

From Homophony to Unity: Existential closure and a unified account of the English present participle*

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1 Introduction and Background

The puzzle: the English verbal affix *-ing*.

- English notoriously exhibits considerable homophony among its affixes.
 - 3SG present tense \sim nominal plural \sim possessive: [-z]
 - past tense \sim passive \sim perfect \sim denominal adjective: [-d]
 - But even against this backdrop, *-ing* stands out.
 - Traditional grammars distinguish adjectival **participles** from nominal **gerunds**—and indeed these are morphologically distinct in many languages.
- (1) a. *Participle*: les enfants **souriants** ‘the smiling children’
b. *Gerund*: **Partir** n’est pas facile. ‘Leaving is not easy.’
c. *Progressive*: N/A
- (2) a. *Participle*: los niños **sonrientes** ‘the smiling children’¹
b. *Gerund*: **Dejar** a su familia no es fácil. ‘Leaving one’s family is not easy.’²
c. *Progressive*: Los niños están **sonriendo**. ‘The children are smiling.’
- In English, by contrast, participles, gerunds, and verbal progressives are all formed with *-ing*:
- (3) a. *Participle*: The **running** children
b. *Gerund*: **Running** is exhausting.
c. *Progressive*: The children were **running**.

*Thanks to the audience at the Cognitive Science colloquium series at Carleton University, where we previously presented parts of this work, and particularly to Kumiko Murasugi, who offered detailed feedback.

¹This form in Spanish is generally called an adjective.

²This is also the infinitival form.

- And furthermore, the types of constructions formed with *-ing* go well beyond the three traditional categories in (3). A fairly standard division identifies at least three sub-types of gerunds, distinguished by the marking of internal and external arguments.³

- (4)
- a. “*ing-of*” gerund: [The reading of books] is rewarding.
 - b. “*Poss-ing*” gerund: [My reading books] is impressive.
 - c. “*Acc-ing*” gerund: [Me reading books] is entertaining.

- In (4a) the gerund *reading* appears to be fully nominal, but both (4b) and (4c) show mixed nominal and verbal properties (accusative case for an object, but either accusative or genitive case for the subject).
- But despite the dizzying array of contexts in which *-ing* occurs, *-ing* nonetheless shows **remarkable uniformity**:
 - The constituent to which *-ing* attaches is always **verbal** (or **clausal**) (cf. [-z], which attaches to both verbs and nouns)
 - Forms in *-ing* are always **perfectly regular** (cf. [-d] – there are lots of irregular past tense forms)

Research Questions:

1. How many distinct syntactic distributions are there for *-ing*?
2. How do we account for the “mixed category” properties of gerunds?
3. Can we treat the many distinct syntactic distributions for *-ing* as involving a single realization, within an underspecification-based model such as Distributed Morphology (DM)?

Proposal: We argue that *-ing* spells out a single formal feature [Ψ], which systematically composes with predicates of eventualities, closing off the event argument of its complement.

This unification captures the shared morphological properties of *-ing* forms (mysterious on traditional accounts assuming several-way homophony), including the Double-*ing* Filter of ?.

Outline of the Talk:

§2: An inventory of *-ing* forms

§3: Similarities across *-ing* forms

§4: A unified analysis of *-ing* forms

- *-ing* as the realization of an abstract feature [Ψ]
- The syntactic configurations in which [Ψ] can occur

§5: An aside on *-ing* and zero-headed compounds

§6: An aside on the Double-*ing* filter

§7: Implications and conclusions

³The label *Poss-ing* goes back to ?, while *Acc-ing* may trace back to ?. The term *ing-of* may be due to ?.

2 Inventorying *-ing*

Most authors have focused only on nominal (gerundive) *-ing* forms, which posed a particular challenge for earlier syntactic frameworks.

→ See for example: *?, ?, ?, ??, ?*, among many others.

Even here, though, there has been essentially no agreement in how many *-ing* forms it is useful to distinguish, and (relatedly) no consensus in terminology.

In this section we attempt to provide an exhaustive inventory of *-ing* forms in English:

Summary: 7 forms with *-ing* in contemporary English:

1. **n-ing**: simplex nouns *The reading* was long.
2. **N-ing** (“*ing-of*” gerunds) *The reading of poetry* is rewarding.
3. **S-ing** (“*Acc-ing*” gerunds) *Me reading a poem* was entertaining.
4. **D-ing** (“*Poss-ing*” gerunds) *My reading a poem* was entertaining.
5. **a-ing**: simplex adjectives The *boring* students were quiet.
6. **A-ing**: “participial” modifiers to nouns The students *having read poetry* were quiet.
(including pre-nominal participles) The *reading* students were quiet.
7. **Prog-ing** (“progressive participle”) The students are *reading long articles*.

...and 2 further *-ing* forms we mostly won't discuss today:

8. Prepositions ending in *-ing*: *concerning, during*, etc. (*p-ING*)
9. Passive “needs X-ing”: *This wood needs burning*.

2.1 *n-ing* and N-ing: simplex nouns and *ing-of* gerunds

n-ING and *N-ING* both correspond to *ing-of* forms in Abney's typology.

We distinguish these two sub-types on the basis of meaning:

n-ing: often has idiosyncratic meanings, and is non-eventive.

- (5) a. A typical baseball **outing** comprises nine **innings**.
b. I attended the **meeting** this evening in this building and it hurt my **feelings**.

N-ing: by contrast, typically has a transparent meaning, and can have a clear eventive interpretation.

- (6) Jane approves of **my two completed plantings of tomatoes**.

Both *n*-ING and N-ING have fully nominal syntax:

- Their external arguments are marked with GEN
- Their internal arguments require *of*
- Adjuncts appear as adjectives
- An ordinary determiner can appear instead of the external argument
- They can be counted, and allow plural marking.

In this they contrast with all other *-ing* forms, which have the internal syntax of VPs.

2.2 S-ing and D-ing: *Acc-ing* and *Poss-ing*

S-ING and D-ING correspond to the descriptive labels *Acc-ing* and *Poss-ing*, sometimes referred to as “clausal” or “sentential” or “verbal” gerundives.

S-ING and D-ING are most obviously distinguished by case of the external argument (if there is one):

- (7) a. S-ING = *Acc-ing*: **Me** quickly planting tomatoes bothers Jane.
b. D-ING = *Poss-ing*: **My** quickly planting tomatoes bothers Jane.

Our terminology reflects the fact that S-ING has the distribution of a **nonfinite clause**, while D-ING has the distribution of a **DP** (Note: these distributions overlap, but are not the same).

- (8) It is pleasant **walking in these woods**.
≈ It is pleasant **to walk in these woods**.

