

Experimenting on the past:

Why don't grammaticalization pathways always recur

Eitan Grossman¹ and Malte Rosemeyer²

¹Hebrew University of Jerusalem & ²University of Freiburg / KU Leuven

Academia Grammaticorum Salensis Septima Decima

28 July, 2020

Salos, Lithuania

Joint work with Malte Rosemeyer



1. Why experimenting on the past is useful
2. A story about the grammaticalization of an anterior construction in Spanish
3. A corpus study and an experiment
4. Conclusions

Why experiment on the past

Linguists love to make up stories about why things are the way they are

Well-known stories include:

- Universal Grammar
- Poverty of the stimulus
- Merge
- Iconicity
- Frequency
- Animacy
- Just to name a few...

We historical linguists know better!

Things are the way they are because they **became** that way through processes of language change!

- Nasal vowels have limited distributions because of the properties of their diachronic sources (VN sequences) and the pathways through which they develop.
- Bound morphemes related to tense have the properties they have because they grammaticalized from erstwhile auxiliaries (etc.).
- Differential Object Marking develops because of the need to disambiguate arguments.
- No, because of information structure.

But historical linguists love stories too!

- Subjectification happens because speakers recruit expressions to express their subjective states of mind.
- Sound change happens because listeners sometimes misparse a speaker's production.
- No, sound change happens because constraints get reranked.
- Reanalysis happens because listeners can parse an utterance in a way that doesn't match the speaker's representation.
- No, reanalysis happens because of the Principle of Reference.
- No, reanalysis happens because children.

Stories are great

But at best, they're **hypotheses** about what happened.
We really just don't know.

An early stab at formulating a testable hypothesis

Jäger & Rosenbach (2008) proposed that the overwhelming unidirectionality of grammaticalization is due to asymmetrical priming, e.g., the stipulated fact that a lexical meaning primes a related grammatical meaning, but the converse isn't true.

Nice idea, but they didn't test it. We'll come back to this.

An early stab at pointing out that experimentalists and historical linguists might get along

Grossman & Noveck (2015) suggest that experimental psychologists could find a wealth of hypotheses about the social and cognitive mechanisms of language change in the historical linguistics literature.

They did **not** point out that doing experiments might help figure out which of these stories hold water.

A first stab at testing something

Hilpert & Saavedra (2018) test Jäger & Rosenbach's (2008) hypothesis about asymmetrical priming.

They find that it doesn't work:

“Contrary to the hypothesis, we observe a negative priming effect: speakers who have recently been exposed to a lexical element are significantly slower to process its grammaticalized variant. We interpret this observation as a horror aequi phenomenon.”

(Another story, cool.)

Another bunch of stories

Differential Object Marking (DOM) has been claimed to develop as the result of the need to disambiguate A and P arguments in transitive clauses.

According to another story, DOM indexes salient semantic properties of arguments.

Broad cross-linguistic investigation suggests that it typically develops due to information-structural reasons related to informativity.

Some experiments

Tal et al., in ongoing work, conduct artificial language learning experiments to test the hypothesis that information structure plays a role.

Specifically, the idea tested is that case marking will emerge in the context of surprising pairings of grammatical role and information structural status.

For example, if lexical P arguments tend to be discourse-new or focal, then by this hypothesis, we would expect discourse-old or given P arguments to be preferentially marked.

The experiment

43 participants over 4 days, run on MTurk.

