinds, rather than particular events. Both event kind descriptions will be converted to event token descriptions, indirectly and directly, respectively, through interaction with tense. We provide a (simplified) entry for the past tense in (18a), adapted from Kratzer (1996), but with the key difference that a realization relation \mathbf{R} is included, which, for this example, converts the event type description contributed by *upset* into an event token description. The denotation of the tensed phrase is given in (18b).

- (18) a. [Past]: $\lambda P \lambda t \exists e, e_k [t < \mathbf{now} \wedge P(e_k) \wedge \mathbf{R}(e, e_k) \wedge \tau(e) = t]$
b. $\lambda t \exists e, e'_k [\cup \mathbf{upset}(e'_k) \wedge \mathbf{Theme}(m, e'_k) \wedge \mathbf{Agent}(\cap(\lambda e_k[\cup \mathbf{singing}(e_k) \wedge \mathbf{Theme}(s, e_k) \wedge \mathbf{Agent}(y_i, e_k)]), e'_k) \wedge t < \mathbf{now} \wedge P(e_k) \wedge \mathbf{R}(e, e_k) \wedge \tau(e) = t]$

⁷ On the analysis pursued here, all verbal predicates begin as referring on the kind-level. We will not explore the consequences of this position beyond the phenomena related to nominalizations considered here, although we note that position has been previously advocated in e.g. Carlson (2003).

While tense directly serves to introduce the event token argument we associate with the main predicate, it does not directly affect the *-ing* form subject. Rather, the entailment of an event token for the *-ing* form follows from the fact that the upsetting event must have been caused by a particular, in the same way that assertions involving explicit kind terms, such as (19) often entail propositions about tokens of the kind, due to the interaction of the lexical entailments of the main predicate with tense (see e.g. Carlson 1977 for discussion).

(19) That kind of singing upset Maria.

This analysis predicts that if the VP-*ing* combines with a predicate that does not entail anything about tokens of the kind, then it will retain its kind-level interpretation. Examples such as (13b), above, confirm this prediction. In this case, the property of being a patriotic duty can be ascribed to a kind of event without entailing the existence of any particular event: The duty to sing may remain unfulfilled, despite one's obligation.⁸

(20) $\text{duty}(\cap(\lambda e_k[\cup \text{singing}(e_k) \wedge \text{Theme}(s, e_k) \wedge \text{Agent}(y_i, e_k)]))$

On our analysis, ACC-*ing* constructions work exactly analogously to VP-*ing*. The only difference is that the subject of the *-ing* form is overtly, rather than contextually, saturated, as illustrated in (21):

(21) a. Jim singing the song
 b. $\lambda y \lambda e_k[\text{singing}(e_k, y, s)](\mathbf{j}) = \lambda e_k[\text{singing}(e_k, \mathbf{j}, \mathbf{s})]$

ACC-*ing* forms, just like VP-*ing* forms, have either type- or (indirect) token-level reference depending on the predicates with which they combine. As the subject of *upset Maria*, a token event of Jim singing is entailed, while as the complement to a predicate like *talk about*, which does not entail the existence of whatever is discussed, we get no such entailment (see (22b)):

(22) a. Jim singing the song upset Maria.
 b. She told him to come see her on Friday and they'd talk about **him running the bar once a week...** [Adapted from COCA]

As a final note, we should point out that our analysis does not exclude the possibility that some strings consisting of an accusative DP followed by an *-ing* form might constitute small clauses rather than VPs, if there should be a syntactic argument for maintaining such structures alongside those discussed here. However, we will not pursue this possibility further here.

⁸ Though as spelled out here, this representation entails that singing the song is some contextually-determined individual's duty, we see no reason why we could not generalize the \cap operator so that it would bind off arbitrarily many arguments, for a more transparently generic interpretation.