Parallels between S-ing and D-ing:

1. Both mark internal arguments (if present) with accusative case, as in (7).
2. Both allow modification via adverbs, as in (7).
3. Both allow the perfect auxiliary *have*, but ban modals:

- (9) a. Me having been planting tomatoes bothered Jane.
b. My having been planting tomatoes bothered Jane.
c. *{Me/my} musting (to) plant tomatoes bothers Jane.

4. Neither allows plural marking or counting:

- (10) *{Me/my} six plantings tomatoes bothered Jane.

Differences between S-ing and D-ing:

1. S-ING allows a post-subject appositive, while D-ING doesn't:

- (11) a. John, who is incompetent, planting tomatoes bothers Jane.
b. *John's, who is incompetent, planting tomatoes bothers Jane.

2. In the complement of perception verbs like *see*, S-ING entails direct perception of the event, while D-ING does not:

- (12) a. I saw John planting tomatoes. (entails *I saw John*)
b. I saw John's planting tomatoes. (does not entail *I saw John*)

- This has been attributed to a Control structure available to S-ING but not D-ING (?)

3. S-ING allows extraction, while D-ING does not:

- (13) a. Who did you see *t* planting tomatoes?
b. *Whose did you see *t* planting tomatoes?

- (14) a. What did you see John planting *t*?
b. *What did you see John's planting *t*?

4. S-ING also allows gapping, while D-ING does not:

- (15) a. John dislikes Jane having two cookies and Mark only one.
b. *John dislikes Jane's having two cookies and Mark's only one

5. In the absence of an overt external argument, it can be difficult to distinguish S-ING and D-ING. But while S-ING does not allow determiners, D-ING can (sometimes marginally) occur with determiners other than GEN-marked nouns—though never with articles.

- (16) a. D-ING: No running races in the halls will be tolerated.
b. D-ING: This constantly telling tales will stop.

- These have varying judgements and can have weird prosody. We return to these examples in section 5.

To summarize:

Shared properties:

- Internal arguments are accusative
- Adjuncts appear as adverbs
- Incompatible with plural marking or counting
- Auxiliaries are present and occur in their main clause order
- Modals are not possible

S-ING (*Acc-ing*)

- External arguments are accusative
- Entail direct perception
- Allow extraction
- Allow gapping
- Disallow all determiners

D-ING (*Poss-ing*)

- External arguments are genitive
- Do not entail direct perception
- Disallow extraction
- Disallow gapping
- Allow some determiners (but no articles)

Most work on English *-ing* has focused on D-ING, due to its “mixed” properties:

- It is nominal in the sense that it occurs in argument positions and marks its subject as GEN.
- At the same time, it has the internal syntax of (nonfinite) clauses or verb phrases: it allows auxiliaries, can be modified by adverbs, and shows accusative case on objects.

In a **lexicalist** syntactic framework, this mixture of properties is problematic.

As we’ll see below, though, the problem does not arise for a framework such as DM.

2.3 *a-ing* and A-ing: simplex adjectives and participial phrases

Parallel to *n-ING* and N-ING, *a-ING* and A-ING have many similarities. Both occur modifying nouns, and so would traditionally be identified as adjectival participles.

a-ing: has all the syntax of A^0 , and tends to have idiosyncratic meaning.

(17) This **freaking** talk is neither **interesting** nor **boring**.

A-ing: is generally phrasal.

- (18) a. Those students **plagiarizing me** will be disappointed.
b. Those students **having been found guilty of plagiarism** will be punished.

The fact that A-ING surfaces post-nominally can be attributed to the general fact that pre-nominal modifiers in English cannot take complements.⁴ Underived adjectives that take complements are also post-nominal in English:

(19) A book **worth over a hundred dollars** was stolen.

We treat transparent participles that occur pre-nominally as also belonging to the category A-ING:

(20) Any habitually **plagiarizing** students will be expelled.

A-ING forms otherwise have the same structure as S-ING (*Acc-ing*), except that they do not allow overt external arguments (the subject appears to always be PRO):

- Internal arguments are marked with ACC: (18a)
- Adjuncts appear as adverbs: (20)
- Incompatible with plural marking or counting
- Auxiliaries are present and occur in their main clause order
- Modals are not possible

⁴Prenominal modifiers are always single words, unless they are in turn modified by an intensifier like *very* or *so*.

2.4 Prog-ing

Finally, the progressive in English is unexceptionally formed by *-ing* together with the auxiliary *be*.

(21) The students are reading poetry.

The progressive is sometimes analyzed as a copular construction with a participial *-ing* form (=a-ING or A-ING), but in contrast to the participle Prog-ING is odd with stative verbs:

(22) a. Prog-ING: #The students are knowing the answer.
b. A-ING: Any students knowing the answer should speak up.

Notably, the progressive auxiliary *be* cannot be the highest auxiliary in S-ING, D-ING, or A-ING—though all allow the higher auxiliary *have*.

(23) a. S-ING: *Me being reading poetry is entertaining. (cf. *Me having been reading...*)⁵
b. D-ING: *My being reading poetry is entertaining.
c. A-ING: *Any students being reading poetry will do well on the test.

This is a form of ?'s (?) Double-ING Filter.

3 The surprisingly uniform morphology of *-ing*

Having reviewed the surprising variety of *-ing* forms, in this section we review the striking morphological uniformity of *-ing* across all these contexts of occurrence.

1. *-ing* is exceptionlessly productive.
2. *-ing* is extraordinarily transparent.
3. *-ing* is perfectly regular.
4. *-ing* is an “Affix Hopping” affix (i.e., it can take scope over a phrase, and always appears on the highest verbal element in that phrase).
5. *-ing* is subject to the “Double-*-ing* Filter”.
6. *-ing* forms allow object incorporation.

3.1 *-ing* is exceptionlessly productive

The affix *-ing* is so productive that every single verb in the English language has an *-ing* form.

→ Indeed, the best definition for “verb” in English appears to be “has an *-ing* form”.

The only other affix in English that is nearly as productive is *-ly*.

- ...and *-ly* is blocked in some cases (**fastly*) and famously alternates with zero.

⁵This second form tells us that there must be (at least) two different positions in the construction where *-ing* is spelled out.

As most morphologists will recognize, this exceptionless productivity makes *-ing* extraordinarily unusual not only in English, but cross-linguistically.

3.2 *-ing* is extraordinarily transparent

The meaning of an *-ing* form appears always to be transparent, except in *n-ING* and *a-ING*.

- Even there, non-compositional meaning is rare (*lightning, evening*)

This is again extraordinary, especially for a “derivational” affix.