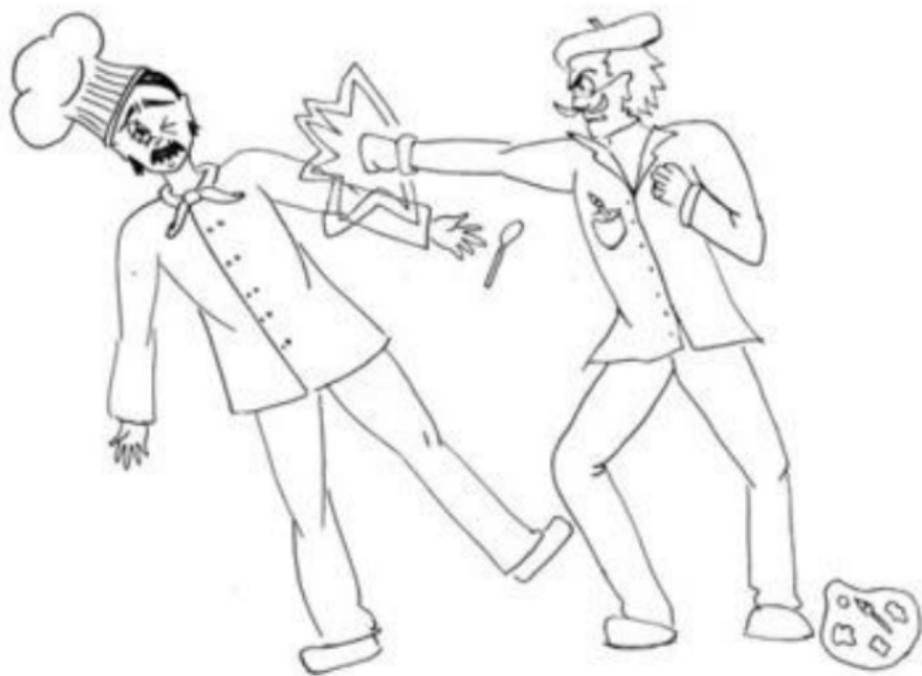
8 animate characters, 4 verbs, one optional case marker (only on object) (50%), two word orders (SOV, OVS) (each 50%).

To manipulate information structure (givenness), one of the characters is introduced before the sentence.

The experiment



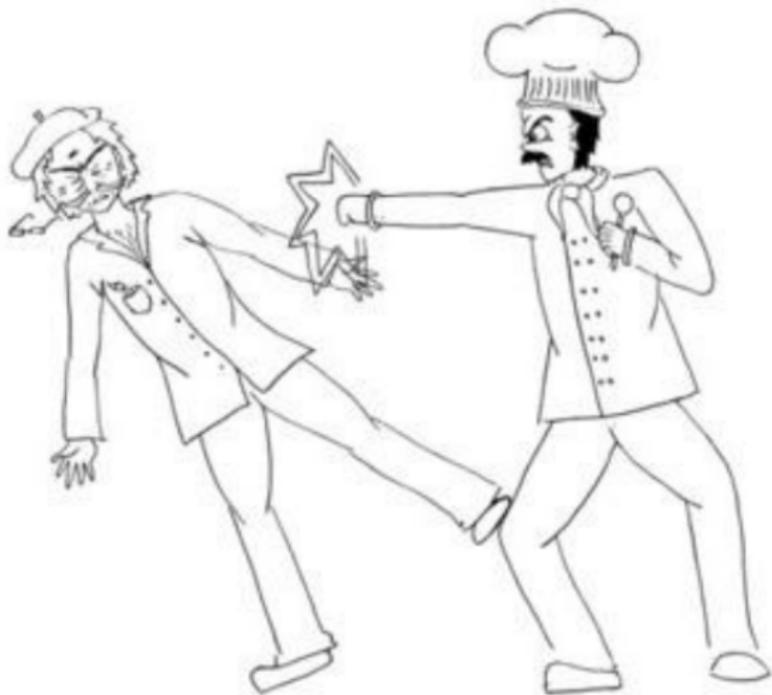
The experiment



The experiment



The experiment



The information structure manipulation

→ painter ←

The painter punched the chef



typical

→ painter ←

The chef punched the painter



atypical

The prediction

If there is a preference for speakers to mark atypical associations overtly (e.g., given objects), then we expect the language learners to increase case marking over time on atypical direct objects.

Did the experiment support the linguists' stories?