3.3.2 Instantiation via D

We now turn to the final structures in which verbal *-ing* forms appear. The first of these is POSS-*ing*. It has been argued by various researchers (e.g. Abney 1987, Pullum 1991) that POSS-*ing* has the internal structure of a VP and the external syntax of a possessive nominal. We follow this lead here. As verbal *-ing* forms without a saturated subject denote a relation between the subject denotation and an event kind, we can straightforwardly apply the semantics proposed in Barker’s (1995) for possessives whose possessee is relational, such as, on his analysis, the noun *father*.⁹ Barker proposed a lexical possession relation (23a) alongside the extrinsic possession relation we used for POSS-*ing*_{of}, which simply passes up the relation contributed by the possessee and allows the possessor phrase to saturate one of the participants in the relation, while the referent of the entire possessive construction saturates the other.

- (23) a. $\emptyset_{[\text{poss}']}: \lambda R[R]$
 b. $[_D \emptyset_{[\text{poss}']} [_{VP} \text{raking the leaves}]]:$
 $\lambda x \lambda e_k [\cup \text{raking}(e_k) \wedge \text{Theme}(\mathbf{l}, e_k) \wedge \text{Agent}(x, e_k)]$
 c. $[_{DP} \text{Jim's}]: \mathbf{j}$
 d. $[_{DP} [_{DP} \text{Jim's}] [_D \emptyset_{[\text{poss}']} [_{VP} \text{raking the leaves}]]]:$
 $\lambda e_k [\cup \text{raking}(e_k) \wedge \text{Theme}(\mathbf{l}, e_k) \wedge \text{Agent}(\mathbf{j}, e_k)]$

Thus, on this analysis, POSS-*ing* constructions are fully assimilated to a subcase of non-verbal (relational) possessive. The analysis thus contrasts both with our account of ACC-*ing* as well as with previous analyses of POSS-*ing* on which the possessor phrase is licensed directly as a kind of subject (e.g. Vendler 1968, Hamm & van Lambalgen 2002). This treatment has several consequences.

First, we predict that POSS-*ing*, like all possessives, will carry what ? refer to as “possessive existential import.” That is, if the relation holds, the possessee must exist. We take this existential import to facilitate the inference of a token event corresponding to the kind contributed by the *-ing* form. Indeed, we find that POSS-*ing* is more resistant to environments where a token event is not entailed than are ACC-*ing* forms¹⁰: Contrast the examples in (24).

- (24) a. He came to the 49ers in a significant trade with the obvious intent of him becoming the starting quarterback. [COCA]

⁹ Recall that we do not share the assumption that nouns can be syntactically relational, though this does not prevent our using the possessive relation as we do below.

¹⁰ See also Portner (1992) who considers the ACC-*ing* construction to be indefinite and the POSS-*ing* construction to be definite.

- b. ??He came to the 49ers in a significant trade with the obvious intent of his becoming the starting quarterback.

Crucially, we expect this possessive existential import to have similar implications for both *POSS-ing* and *POSS-ing_{of}*, in contrast to *ACC-ing*. One indicator that this is correct is the contrast in (25). Both of the possessive-marked *-ing* forms in (25a) entail that there were children singing, whereas there is no such entailment with the *ACC-ing* form in (25b).

- (25) a. No child's singing (of) the song upset us.
- b. No child singing the song upset us.

A second consequence of the analysis is that, despite the shared possessive existential import, we nonetheless predict a number of subtle differences between *POSS-ing* and *POSS-ing_{of}* constructions. On the one hand, since we assume that nominal *-ing* is not relational, it combines with Barker's extrinsic $\emptyset_{[\text{poss}]}$, which contributes the contextually-valued relation π . As a result, there is no requirement that the possessor in *POSS-ing_{of}* bear the relation that corresponds to the "subject" participant. Indeed, in examples like (26a), the possessor Maria could be either the agent of the reading or simply an attendee or organizer of the reading (Kratzer 1996). In contrast, as verbal *-ing* is relational, it combines with the lexical possessive $\emptyset_{[\text{poss}']}$, which forces resolution of the possessive relation as the external argument of the event; as predicted, the possessor in (26b) can only be interpreted as the agent of the reading.