3.3 *-ing* is perfectly regular

Across all verbs, *-ing* always has **exactly** two allomorphs: /ɪŋ/ and /ɪm/.⁶

- Often called “g-dropping”—though this name is historically misleading.
- The variation between /ɪŋ/ and /ɪm/ is conditioned by register, dialect, and speech rate.⁷

This is **not** a phonological effect: it applies to *-ing*, not to any word-final [ɪŋ] sequence.

3.4 *-ing* participates in “Affix Hopping”

One of the characteristics of *-ing*—distinguishing it from some gerunds and participles in other languages—is that it can attach to complex constituents, not only to single verbs.

When that constituent contains an auxiliary verb, *-ing* always suffixes to the leftmost auxiliary—**not** to either the first or last word (like possessive *'s*, and some phrase-attaching “affixes” in English, like *-ish*), or to the main verb.

- (24) a. Running home, John tripped.
b. Having run home, John was tired.
c. Being chased home, John ran.
d. Having been chased home, John was tired.
- (25) a. The girl who arrived late’s seat was already taken.
b. This all feels too done-at-the-last-minute-ish to me.

Whatever mechanism is responsible for “Affix Hopping”, it applies not only to the “inflectional” Prog-ING, but also to the “derivational” S-ING, D-ING, and A-ING.

3.5 The “Double *-ing* Filter”

The Double *-ing* Filter was first described by ?, and the subject of a flurry of subsequent descriptions and analyses: see, for example, ?, ?, ?, and ?

Though the judgements are subject to some dispute the generalization is that in some cases (but not all), *-ing* forms can be blocked when adjacent to other *-ing* forms, even when the two forms belong to “different” *-ing* constructions.

- (26) a. We started reading the poem.
b. We were starting to read the poem.

⁶For some speakers, notably in the Ottawa valley, there is an allomorph /ɪn/, which is also perfectly regular.

⁷The alternation between /ɪŋ/ and /ɪm/ is a well studied sociolinguistic variable, established in classic studies including ?, ?, and ?. See ? for a recent overview.

c. *We were starting reading the poem.

(27) *Being chasing the dog home, John ran hard.

We will return to the Double-*ing* Filter in section 6.

3.6 *-ing* forms allow object incorporation

English nouns and adjectives generally allow noun incorporation.

- (28) a. Truck-drivers are often tired.
b. These walnuts are oven-roasted.
c. The love-lorn teenager sighed.

What is special about *-ing* is that it allows object incorporation even when the *-ing* form is neither a noun nor an adjective—though this is subject to variation and judgements seem to vary wildly.

(29) a. I've been paper-grading all day. (Prog-ING)
b. *I paper-graded all day yesterday.

(30) a. I can hear John chair-throwing from here. (S-ING)
b. *Earlier I heard John chair-throw.

Nonetheless, this is a **Big Deal**TM.

- English does not have productive noun incorporation. (*I paper-graded all day)
- Rather, it is only allowed in *-ing* forms
- *-ing* forms can also be A and N
- A and N do allow noun incorporation

3.7 Summary

These shared features are especially interesting from the perspective of morphological theory.

- The syntactic environments *-ing* appears in seem not to have anything in common.
→ *-ing* has an arbitrary, disjunctive set of set of exponenda.
- Such cases are typically treated as cases of different, but homophonous affixes—and this has been the standard view of *-ing*.
- But if *-ing* were really many homophonous affixes, it would be a striking coincidence that they all share exactly the same morphological properties.

Especially the exceptionless productivity and the noun-incorporation

- This kind of unexplained pattern is often called a “morpheme” in morphological theory (though there are more dramatic examples of morphemes)

Following ?, a morpheme is a morphological pattern that is divorced from syntax or phonology.

- This is so true of *-ing* that it is often called the “present participle”, a morphology-only concept that has no reflex in the syntax.

Our goal in section 4 is to overcome the apparent diversity of *-ing*’s distribution to propose a single underspecified context in which it occurs.

4 A unified analysis of *-ing*

The old problem: *-ing* as a “mixed category”

Most work on *-ing* has been **lexicalist**: assumes the output of morphology is the input to syntax.

- From this perspective, the major challenge is that *-ing* seems to create “*mixed categories*”: S-ING, D-ING, and A-ING are verbal on the inside, but nominal or adjectival on the outside.

By contrast: we assume a realizational approach to morphology, specifically Distributed Morphology (DM: ???).

- Does not assume a generative lexicon for word formation.
- Syntax manipulates abstract features rather than words.

Mixed categories are not an issue for DM:

- DM usually assumes a contemporary minimalist syntax that is less dependent on lexical category determining greater syntactic structures.
- We often assume that expanded NPs, VPs, and APs have a lot in common with each other, syntactically. This is captured by assuming that they share certain features.
- As a result, “mixed categories” are not a theoretical problem. Rather, we predict them and would be perplexed if they *didn’t* exist.

So, the main problem of *-ing* that plagues other previous analyses (that *-ing* appear to jump from category to category at will and even create mixed categories) is not a significant problem for us.

A new problem:

- DM, under most circumstances, assumes a “morpheme” (called a Vocabulary Item) is a simple mapping from a set of features to a phonological string.
- From this point of view, morphemes like *-ing* that apparently realize a disjunctive set of features are problematic.
- English *-en* (*broken*, *seen*; also called a participle) is a classic example of this because it realizes [PERFECT] *or* [PASSIVE].⁸
- When presented with an apparently disjunctive set of features, a DM analysis must find a common atomic meaning in the disjunctive sets, or posit two different Vocabulary Items. **But:** the second type of analysis usually fails to capture important generalizations.

Our goal: To find a compelling candidate for a syntactic/semantic feature common to all the contexts of *-ing*’s occurrence.

⁸Though see for example ? for arguments for the syntactic and morphological identity of these forms.

4.1 The analysis in overview

The central problem presented by *-ing* is that it seems to do **too many things**.

- Standard view has been that *-ing* therefore requires (at least some) homophony / morphological arbitrariness.

We argue instead for a unified analysis of *-ing* forms:

- *-ing* is the realization of an abstract feature that occurs on several different heads.
- This feature has consistent semantics, though it may co-occur with other features.
- For convenience, we label this feature [Ψ].

So what is [Ψ]?

A thread in theoretical analyses of *-ing* has been the idea that gerunds involve a defective Infl^0 .

The argument that what we call S-ING is clausal can be traced at least to ?—though in the context of an argument that D-ING constructions (what he calls *Poss-ing*) are internally nominal.