Kind of, but kind of not. There were two main effects:

- Given P arguments tended to be shifted to OSV order.
- Initial arguments in OSV order tended to be case-marked.

The conclusion is that information structure had an **indirect** effect on the development of case marking.

It is useful to experiment on the present to test hypotheses about change

- Most stories about language change are actually about ‘online’ aspects of cognition and interaction.
- So if these mechanisms and processes do play a role in shaping language change, we should expect them to show up in controlled settings.
- Interestingly, we should expect them to show up in a stronger and cleaner fashion in controlled settings, because ‘in the wild’ they interact with innumerable other factors and can easily be invisible in some cases.

It is useful to experiment on the present to test hypotheses about change

If these cognitive and interactional mechanisms and processes are relevant for language change, they can be considered to be something along the lines of Bickel's 'functional factors,' which are:

grounded in the biological/cognitive or social/ communicative conditions of language, such as specific processing preferences ... or specific sociolinguistic constellations ... that systematically bias the way linguistic structures evolve. The defining property of functional triggers is that they affect transition probabilities universally, independent of concrete historical events (Bickel 2017, with similar formulations elsewhere).

A case study: the grammaticalization of an anterior in Spanish

Recent past or anterior from 'finish' sources

Our case study deals with the development of recent past or anterior constructions out of constructions containing a verb meaning 'finish,' in which an active agent brings a process to an end (Bybee et al. 1994)

This grammaticalization pathway is documented in languages as diverse as Sango (Central Africa), Mwera (Tanzania), Palaung (Burma), Tobela, Daga, Coptic, Thai, and numerous creoles, such as Tok Pisin and Rodrigues Creole French, and it is attested in sign languages such as American Sign Language.

'Finish' anteriors

In Palaung (1), the verb cluster “signals a situation prior to and relevant to the situation in the next clause” (Bybee et al. 1994).

(1) Palaung (Austroasiatic, Burma; cited in ?, 72)

mī hwɔ̄-i hɔ̄m yɔ̄ pɔ̄m v̄ēng
2.SG finish eat EMP rice return

'Come after you have eaten'

A 'finish' anterior in Europe

Interestingly, it is not common in Europe, with the exception of Ibero-Romance.

In Modern Spanish, for example, the *acabar* 'finish' + *de* 'of' + infinitive construction has developed into a marker of recent past (2).

(2) Spanish (Indo-European)

Juan acab-a de compr-ar un coche

Juan finish-PRS.3SG of buy-INF DET.INDF.M.SG car

'Juan just bought a car'

A historical study (Rosemeyer & Grossman 2017)

In a long and complicated article, we investigated the first stages of the gramamticalization of this construction.

The basic starting point was Bolinger's statement that "once a verb is given an infinitival complement, that verb starts down the road of auxiliariness" (1980).

We asked how verbs get verbal complements in the first place.

A historical study (Rosemeyer & Grossman 2017)

We examined a corpus of historical Spanish from the 13th to the 18th centuries, and also checked Modern Day Spanish.

Our conclusion was that constructions with the verb *acabar* underwent a process of OVERTIFICATION, in which previously inferred material was made explicit.

We started out from a theory-based prediction:

1. At early stages of the grammaticalization, the finished event should be left implicit if the event is the default interpretation for a given collocation of 'finish' and a direct object.
2. If the event differs from the default interpretation, i.e., is informative, it cannot be inferred and should be made overt.

Our predictions

So we expected distributions like the following at early stages:

1. John finished the pasta.
2. John finished instagramming the pasta.

The idea being that the default interpretation of ‘finish the pasta’ is, averaging across contexts, is ‘finish eating the pasta.’

