The *-ing* Dynasty: Rebuilding the Semantics of Nominalizations

-ing forms as in (1) have played a central role in debates over natural language ontology for abstract objects: since at least Vendler 1968, interpretive differences between the forms have been treated by appeal to different sorts of abstract objects. For example, on Zucchi's 1993 analysis, (1a) denotes a *state of affairs* (a primitive object in the subdomain of propositional entities), while (1b,c) denote events; Hamm & van Lambalgen argue that (1a,d) denote *fluents* (primitive time-dependent properties), while (1b,c) may denote either event types or tokens. The structure in (1e), widely considered ungrammatical, has never been given an analysis, while (1f) is typically not given a semantics distinct from (1d) except for PRO as subject.

(1) a. Al's raking the leaves   (POSS-*ing*) d. Al raking the leaves   (ACC-*ing*)
     b. Al's raking of the leaves (POSS-*ing*$_{of}$) e. the raking the leaves   (the+VP-*ing*)
     c. the raking of the leaves   (-*ing*$_{of}$) f. raking the leaves   (PRO-*ing*)

Despite these accounts' merits, these additional ontological objects are not otherwise motivated and have not been widely integrated elsewhere in semantic theory. Building on recent research in other areas of nominal semantics and on the results of an extensive corpus study, we account for the uses and interpretations of all *-ing* forms using only event types and tokens, for which there is ample independent evidence; certain effects that arise depend on whether the event type/token is individuated through number or temporal anchoring.

Data: Corpus work reveals a far wider range of uses of the *-ing* form than treated in the literature. We examined all uses (except in the progressive or as a prenominal modifier) of 40 different *-ing* forms in the Brown Corpus, chosen to represent a sample of different argument realization types. Despite the literature's focus on configurations as in (1a-d), where a determiner or possessive "subject" is present, the vast majority (82%) of *-ing* forms occurred with no overt determiner or subject. Similarly, the focus on *-ing* forms in direct argument position misses 85% of naturally-occurring examples, which mainly occur with prepositions (*capable of raking*) or connectives (*while raking*), or as adverbial adjuncts (2). These cases provide crucial, overlooked clues. For instance, while *capable* systematically accepts PRO-ing forms, it accepts definite *ing*$_{of}$ only in very specific contexts (??*capable of the raking of the leaves*).

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

Such data lead us an alternative semantics for *-ing* which connects its disparate uses through a novel combination of already existing hypotheses about the semantics of their parts.

Core Proposal: We treat the *-ing* form as uncategorized root material that, in combination with functional morphology, projects as either a noun or verb. This syntax is in the spirit of so-called "neo-constructionist" or "exo-skeletal" approaches (see Borer 2003); the semantics, inspired in Zamparelli's (1995) "layered" DP analysis on which nouns denote kinds and are converted to kind- or token-level descriptions via functional morphology. We take the root *-ing* form to denote an event type (or, interchangeably here, kind), represented for e.g. *raking* as **raking**.

Adapting Zamparelli, we treat Number as a function from kinds to sets of instances of those kinds or to sets of subkinds, yielding (3a,b) for nouns (e_k an event type). The verbal head contributes thematic information and is represented as in (3c), where *x*, *y* can range over type- or token-level entities. This converges with Dowty 1989's conjecture that the fundamental difference between *-ing* nouns and verbs is that the former have a neo-Davidsonian denotation while the latter have an ordered argument denotation; see Carlson 1984, Zucchi 1993.

(3) a. $[_N \text{ raking}] : \lambda e[R(e, \textbf{raking})]$
     b. $[_N \text{ raking}_{subkind}] : \lambda e_k \forall z \square[\textbf{R}(z, e_k) \rightarrow \textbf{R}(z, \textbf{raking})]$
     c. $[_V \text{ raking }] : \lambda y \lambda x \lambda e_k[\textbf{raking}(e_k) \wedge \textbf{Agent}(x, e_k) \wedge \textbf{Theme}(y, e_k)]$

All nominal *-ing* theme participants are thus expressed using *adjunct of*-PPs (Grimm & McNally 2013), while verbal *-ing* theme participants can be expressed as direct *arguments*, yield-

ing both structures like *raking of leaves* and *raking leaves*. The agent argument of verbal *-ing* forms can be saturated by another nominal (1d) or bound; for nominal *-ing*, neither is an option.