? develops the clausal analysis of S-ING in terms of a theory of (defective) Infl^0 :

- Like *to*-infinitives, clausal gerunds (our S-ING and D-ING) are temporally dependent.
- Unlike both *to*-infinitives and finite clauses, gerunds lack a CP:
 - Gerunds are never interrogative
 - There is no gerundive complementizer equivalent to non-finite *for* or finite *that*.⁹

Stowell proposes on the basis of these similarities that *-ing* is distinct from both infinitives and finite clauses in being unspecified for tense.

- A similar view is adopted in ? and ?, and more recently by authors such as ??.

(We will adopt essentially the same view of S-ING, except that we use the label T^0 in place of Infl^0 .)

Looking beyond S-ING, it is notable that **all** *-ing* forms involve a pre-finite verbal projection:

- N-ING: *vP*
- S-ING, D-ING, and A-ING: *VoiceP* or *PerfP*
- Prog-ING: *VoiceP* (and possibly just *vP*, depending on how unaccusative verbs are analysed)
- None combine with *TP* or *ModalP* (or with *ProgP*—more on that later)

Syntactically the constituents with which *-ing* composes don't have much in common.

Semantically, though, they do: they are all **predicates of eventualities** (=events or states).

- For *vP* and *VoiceP* this is uncontroversial:
 - Assuming Neo-Davidsonian event semantics, projections within *VoiceP* are **event descriptions**.¹⁰

⁹Though cf. ?, who identifies “*Poss-ing*” as a complementizer.

¹⁰Current approaches to event semantics develop ?: for early proposals see e.g. ?, ?, ??.

- For aspect (including the perfect) an event-based semantics is more controversial:
 - A fairly standard view treats aspect as a purely temporal operator, *or* as an operator that converts a predicate of events into a predicate of times (with which tense can compose).
 - But an alternative view treats aspect as an event modifier, relating the event described by VoiceP not to a time but to another event: see for example ?, ?, ?, ?
 - From this latter perspective, it is only **finiteness** that moves us from talking about events to talking about a specific time or world.¹¹
 - On this event-based view, there is a semantic divide not between the argument structure domain and aspect, but between aspect and tense.

So [Ψ] (realized as *-ing*) always composes with a predicate of events or states.

How is [Ψ] interpreted?

- [Ψ] should have a consistent **interpretation**, alongside its consistent realization as *-ing*.
- We propose that it **existentially binds** the eventuality argument of its complement, allowing the event to be referred to (in N-ING, S-ING, and D-ING), related to another event (in Prog-ING), or related to an individual or event (in A-ING)
- TP, ModP: independently saturate the predicate of events introduced by lower projections, and so are not candidates for composition with a head bearing [Ψ]. In other words, a head bearing [Ψ] cannot take either TP or ModP as its complement.

The remainder of this section develops this proposal incrementally, beginning with cases where *-ing* appears to attach to comparatively large clausal constituents (S-ING), then proceeding to other cases.

4.2 S-ing: Non-finite clause with non-finite clause distribution

Recall from section 2.2 that S-ING constituents have the internal and external distribution of non-finite clauses.

1. They occur in argument positions (31a), but can be extraposed like clauses (31b):

- (31) a. Allison agreeing to see us was surprising.
 b. It was pleasant seeing you.

2. Their subject appears in the accusative, rather than with possessive 's.

3. They allow adverbial modification, and a full sequence of aspectual and passive auxiliaries (though not finite tense, infinitival *to*, or modals).

- (32) a. Having been driven to work makes my day much easier.
 b. Having been working all day made me want to stay home in the evening.
 c. My mother loudly calling my name was embarrassing.

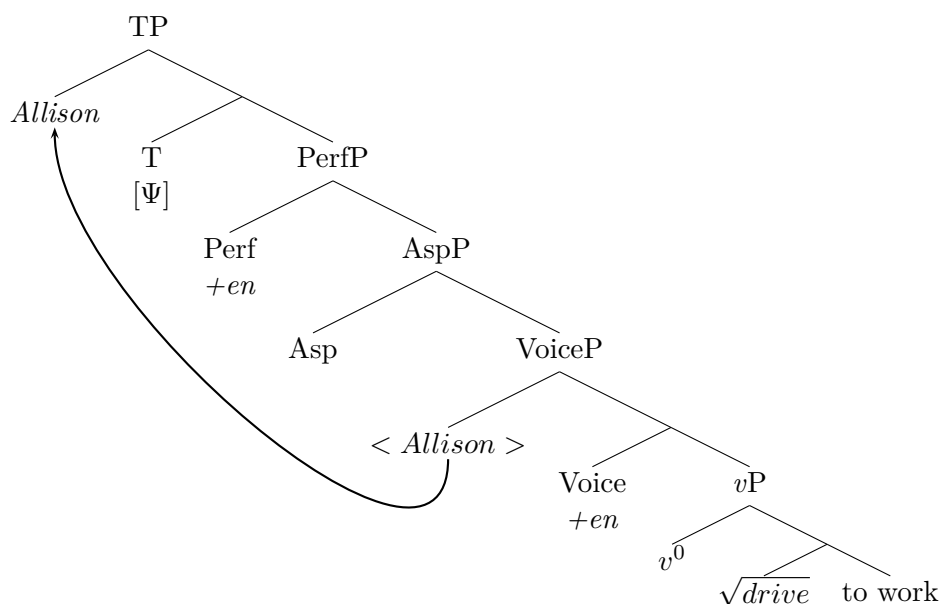
¹¹See ? for a view of Infl^0 as a general “anchoring” head.

Based on their clausal properties, and their complementary distribution with known T elements, we follow e.g. ?? in proposing that S-ING involves a non-finite T head.

- More precisely, S-ING involves a head that can semantically combine with the same set of elements that T can: VoiceP or with an aspectual projection, but not with TP or ModalP.
 - VoiceP, AspP, and PerfP all correspond to predicates of eventualities (events or states), as do the smaller projections with which *-ing* composes (in e.g. N-ING).
- Accusative case is available to a subject in the specifier of this head, though there can also be a PRO subject.

We propose that this non-finite T head bears the feature $[\Psi]$, morphologically realized as *-ing*.

(33) [**Allison having been driven to work**] was unusual.



4.3 D-ing: S-ing + D

The most immediately obvious difference between D-ING (=“Poss-*ing*” or “hybrid gerundives”) and S-ING is the case marking of the subject:

(34) Allison’s agreeing to see us was surprising.