Early Spanish data: an uninformative finished event

(3) Spanish

e **acab-ó** la torre dal=faro
and finish-PST.PFV.3SG DET.DEF.F.SG tower of.the=lighthouse

que comença-a-ra hercules
that begin-THEME-PST.IPFV.SBJ.3SG hercules

‘And he finished the tower of the lighthouse that Hercules had begun’ (*EDE*, 13th century)

Early Spanish data: an informative finished event

(4) Spanish

aquel anno **acab-o** **de cercar** toda
that year finish-PST.PRFV.3SGM of surround.INF all

la uilla de Roma de muros muy fuertes
the city of Rome of walls very strong

‘That year he finished surrounding the city of Rome with very strong walls’ (*EDE*, 13th century)

At this stage

- The construction showed the expected distribution.
- Our story (a): informativity is what got infinitives into the *acabar de* construction.
- Our story (b): marking informativity is the coded meaning of the *acabar de* construction.
- It was not yet associated with recent past meanings.
- How did the construction receive its temporal meaning?

The grammaticalization of acabar de + INF as an anterior

The recent past meaning first occurred in relative past contexts in which, contrary to the distribution described above, an overt infinitive expressed an **uninformative** event.

(5) Spanish

Y en este tiempo como **fuese**
and in DET.DEF.M.SG time when be.PST.IPFV.SBJ.3SG

acab-a-da de hacer la puente
finish-THEME-PTCP.F of make.INF DET.DEF.F.SG bridge

pas-ó la Infantería española
pass-PST.PFV.3.SG DEF.DET.F.SG infantry Spanish

'And then, when they had finished building the bridge (lit. the bridge had been finished building), the Spanish infantry passed over it' (CDC, 16th c.)

The grammaticalization of *acabar de* + INF as an anterior

In the example (6), the infinitive *hacer* ‘make’ could have been omitted without loss of information, given that the meaning ‘to finish a bridge’ implicates that the full meaning of the sentence is ‘to finish building/making a bridge.’

(6) Spanish

Y en este tiempo como **fuese**
and in DET.DEF.M.SG time when be.PST.IPFV.SBJ.3SG

acab-a-da de **hacer** la puente
finish-THEME-PTCP.F of make.INF DET.DEF.F.SG bridge

pas-ó la Infantería española
pass-PST.PFV.3.SG DEF.DET.F.SG infantry Spanish

‘And then, when they had finished building the bridge
(lit. the bridge had been finished building), the Spanish
infantry passed over it’ (CDC, 16th c.)

The grammaticalization of acabar de + INF as an anterior

At this stage, overt uninformative infinitives were used in the context of discourse progressions.

Keep in mind that we claimed that the earlier coded meaning of the construction was to mark an event as informative.

But innovative speakers can 'abuse' constructions for all sorts of discourse-related and rhetorical effects.

The grammaticalization of *acabar de* + INF as an anterior

Anterior temporal clauses were the crucial context for the reanalysis of the *acabar* construction as an anterior construction.

Innovative speakers used the *acabar de* INFINITIVE construction in contexts not licensed by its earlier meaning, in order to highlight a discourse progression.

Listeners, unable to accommodate the presupposition that the finished activity is highly informative, were coerced into reanalyzing the construction.

Because the *acabar de* INFINITIVE was frequently used in relative past contexts, listeners reanalyzed the construction as marking relative past, which in main clauses amounted simply to locating the event prior to speech time.

Summarizing the claims

- At early stages, the construction marked a finished event as informative.
- It was later used in contexts of discourse progression, even when the finished event was uninformative.
- These contexts were typically anterior temporal clauses (after finishing doing X...).
- Listeners could not interpret these infinitives as describing informative events, so they were coerced into reanalyzing the construction.
- The reanalysis was guided by the very consistent context of temporal anteriority.

So many stories!

Actually, our story was even more complicated, and involves lots of statistics and terminology from pragmatics and the grammaticalization literature.

We are confident that our claims are consistent with the data.

However, it is difficult to know if these are simply stories that we are telling ourselves.

Since we do not have access to the minds of speakers of Early Spanish, or even access to actual interaction between speakers, it is hard to evaluate the mentalistic claims made by historical linguists.

Experimenting on the present to test
claims about the past

No access to the minds of dead speakers and listeners

We take the analysis of R&G (2017) as a causal theory which can be tested on other languages.