- (26) a. Maria's reading of *Pride & Prejudice*
- b. Maria's reading *Pride & Prejudice*

On the other hand, the fact that the possessor combines with a potentially token-denoting *-ing_{of}* phrase in one case and a type-denoting *-ing* phrase in the other entails that, possessive existential import notwithstanding, *POSS-ing* phrases will be type-denoting, while *POSS-ing_{of}* phrases will generally be token-denoting.¹¹ This distinction will be relevant when we discuss the selectional preferences of different predicates below.

A third consequence of treating *POSS-ing* as a possessive DP with a VP complement is that it predicts that we might find such VPs with other determiners. Perhaps surprisingly, this prediction also turns out to be correct. Though it has long been claimed that examples like (27a) are ungrammatical, the literature also includes various mentions of attested examples such as that in (27b) (Vendler 1967, p. 131; Schachter 1976, Abney 1987, Milsark 2005, Pullum 1991).

¹¹ We say "generally" because Number can also create descriptions of subkinds as well as descriptions of tokens, as shown in 6b.

- (27) a. *the raking the leaves
 b. I've recently decided to learn how to wear a bit of make-up ... For a "normal" person, it's **the not wearing make-up** that is stressful and prone to judgment. (COCA)

In ? we present an extensive empirical study of this construction, demonstrating its robustness in contemporary English, along with an analysis that uses exactly the same approach to the verbal *-ing* form that we use here for POSS-*ing*. We show that crucial to licensing the construction is appearance in a discourse context where anaphoric reference to an event kind, rather than an event token, is called for.¹²

Finally, the analysis we put forth connects to the early observation of Vendler (1967) that the different constructions in (1) show preferences as to which predicates they combine with. Vendler observed that certain predicates, which he called "narrow containers" are restricted to nominal *-ing* forms, or in his terms "perfect" nominals, as shown in (28). Other predicates, termed "loose containers", are not so restricted, but allow for both nominal as well as verbal *-ing* forms, as shown in (29).

- (28) a. The singing/Ed's singing of *La Marseillaise* occurred at midnight.
 b. ??Singing/Ed singing/Ed's singing *La Marseillaise* occurred at midnight.
- (29) a. The singing/Ed's singing of *La Marseillaise* surprised me.
 b. Singing/Ed singing/Ed's singing *La Marseillaise* surprised me.

The narrow container class also includes *be slow, fast, sudden, gradual* and *prolonged*, all of which predicate some quality that is most naturally ascribed to a token: pragmatically, it is unlikely that all (normal) singings of the *Marseillaise* occur at midnight or are fast, slow, etc., which is what predication to an event kind would entail. It is therefore unsurprising that such predicates strongly prefer the *-ing*_{of} forms which, as argued above, can be token-event denoting.

Verbal *-ing* forms, in contrast, do not directly supply a token event, and accordingly are not directly compatible with the selectional restrictions of narrow containers. Though we argued above that verbal *-ing* in combination with a main predicate such as *upset* results in an entailed event token, the facility with which any given predicate allows this sort of entailment with a kind-denoting argument is

12 Given the appearance of negation in (27b), a few comments are in order, although we cannot treat negation in the context of VP-*ing* constructions in detail here. What is crucial for our purposes is that negation in examples such as (27b) is treated as VP-modification rather than sentential-level, as, for instance, in Kim & Sag (2002). The intuition is that the negation as used here combines with the rest of the VP to form a description that identifies not merely the complement of some kind of event, but rather something more specific. For example, in the case of not wearing make-up, it should describe something like the state of Robin having a clean face but not, for instance, the event of it raining in Barcelona.

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subject to variation. For example, note that a similar restriction to that observed for narrow containers is found with certain predicates of token-level entities, such as *alive* or *dead* in (30).

- (30) a. That animal is alive/dead.
b. ??That kind of animal is alive/dead.

We also note that certain predicates, such as predicative use of *capable* in (4), select only event types and thus resist token-denoting nominal *-ing* forms. Other candidates for such contexts are the argument positions governed by nouns such as (*im*)*possibility*, e.g. *the impossibility of (??the) singing (??of) the song*.

- (31) a. Ed is capable of raking the leaves.
b. ??Ed is capable of the raking of the leaves.