But recall from section 2.2 that they differ in a number of other ways as well:

S-ING (Acc- <i>ing</i>)	D-ING (Poss- <i>ing</i>)
<ul style="list-style-type: none"> • External arguments are accusative • Entail direct perception • Allow extraction and gapping • Disallow all determiners 	<ul style="list-style-type: none"> • External arguments are marked with GEN • Do not entail direct perception • Disallow extraction and gapping • Allow some determiners (but no articles)

At the same time, though, D-ING closely resembles S-ING.

- In particular, D-ING is like S-ING in allowing adverbial modification and aspectual auxiliaries:

- (35) a. My having been arrested was inconvenient.
 b. My mother's loudly calling my name was embarrassing.

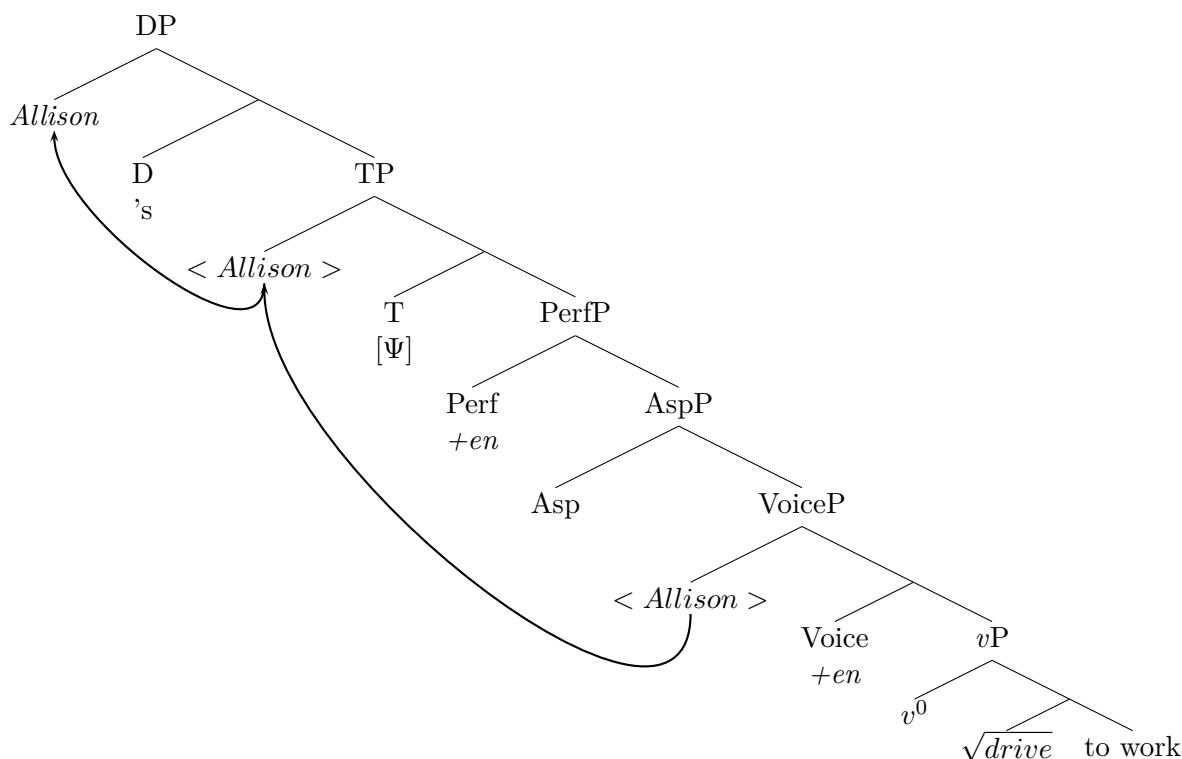
Accounting for shared **internal** properties (modification + auxiliary sequence):

- **Like** S-ING, D-ING involves a non-finite T head bearing [Ψ] merged above a predicate of events.

Accounting for different **external** properties (determiners + extraction):

- **Unlike** S-ING, D-ING has an additional DP superstructure above the non-finite T head.
- The presence of D forces the subject to raise into the “nominal subject” position (Spec-DP), where possessive 's is licensed.
- The subject is then **frozen** in this position: English does not allow extraction of subjects from Spec-DP (the Left Branch Condition of ?).

- (36) [**Allison's having been driven to work**] was unusual.



- Possessive 's appears to be the only determiner available in D-ING structures. We suggest that this is because the DP structure forces raising of the subject, and 's is the only determiner that can host the subject in its specifier.

(See Milsark 2006 for some discussion of possible other determiners in *-ing* structures.)

A wrinkle: The following example seems to have a different D in a D-ING structure.

(37) This [repeatedly finding my hidden cash] needs to stop.

We believe this is a compound structure, parallel to (38):

(38) This [[repeatedly finding my hidden cash] [thing]] needs to stop.

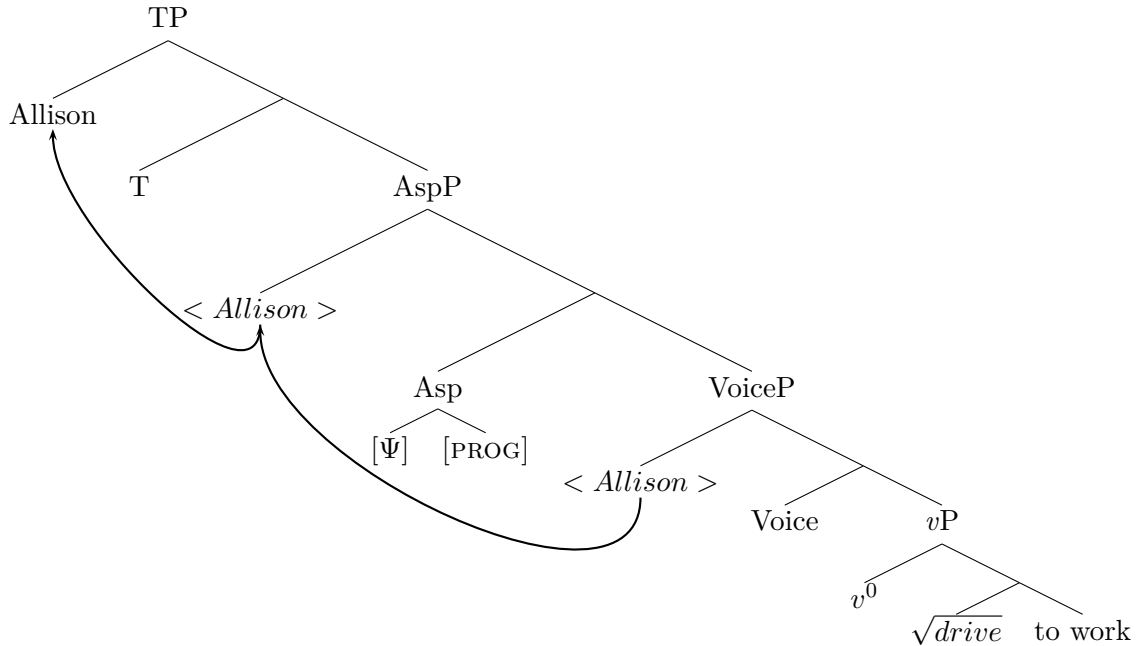
We briefly return to these data in section 5.