Since the claims are not about historical forces, but rather about panchronic principles of online communication, we test the validity of the particular predictions on speakers of a distantly-related language, English.

Two studies

- A corpus study, in which we operationalize the notion of ‘informativity,’ used in an impressionistic fashion in R&G (2017), as a quantitative measure known as mutual information.
- An experimental study, in which we attempt to measure the extent to which the inferential mechanisms claimed to be operative in Early Spanish are operative in Present-Day English as well.

Note that English did not undergo this grammaticalization pathway, but if we are correct that the communicative biases that we postulated for earlier Spanish are Bickelian functional factors, then they should show up in other languages as well.

The corpus study

Goals of the study

The goal of the study was to test the prediction that, like in Early Spanish, the use of an overt lexical verb in Present-Day English FINISH constructions depends on two factors.

Prediction 1: informativity

First, we test the prediction that the distribution of overt vs. omitted lexical verbs in Present-Day English is subject to the same constraint as that identified for Early Spanish.

Specifically, we test whether the use of an overt verb (in a form we call here by the traditional term 'gerund') is more likely when the action described by the lexical verb is informative.

Prediction 2: narrative progression

Second, we test the prediction that like Early Spanish speakers, Present-Day English speakers can exploit the FINISH + gerund construction to implicate the highlighting of a narrative progression in a text.

We would expect the use of FINISH + gerund to be likelier in temporal subordination contexts than in other syntactic contexts such as main or relative clauses.

What do we mean by informative?

We mean that the interpretation differs from the default interpretation of a specific 'finish' + direct object collocation.

For example, we hypothesize that, averaging across contexts, the collocation 'finish dinner' (7a) has the default interpretation 'finish eating dinner' and not, e.g., 'finish transporting dinner in a car' or 'finish instagramming dinner.'

Conversely, we expect that when the finished event is informative, an overt verb will occur, as in (7b).

(7) English

a. John finished dinner.

b. John finished instagramming dinner.

Prediction 3

Since we hypothesize the discourse progression function to be more likely to arise with *uninformative* than informative gerunds, we would expect the effect of temporal subordination to be stronger with uninformative than informative gerunds.

We predict that the syntactic context (temporal subordination vs. the rest) will interact with the lexical semantic context (uninformative vs. informative finished activity).

All instances of the syntagm *had finished* from two corpora of Present-Day-English: the Corpus of Contemporary American English (Davies 2017) and the British National Corpus (Davies 2017).

The decision to focus on pluperfect uses of FINISH was made on the basis of the fact that these data would allow for a comparison of FINISH in temporal subordination contexts and other syntactic contexts.

Eliminated false positives and examples without a direct object.

- (8) When I turned the radio station back up, Blind Willie **had finished** and Big Joe Williams was carrying on about his "Little Leg Woman". (Bk:DesertWindLena, 2012, COCA)

Eliminated examples in which no variation is possible, mainly when the direct object describes a state or an event.

- (9) Other than Winston and Buddy Lockridge, he'd only given the number to Brass Doran in Quantico and he **had finished his business** with her. (Bk:DarknessMoreThan, 2001, COCA)

The only plausible gerund would be 'doing,' which isn't more informative than its omission.

A final dataset of $n=660$ tokens of transitive FINISH. Of these tokens, $n=249$ involve the use of a gerund, whereas $n=411$ do not.

Coded each token for four parameters targeting our hypotheses.

First, we coded the tokens instantiating the FINISH + gerund + DO construction in terms of the variable OVERT.

This variable received the three levels (a) "NoGerund", (b) "InformativeGerund", and (c) "UninformativeGerund".

The distinction between informative and uninformative gerunds (levels (b) and (c)) was made on an intuitive basis and had an entirely heuristic value for our analysis.

A variable measuring the Mutual Information Score (MI) between FINISH and the lemma of the direct object.

It provides a quantitative measure of the attraction between these two constituents in the corpus.