Though we cannot do full justice here to the intricacies of the data, we conclude that our analysis makes promising predictions.

To close this section, we now address a final set of facts accounted for by our particular division of *-ing* forms into nominal and verbal subfamilies, namely the distribution of these forms as free adjuncts.

3.3.3 Free adjuncts

We noted in section 2 that VP-*ing* and ACC-*ing* forms are frequently used as adverbial adjuncts, as in (2), repeated here as (32), while no other *-ing* forms are.

- (32) He saw Mose squatting by the hearth, **breaking up hardtack into a pan**.

We treat verbal *-ing* adverbial adjuncts as intersective modifiers of main clause event kind descriptions or alternatively, following Stump (1985), as intersective temporal modifiers of tensed clauses. In both cases, the event kind description is eventually linked to a time at which it holds. But if such a description can be truthfully applied at a given time, in most cases there must be an event token instantiating the kind at that time. Thus, we can adapt Stump's analysis and convert VP/ACC-*ing* forms to temporal modifiers in combination with an explicit or implicit temporal adverb. In (34) we analyze a simplified version of (32), given in (33). Here we take the implicit temporal adverb to contribute a default temporal relation of simultaneity, though Stump showed that other relations can be pragmatically induced.

- (33) Mose smiled, blushing.

- (34) a. $\text{Adv}_{\text{temp}}: \lambda P_{\langle e_k, t \rangle} \lambda Q_{\langle i, t \rangle} \lambda t \exists t', e, e_k [\text{Adv}(t, t') \wedge P(e_k) \wedge \mathbf{R}(e, e_k) \wedge \tau(e) = t' \wedge Q(t)]$

- b. $[\text{AdvP } \emptyset_{[\text{Adv}_{\text{temp}}]}] [\text{VP blushing}]: \lambda Q_{(i,t)} \lambda t \exists t', e, e_k [\text{Simul}(t, t') \wedge \cup \text{blushing}(e_k) \wedge \mathbf{R}(e, e_k) \wedge \tau(e) = t' \wedge Q(t)]$
- c. $[\text{S Mose smiled}]: \lambda t \exists e', e'_k [t < \text{now} \wedge \cup \text{smile}(e'_k) \wedge \mathbf{R}(e', e'_k) \wedge \tau(e) = t]$
- d. $[\text{S Mose smiled,}]_{[\text{AdvP blushing}]}: \lambda t \exists t', e, e_k [\text{Simul}(t, t') \wedge \cup \text{blushing}(e_k) \wedge \mathbf{R}(e, e_k) \wedge \tau(e) = t' \wedge \exists e', e'_k [t < \text{now} \wedge \cup \text{smile}(e'_k) \wedge \mathbf{R}(e', e'_k) \wedge \tau(e') = t]]$

The entry for the implicit temporal adverb imposes, in addition to the temporal relation (here simultaneity), a shift from event kinds to event tokens through the realization relation R . An immediate consequence of this analysis is that only VP-*ing* and ACC-*ing* appear as sentential adjuncts because only they have an unbound event-kind variable that can be temporally anchored as the adverbial requires.

An important goal for future research will be to extend this analysis to cover the full range of overt temporal adverbials, as different adverbials impose different constraints on the type of *-ing* constructions they accept, as shown in (35).

- (35) a. While reading the poem / *the reading of the poem, ...
 b. During the recitation / the reading of the poem, ...

Summarizing, our reconstruction of the family of *-ing* forms divides them fundamentally into those that are based on nominal vs. verbal *-ing*, the former characterized syntactically by taking theme participants in (adjunct) *of*-PPs; the latter, by taking them directly as DPs. Further subdivisions within the family of verbal *-ing* constructions depend on whether the referential properties of the construction are attributable indirectly or directly to tense (VP/ACC-*ing*), or, alternatively, to a determiner (POSS-*ing*, *the*+VP-*ing*). This analysis permits us, among other advantages, to cross-classify for some purposes these latter *-ing* forms with the nominal ones.