4.4 Prog-ing: [Ψ] on Asp

One of the central puzzles for an account of English *-ing* is the fact that it occurs not only in gerunds but in the **progressive**, even though gerunds do not exhibit progressive semantics.

- This is a problem for any theory where it is syntactic **heads** that are the units of morphological realization / semantic interpretation (as in lexicalist theories)
- In the framework we adopt, by contrast, it is **features** that are both realized and interpreted.
 - We need not say that gerunds and progressive aspect have the same **overall** semantics, so long as we can identify some **component** of meaning they have in common.
- In event-based temporal semantics, part of the semantics of progressive aspect is a saturation of / quantification over the predicate of events expressed by Voice.
 - This is precisely the semantics we attribute to [Ψ].
- What differentiates the progressive from gerunds is that Asp relates the event of VoiceP to a new situation (the Topic Situation) in a specific way. For convenience, we attribute this to a another feature on Asp which we simply label [Prog]

(39) **Allison is driving to work.**



Like other heads bearing $[\Psi]$, a lower argument is attracted into the specifier of progressive Asp, as can be seen in progressive *there* clauses (??):

(40) There are pictures being taken on campus today. (*There are being pictures taken. . .)

4.5 N-ing: $[\Psi]$ below VoiceP

S-ING, D-ING, and Prog-ING all attach at least above VoiceP—i.e. above the merge position of the external argument.

If the distribution of *-ing* is determined by semantics, though, we would expect *-ing* to also attach lower, assuming that verbs project an event-based semantics.

Indeed, we argue that this is the structure that gives rise to N-ING (aka “*ing-of*” or “gerundive nouns”)

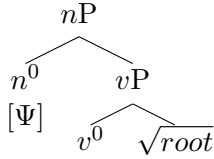
- These require possessive marking on subjects and *of*-marking on internal arguments.
- They also allow modification by adjectives and numerals, as well as plural marking.

(41) Allison admired my two completed plantings of tomatoes.

Unlike fully nominal *-ing* forms (*inning*, *feeling*), N-ING has an event reading.

We attribute this to the structure in (42), where *-ing* merges above *vP*, but below all argument-structural projections:

(42) Structure of N-ING:



4.6 A-ing: $[\Psi]$ in appositive position

Clausal *-ing* structures sometimes occur in post-nominal position—we have labelled these A-ING for descriptive purposes, but now propose that these are simply S-ING in appositive position:

(43) The five students [having been found guilty of plagiarism] will be punished.

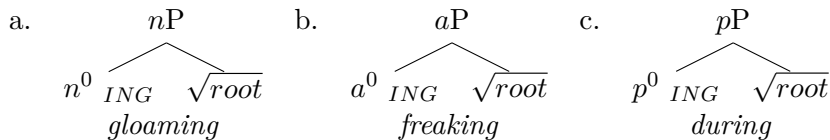
- As we said earlier, when S-ING corresponds to a single word, it can appear pre-nominally.

(44) The five plagiarizing students will be punished.

4.7 A residue of *-ing* without $[\Psi]$: *a-ing* and *n-ing* (and *p-ing*)

Some *-ing* forms appear to be frozen: they lack eventive interpretations, and often have idiosyncratic meanings. For these we assume that *-ing* realizes the categorizing head itself.

(45) Structures of *n-ING*, *a-ING*, and *p-ING*:



These are all non-eventive, and have slightly idiosyncratic interpretations.

- The only reason we think the morpheme *-ing* is here at all is that these forms are subject to g-dropping, like other *-ing* forms.

4.8 Summary

We have argued for a (mostly) unified view of *-ing*:

- The abstract feature $[\Psi]$ can occur on a variety of heads.
 - $[\Psi]$ is uniformly realized as *-ing*
 - $[\Psi]$ is uniformly interpreted by existentially closing the event argument of its complement.
- Differences among *-ing* constructions arise from three sources:
 1. Structure above $[\Psi]$ (S-ING vs. D-ING)
 2. Structure below $[\Psi]$ (S-ING vs. N-ING)
 3. Other features on the same head as $[\Psi]$ (S-ING vs. Prog-ING)
- There is some residue of frozen/lexicalized forms with *-ing* (*a-ING*, *n-ING*, and *p-ING*)

5 An aside on compounds

There are particular instances of what appears to be D-ING that are more “mixed category” than typical D-INGS (which are just S-ING with a DP layer)

(46) This suddenly sniping me from stealth has to stop. (e.g. in a video game)

- This construction has a curiously idiosyncratic intonation that sounds to us rather like the intonation found in phrasal compounds, which often is assumed to be English compound stress (see ? for discussion).

Indeed, this seems to “want” to be indicated orthographically, as in (47).

(47) a. This ‘suddenly sniping me from stealth’ has to stop.
b. This suddenly-sniping-me-from-stealth has to stop.

- Another clue that these are strange: there seems to be an alternation for these instances of D-ING with an overt noun such as “thing” or “business”:

(48) a. This suddenly-sniping-me-from-stealth thing has to stop
b. This suddenly-sniping-me-from-stealth business has to stop

In addition to their curious intonation, these more-nominal varieties of D-ING have several further perplexing properties:

1. They can appear with an **adjective** apparently directly modifying a verbal projection:

(49) This **repeated** sniping-me-from-stealth has to stop

2. They can appear with an **adjective preceding an adverb**:

(50) This **repeated suddenly**-sniping-me-from-stealth has to stop

3. They can appear with a **determiner before an overt accusative subject**:

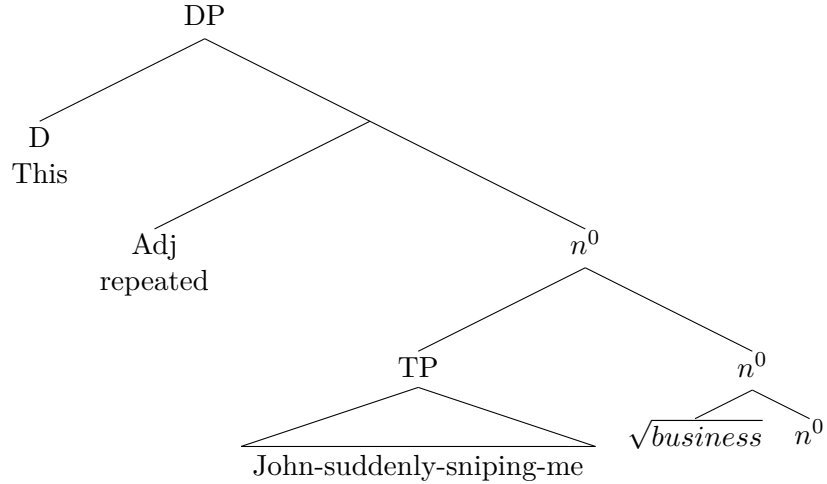
(51) a. **This** John-sniping-me-from-stealth has to stop
b. ***This** John’s-sniping-me-from-stealth has to stop