This is done by contrasting their actual co-occurrence rate with the co-occurrence rate corresponding to a chance distribution.

Calculating MI

Mutual Information was calculated on the basis of the formula in (1), where A represents the frequency of the object, B represents the frequency of FINISH, AB represents the frequency of FINISH within a distance of four words from the object, sizeCorpus represents the size of corpus and span represents the span of words (four words to the left and right of the node word, i.e. eight).

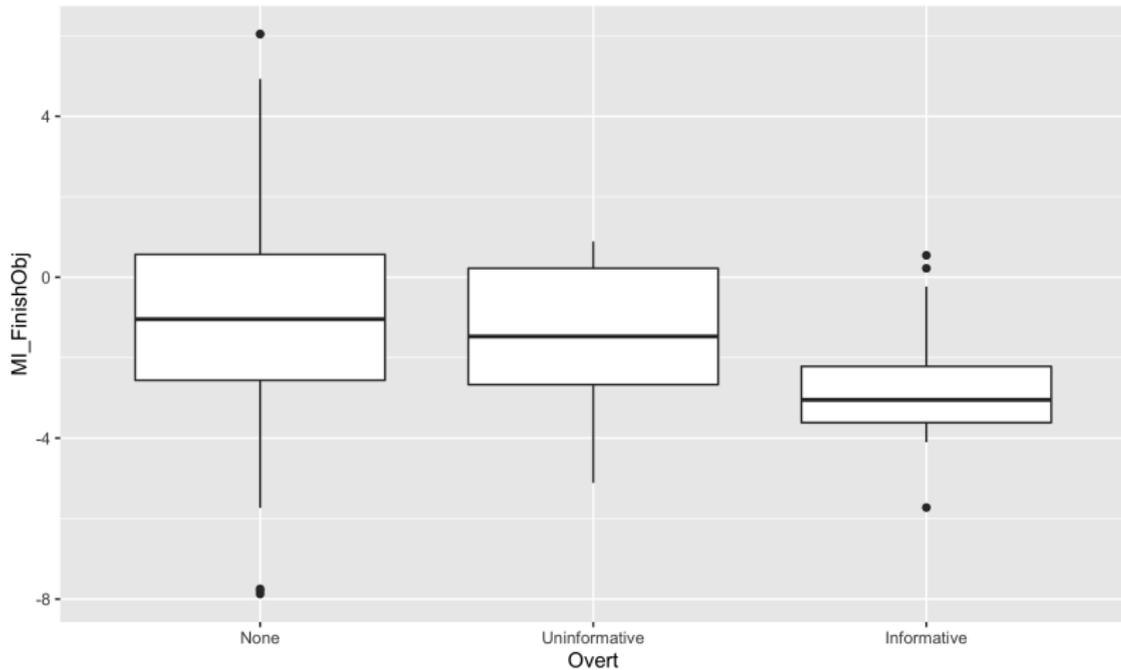
$$MI = \log * ((AB * sizeCorpus)/(A * B * span))/\log(2) \quad (1)$$

The MIFINISHOBJ variable can be said to measure the availability of default readings for a given FINISH + DO sequence.

Thus, a high value of the FINISH + DO sequence on the MI variable would imply that a default reading is easy to derive from the FINISH + DO sequence.

Results

This expectation is borne out in the data.



There is a significant correlation between the OVERT and MIFINISHOBJ variables.

Thus, the mean Mutual Information score between FINISH and the object lemma is lowest for cases involving informative gerunds, somewhat higher for cases involving uninformative gerunds, and highest for cases that do not involve a gerund.

These differences reach statistical significance.

So it looks like this prediction is confirmed.

We coded each token in the corpus for the variable AFTER, which describes the syntactic context.