4 Outlook

Recasting the analysis of *-ing* forms in terms of a contrast between event kinds and event tokens is a shift in perspective from the approaches mentioned in section 1, where (token) events are contrasted with propositions or other ontological objects such as states of affairs or fluents. While our analysis largely aligns with others for occurrences of *-ing* forms the denote event tokens, it is notably simpler in using only event kinds as opposed other ontological objects. In addition to its relative parsimony, this reliance on event kinds has two noteworthy implications.

First, it should lead us to expect evidence of event kinds among the nominalization strategies in other languages. Interestingly, recent research on nominalizations in two Romance languages provides exactly this sort of evidence. Shirakowski (2015) argues that the distinction between event kinds and tokens corresponds to different

types of Spanish nominalized infinitive. The Spanish nominalized infinitive comes in nominal and verbal forms, which can be distinguished through familiar criteria: nominal nominalized infinitives take adjectival modification and express event participants through PPs, while verbal nominalized infinitives take adverbial modifiers and express event participants as arguments. Using an acceptability judgement task, Shirakowski shows that verbal nominalized infinitives occur preferably in generic contexts where they refer to an event kind. In contrast, this effect is not found with nominal nominalized infinitives. The examples below, from Shirakowski (2015) (glosses added), show the verbal nominalized infinitive in a generic and episodic context, respectively, the latter of which is degraded.

- (36) a. A largas distancias el transportar alimentos siempre es un reto.
to long distances the transport.INF food always is a challenge
'On long distances, transporting food is always a challenge.'
- b. ?Los responsables han asegurado que el transportar alimentos
the authorities have assured that the transport.INF food
ya está en marcha.
already is in motion
'The authorities have assured that transporting food is already in progress.'

A similar situation arises in Romanian. Iordachioaia & Soare (to appear) discuss a particular type of nominalization, the *nominal supine*, which they argue makes reference to event kinds. The nominal supine is constructed on the past participle form by means of suffixing the definite determiner, which Iordachioaia & Soare argue attaches directly to the verbal form without intervening nominalizing functional morphology (on their analysis, contributed by nP). Romanian also has nominalized infinitives, but these cannot serve as subjects of kind-selecting predicates; only the nominal supine is allowed, as (37) demonstrates (adapted from their example (20)).

- (37) Culesul / *Culegera grăului cu mâna a dispărut
harvest.SUP.the / harvest.INF.the wheat.GEN with hand has disappeared
în ziua de azi.
in day of today
'Harvesting wheat by hand is extinct nowadays.'

Second, in extending the layered-DP approach to the verbs and providing the latter with deeply similar semantic interpretation, our analysis takes a step towards connecting Zamparelli's proposal to ideas that have circulated for some time in so-called "exo-skeletal" approaches to morphosyntax (including Distributed Morphology and certain constructional approaches; see Borer 2003 for general discussion).

Borer draws a fundamental distinction between uncategorized roots and functional linguistic material: roots contribute conceptual content which, in the course of morphosyntactic derivation, is eventually relatable to denotations familiar from formal semantics (see Potts (2008) for commentary), though to our knowledge the details of how this happens have not been spelled out.

Despite important differences of detail between our analysis and the analyses of nominalization in these exo-skeletal approaches (see Newmeyer 2009 for a recent review of the latter), our generalized use of Zamparelli's proposal that nouns denote kinds is clearly reminiscent of the idea that roots contribute conceptual content. Our use of functional material to turn kind-denoting expressions into token-ascribable properties or token-referential expressions can thus be seen as the starting point for a full account of how the link between conceptual content and reference is mediated linguistically.

In addition to its distinct semantic perspective, our analysis also challenges conventional wisdom on the syntax/semantics interface for nominalizations. We maintain maximally simple accounts of nominal argument structure, positing no differences between event and non-event nominals, and of possessive morphology. Perhaps surprisingly, we rescue Dowty's (1989) claim that nouns and verbs differ in their argument structure properties. In future work, we hope to ground this claim a theory of the differences in the ways in which nouns and verbs are typically used to individuate discourse referents, and in a theory of how arguments and adjuncts contribute to the descriptive content of referential expressions.

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