4. They allow the sequence **determiner-adjective-subject-adverb**:

(52) **This repeated John-suddenly**-sniping-me-from-stealth has to stop

When an overt noun like “business” or “thing” appears, these are obviously phrasal compounds.

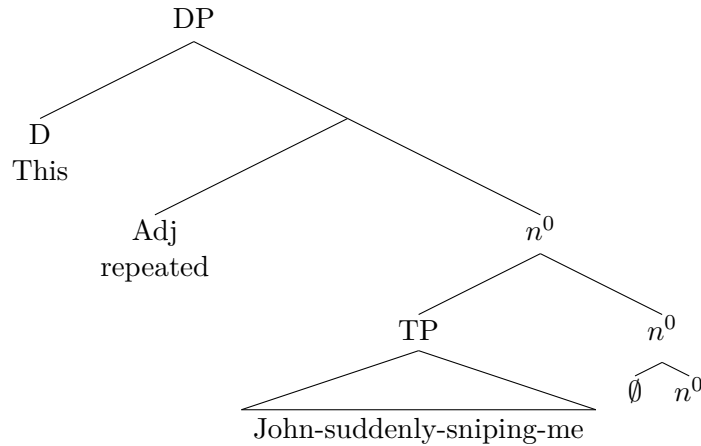
(53) **This repeated John-suddenly-sniping-me business** has to stop.



We argue that the strange more-nominal instances of D-ING are also phrasal compounds, but with a **null head**.

So these aren't instances of D-ING at all, but instead S-ING in a phrasal compound.

(54) **This repeated John-suddenly-sniping-me** \emptyset has to stop.



This is an exciting possibility that must be further investigated.

- In particular: to what extent can English do this with other phrases other than S-ING?

An alternative explanation is that the entire S-ING constituent has been zero-derived by a null n. This is congruent with ?'s (?) analysis of phrasal *-ish*

(55) This is too John-sniping-me-from-stealth-ish for me.
 (cf. This is too John-snipes-me-from-stealth-ish for me.)

Note that these *-ish* constructions also appear to have compound stress, which does suggest a congruent analysis (also true of ?'s examples, though she does not address compound stress).

6 An aside on the Double-*ing* Filter

As noted in section 2. *-ing* is famously subject to ?'s (?) Double-*ing* Filter.

The descriptive filter: Sentences with two successive *-ing* verbs are ungrammatical, unless the second is nominal.¹²

All authors agree that the filter applies to the complements of aspectual verbs as in (56):

- (56) a. It {started / began / continued } snowing.
b. It was {starting / beginning / continuing } to snow.
c. *It was {starting / beginning / continuing } snowing.

Reports are mixed for complements to verbs like *try* and *attempt*, as shown in (57).

- (57) a. We { tried / attempted } dancing.
b. We were { trying / attempting } to dance.
c. ?We were { trying / attempting } dancing.

As we noted above, the filter can also be seen in examples like (58): the progressive auxiliary cannot be the highest auxiliary in S-ING, D-ING, or A-ING:¹³

- (58) a. S-ING +Prog-ING: *Them being reading the book is impressive.
b. D-ING +Prog-ING: *Their being reading the book is impressive.
c. A-ING +Prog-ING: *The person being reading the book was tall.

On the other hand *ing-ing* sequences are found in a variety of other contexts:

- (59) a. The police are stopping (people) drinking on campus. (Prog-ING above S-ING)
b. Her having knitting a gift to finish is stressful. (D-ING above S-ING)
c. The choir beginning their practicing was pleasant to hear. (Prog-ING above D-ING)

- Several modern accounts of the Double-*ing* Filter have cast it as a **morphological OCP** effect (see e.g. a brief discussion in ?, also ?, ?).
- Our account allows an alternative semantic explanation: two heads bearing [Ψ] cannot merge immediately in sequence, because there is no event variable for the second instance of [Ψ] to bind.
 - This accounts for cases like those in (59), where progressive aspect is the highest projection in the constituent from which we attempt to form S-ING, D-ING, or A-ING.
 - The grammaticality of (57) and of the examples in (59) can be explained by the presence of a lexical verb or DP layer in between the lower and higher instances of *-ing*.¹⁴

¹²This was initially formalized by Ross as a global output constraint on syntactic structures, but was reformulated by ? and ? in local terms.

¹³As ? observes, the complements of these verbs show mixed results when subjected to tests for noun-hood. Emonds discusses clefting and tough-movement, as well as passivization and interaction with particles.

¹⁴To the extent that the examples in (57) are ungrammatical, this may be better related to a morphological restriction requiring zero inflection in some constructions with *try and*; this is true of some of the examples discussed by ? involving a sequence beginning *going*, an example of the *go-get* construction discussed in ?.

- The ungrammaticality of the *ing-ing* sequences in (56) require alternative explanation. First, we note that some aspectual verbs are simply impossible in the progressive when they take a clausal complement—they have no option of taking a *to*-infinitive complement.

- (60)
- a. It { kept / stopped } snowing.
 - b. *It was { keeping / stopping } to snow.
 - c. *It was { keeping / stopping } snowing.

- Aspectual *keep*, in particular, is often analyzed as an aspectual auxiliary—i.e. as an Asp⁰ head. The same could be said for *stop* in its aspectual use. On this view, the reason (59c) is ungrammatical is because it is the equivalent of attempting to have two grammatical aspect heads in a single clause—progressive above *keep* or *stop*—where English (like many other languages) allows only one.
- We tentatively suggest the same is true for the *ing-ing* sequences in (56), except that verbs like *start*, *begin*, and *continue* are both aspectual auxiliaries (in Asp⁰, whose complements appear with *-ing*) and main verbs (when their complements are non-finite clauses).
- When their complement ends in *-ing*, they cannot themselves be made progressive for the same reason *keep* or *stop* cannot: this would involve two Asp projections in a single clause.