Two levels:

1. "False", representing main clauses and subordinate clauses other than temporal clauses that indicate that the action in the main clause happened after the action in the subordinate clause
2. "True", representing temporal clauses that indicate that the action in the main clause happened after the action in the subordinate clause

Examples

- (10) In fact, at one point, she thought she **had finished** the model's head, but revised it when she saw him again. (BkSF:MovingMars, 1993, COCA)
- (11) Henry sat down out of sight and weeded geraniums for a few moments. [...] When he **had finished the flower bed**, he thought he heard the young doctor moving in the office. (ChildLife, 1998, COCA)

Determination and informational status

We coded each token according to the nature of determination of the object (variable DETERMINATION) because we assumed determination to be indicative of the informational status of the event.

In examples such as the *flowerbed* example, the omission of the gerund might be due to anaphoricity, i.e., the fact that the action has been explicitly mentioned in the preceding context and consequently, *flowerbed* has a specific referent. The variable DETERMINATION received the levels "Definite", "Indefinite", and "Possessive".

A logistic mixed-effects logistic regression model that predicted whether or not a gerund was used in the FINISH construction from the variables MIFINISHOBJ, AFTER, and DETERMINATION.

Expected results

- Gerund use is less likely if the FINISH + object syntagm scores high on the MIFINISHOBJ variable, and when the object NP is definite,
- Gerund use is more likely in subordinate temporal clauses indicating anteriority of the event expressed in the subordinate clause to the event expressed in the main clause (variable AFTER),
- Gerund use is even more likely in such subordinate temporal clauses indicating anteriority if the the FINISH + object syntagm scores high on the MIFINISHOBJ variable (interaction between MIFINISHOBJ and AFTER)

All predictor variables have a significant main effect on the likelihood of gerund usage in FINISH + DO constructions.

1. First, a higher MI score between FINISH and the object lemma significantly decreases the likelihood of gerund use.
2. Second, gerund use is significantly more likely in 'after' contexts than other syntactic contexts.
3. Third, in comparison to definite determination, there is a lower likelihood of gerund use when the object is modified by a possessive.

Interpretation of results (1)

The use of a gerund is more likely when the interpretation obtained by leaving out the gerund differs from the interpretation obtained by using the FINISH + gerund construction.

In other words, the gerund is typically used when it is informative, i.e., when the use of the gerund leads to an interpretation of the finished event that differs significantly from the default interpretation that would be expected on the basis of the combination of FINISH and the direct object.

Interpretation of results (2)

The results from the corpus study confirm the second prediction, namely that speakers exploit the use of the gerund in order to signal discourse progression.

Gerund use is significantly more likely in subordinate temporal clauses in which the complementizer expresses *after* or a complementizer with similar meaning.

Interpretation of results (3)

Only tentative evidence was found for the third prediction, i.e. the assumption that the effect of temporal subordination is stronger with uninformative than informative gerunds.

Thus, although speakers do more frequently use uninformative than informative gerunds when exploiting the use of gerunds in 'after' contexts to highlight discourse progression, this effect is weak and does not reach statistical significance.

In other words, the analysis does not give evidence for the assumption that English speakers use uninformative gerunds in 'after' contexts in order to highlight the discourse progression effect.

This is precisely the part of the story that we claimed was crucial for the grammaticalization of the anterior temporal construction in Spanish!

This is the first point in which our predictions were not borne out for English.

In essence, this finding means that some of the inferences typically associated with 'finish' events are shared by English and Spanish, the two languages differ in a particular and potentially crucial aspect of usage.

Exploring the difference

While for Early Spanish speakers, there was a tight statistical association between anterior temporal clauses and uninformative events, English speakers exploit constructions like 'After finishing eating dinner' both to highlight a discourse progression **and** to mark the informativity of the action described by the gerund.

In other words, there is no close correspondence between this construction and uninformative events.

An experimental study

Why an experimental study

Corpus studies are great about telling us about usage, in this case production, but what about perception?

After all, a lot of the stories in historical linguistics are about perception-based mechanisms, such as reanalysis.

Why an experimental study

The results from the corpus study presented in the last section suggest that English speakers exploit gerund use in FINISH constructions both as a marker of discourse progression and as a marker of informativity of the finished event.