Determiners: The expression in (3-a) must be saturated to serve as an argument. Determiners and, we argue, possessive DPs as well, achieve this in an entirely standard fashion. More controversially, we argue that both options are also available for the VP. Although most researchers have taken possessive DPs merely to stand in for the subject, we observe that the interpretational possibilities among POSS-*ing*, POSS-*ing*$_{of}$, and ACC-*ing* differ sharply: as seen in (4), both possessive *-ing* forms, like ordinary possessives but unlike ACC-*ing*, have a referentiality requirement ("possessive existential import" in Peters & Westerståhl 2013), precisely as expected if the possessive always makes the same contribution, and is never a true "subject".

(4) a. No child's singing (of) the song upset us. (existential import)
      b. No child singing the song upset us. (no existential import)

We consider allowing VPs to combine with the possessive to be preferable to Zucchi's account of similar contrasts, which located the difference in an ambiguity in the verb.

If an *-ing* VP can combine with a possessive DP, it should also combine with other determiners to refer anaphorically or uniquely to an event type, just as adjectives do in restricted contexts (e.g. *the fluffy*; see Glass 2014 for recent discussion). Although uses such as (1e) have long been maligned in the literature, despite attested examples (e.g. Abney 1987, Milsark 2005), we found that such uses occur robustly precisely when an event type is referred back to.

(5) For a "normal" person, it's **the not wearing make-up** that is stressful .... (GloWbE)

If a type-shifter like Chierchia's (1998) $^{\cap}$ operator binds off the VP instead, we get the corresponding generic, non-anaphoric use of PRO-*ing* found in e.g. *Wearing makeup is stressful*.

Containers: Vendler 1968 noted that predicates differ in selectional preferences for nominal and verbal *-ing*: "loose containers" (*be fun/unlikely*) permit both forms; "narrow containers" (*was slow/occurred at 12*), only nominal *-ing*. This follows immediately from our analysis: the former predicates allow both token or type eventualities, while the latter require token eventualities, a denotation unavailable to VP in the absence of temporal anchoring. Moreover, we expect certain predicates to select only event types and thus block token-denoting nominal *-ing*. In the talk, we isolate a novel class of adjectival "containers", such as *capable*, which exemplify this.

Verbal *-ing* Adjuncts: We treat verbal *-ing* adverbial adjuncts as intersective modifiers of main clause event type descriptions or alternatively, following Stump 1985, as intersective temporal modifiers of tensed clauses. In both cases, the event type description is eventually linked to a time at which it holds. But if an event type holds at a time, there must be an event token instantiating the type. Thus, e.g. we can adapt Stump's analysis and convert PRO/ACC-*ing* forms to temporal modifiers in combination with an explicit or implicit temporal adverb as in (6) (τ, the temporal trace function). With implicit adverbs, we take simultaneity as the default temporal relation, though Stump showed that other relations can be pragmatically induced.

(6) $\text{Adv}_{\text{temp}} : \lambda P \lambda t \exists e, t'[\mathbf{Adv}(t,t') \wedge P(e_k) \wedge \mathbf{R}(e,e_k) \wedge \tau(e) = t']$

A crucial difference between gerund forms emerges: PRO/ACC-*ing* forms achieve reference to token events via temporal anchoring, while, e.g., *-ing*$_{of}$ forms do so through nominal structure. POSS-*ing* and definite *-ing*$_{of}$ are disallowed as adjuncts due to their non-predicative denotations; bare *-ing*$_{of}$ is blocked because nominal individuation is effected by number, not time.

Conclusion: Our analysis of *-ing* forms, despite its ontological frugality, extends to many robustly occurring but so far unanalyzed cases (the+VP-*ing*, adjuncts, adjectival "containers").

Selected References: GLASS, L. 2014. Deriving the two readings of English determiner + adjective. *SuB18*. HAMM, F. & M. VAN LAMBALGEN. 2002. Formal foundations for semantic theories of nominalisation. *ZAS Papers in Linguistics*. PETERS, S. & D. WESTERSTÅHL. 2013. The semantics of possessives. *Language*.