7 Implications and Conclusions

The present study is important for two reasons:

1. It eliminates a notorious morpheme: the English “present participle”.

- In DM, morphology is an “interface processor”; i.e., not a separate generative component of the grammar.

“Morphology has no proprietary categories, but deals only in morphs, understood as pieces of phonological material lexically specified with instructions for their use as exponents of syntactic properties.” (? , 311)

- In such a theory **there can be no morphemes** such as “participles”, except as observed patterns that follow from something else.
- Any putative morpheme must have a discoverable, non-disjunctive syntactic representation. If we can’t come up with one, then either:
 - We just need to try harder, (notice something we hadn’t yet seen, or move the theory forward in some way), *or*
 - We need to adopt a different theory of morphology.
- The elimination of morphemes is a vibrant research program:
 - Spanish inflectional classes (?)
 - Latin Third Stems (?)
 - Many others, listed in ?

- Taking event semantics into account, we have discovered a constant property of (almost) all *-ing* forms: existential closure of a predicate of events. This gives a non-morphomic analysis for the so-called present participle in English.

2. **It provides overt evidence for several English syntactic heads, all of which share a semantic property.**

- As theories of syntax and the syntax-semantics interface mature, we find that we require a considerable number of (often phonologically null) functional heads, bearing semantically contentful features.

If these theories are on the right track, we expect to find languages in which these features are overtly spelled out.

- This has of course happened many times:
 - little- v^0 : first proposed by (?) for theory-internal reasons
Spelled out in many languages (see ? on Ojicree “finals”)
 - Voice ((???)): first proposed to host the external argument. Spelled out in many languages by passive/nonactive morphology.
 - Appl⁰ ((?)): proposed as an argument-introducer. Spelled out by verbal morphology in lots of languages.
- Here we contribute to the literature by identifying an interpretable feature found on a variety of syntactic heads, and showing that it is consistently spelled out by a particular grammatical morpheme: *-ing*.

It just happens that we found it in the world’s most studied language!

- Our work suggests that a promising way to understand, and eliminate, particularly recalcitrant morphemes is to look for the unity underlying them not in the syntactic **head** involved, but rather in the interpretable **features** being spelled out.
 - The easy cases are those where a morpheme consistently realizes a single syntactic head.
 - The hard (i.e. interesting and fun) cases are those where the morpheme spells out a single syntactic feature that may lurk on a variety of syntactic heads.

Summary: Answering the questions we started with

Research Questions (repeated from introduction, but with answers this time)

1. **Q:** How many distinct syntactic distributions are there for *-ing*?
A: Superficially, at least seven.
2. **Q:** Can we treat the many distinct syntactic distributions for *-ing* as involving a single realization, within an underspecification-based model such as Distributed Morphology (DM)?
A: Yes! Except when part of a lexicalized form, *-ing* consistently spells out a single interpretable feature: $[\Psi]$, which has a consistent semantic effect—existential closure of an event variable.

3. **Q:** How do we account for the “mixed category” properties of gerunds?

A: [Ψ] can appear on any head that selects a predicate of events. Both nominal and verbal heads can select predicates of events.

A The diachrony of *-ing*

What do we know about the history of *-ing*?

What follows is a fairly standard view of the diachrony of participles and gerunds in English, of the type one might find in a textbook.

We don't know a lot about Old English.

- Many monasteries were destroyed by the Vikings, along with the written records they housed.
- What we **do** know about Old English is actually about a dialect called West Saxon:
 - A very late stage of Old English, and probably an artificial, literary dialect
 - Definitely **not** the ancestor of any of the major Standard dialects of English today.
- West Saxon had two relevant affixes.
 1. *-ende*: “present participle”, with a history dating back through Common Germanic (**-andz-*) and Proto-Indo-European (**-nt-*)
 2. *-ung*: deverbaler (gerund), also with a history dating back through CG (**-unga*) and PIE (**-enkw*)

We know more about Middle English.

- Still not a lot though, because some French-speaking Vikings (the Normans) had conquered England and English wasn't used much—especially in writing—by the literate classes.
- By the end of Middle English:

1. The present participle:

Northern Dialects: *-and(e)*

Midlands: *-end(e)*, *-ing(e)*, *-yng(e)*

South: *-ing(e)*, *-ind(e)*, *-yng(e)*

Note that these are spelling variations. All probably pronounced some variety of /ən/, /in/, or /ɪn/ as the result of regular phonological changes.

2. The gerund:

By the end of Middle English *-ung* has rather famously been replaced with *-ing*.

Again, this is spelling: these were, again, all probably pronounced some variety of /ən/, /in/, or /ɪn/, as the result of a different set of regular phonological changes.

- What do the spellings tell us?

At least some speakers were occasionally spelling *-end(e)* as *-ing(e)* by analogy with the homophonous *-ing*.

- Spelling reanalysis for homophones is well known. (e.g., island, isle, and aisle).
- Also, Middle French didn't have a contrast between these two forms and Middle French had enormous effect on Middle English.

We know a lot about Early Modern English—it was written down **a lot**

- Both affixes are spelled “-ing” and pronounced /ɪŋ/
- There’s also a dramatic rise in “spelling pronunciations” in Early Modern English
 - Where you choose to pronounce things the way they are spelled rather than spell them the way they are pronounced (or be happy with a difference)
 - This is a side-effect of the rise of the prescriptive tradition in Early Modern English
 - Here are some examples: *Anthony, Catherine, landscape, often, forehead, Helen, fault, adventure, perfect, arctic, baptism, ye, Ralph, schedule, hotel, and polka.*
- So, *-ing* began to be pronounced /-ɪŋ/
 - “g-dropping” is a misanalysis of the pronunciation difference between the original sounds and spelling pronunciation.
 - But, it took. So we spell the original /m/ pronunciation as ‘-in’ and now have regular register-driven allomorphy.

And as far as we can tell, these divergent affixes are now a single affix.

What can we infer about learning strategies and cognition?

It is generally believed (?, ?, among many others) that first-language acquisition plays a crucial role in language change.

The case of *-ing*:

- Speakers of Middle and Early Modern English were presented with two homophonous affixes in apparently disjunctive conditions.
- But they weren’t completely disjunctive. There was one small semantic property they had in common. They both involved existential closure of an event variable.
- We hypothesize that this became the core property (i.e., feature) of *-ing*, which was set up as what we have been calling feature [Ψ].
- And that, combined with a (violable) constraint against homophony, was enough for language learners to posit a single affix.
- And so, now there is one *-ing*.