We tentatively interpret this result as raising the possibility that the use of both informative and uninformative gerunds in anterior temporal clauses blocks the close association between anterior temporal clauses and uninformative events that was hypothesized to be a main trigger of the grammaticalization of the anterior construction in Spanish.

The experiment

We conducted a web-based experiment in the non-cumulative self-paced reading moving-window paradigm.

54 participants were asked to read 18 invented target stories consisting of an introductory sentence and a target sentence.

Table 1: An example stimulus from the reading-time experiment

Introduction	Elizabeth was getting ready for the Medieval fair.
Target	[immediacy = F, overt = none] A while after she had finished the sword, she heard her phone ring.
	[immediacy = T, overt = none] As soon as she had finished the sword, she heard her phone ring.
	[immediacy = F, overt = uninf] A while after she had finished forging the sword, she heard her phone ring.
	[immediacy = T, overt = uninf] As soon as she had finished forging the sword, she heard her phone ring.
	[immediacy = F, overt = inf] A while after she had finished choosing the sword, she heard her phone ring.
	[immediacy = T, overt = inf] As soon as she had finished choosing the sword, she heard her phone ring.

Explanation

The introductory sentence established the protagonist of the story (Elizabeth) and introduces an activity carried out by the protagonist (getting ready for the Medieval fair).

The target sentence is composed out of an anteriority-expressing temporal subordinate clause and a main clause.

In the subordinate clause, the protagonist finishes an action that is understood as part of the more general activity introduced in the introductory sentence. This action involves an artifact codified as the direct object of the action, whose existence can be inferred from the scenario depicted in the introductory sentence via a bridging inference.

The main clause describes a subsequent action that takes place after the action in the subordinate clause.

Table 2: An example stimulus from the reading-time experiment

Introduction	Elizabeth was getting ready for the Medieval fair.
Target	[immediacy = F, overt = none] A while after she had finished the sword, she heard her phone ring.
	[immediacy = T, overt = none] As soon as she had finished the sword, she heard her phone ring.
	[immediacy = F, overt = uninf] A while after she had finished forging the sword, she heard her phone ring.
	[immediacy = T, overt = uninf] As soon as she had finished forging the sword, she heard her phone ring.
	[immediacy = F, overt = inf] A while after she had finished choosing the sword, she heard her phone ring.
	[immediacy = T, overt = inf] As soon as she had finished choosing the sword, she heard her phone ring.

Variables

The subordinate clause in the target sentence was modified according to two variables: (a) IMMEDIACY, with the levels 'True' and 'False', and (b) GERUND, with the three levels 'None', 'Uninformative' and 'Informative'.

The variable IMMEDIACY referred to whether the complementizer expresses that the action in the main clause instantly succeeded the action in the subordinate clause, variable level 'True') or there was a lapse between the two actions, variable level 'False').

The three levels of the variable GERUND referred to the presence and informativity of the gerund; either no gerund was present (variable level 'None'), an uninformative gerund was present (variable level 'Uninformative') or an informative gerund was present ('Informative').

The two variables lead to a total of six conditions.

Table 3: An example stimulus from the reading-time experiment

Introduction	Elizabeth was getting ready for the Medieval fair.
Target	[immediacy = F, overt = none] A while after she had finished the sword, she heard her phone ring.
	[immediacy = T, overt = none] As soon as she had finished the sword, she heard her phone ring.
	[immediacy = F, overt = uninf] A while after she had finished forging the sword, she heard her phone ring.
	[immediacy = T, overt = uninf] As soon as she had finished forging the sword, she heard her phone ring.
	[immediacy = F, overt = inf] A while after she had finished choosing the sword, she heard her phone ring.
	[immediacy = T, overt = inf] As soon as she had finished choosing the sword, she heard her phone ring.

The dependent variable in the experimental setup was the reading time of the direct object (in the example stimulus, *sword*).

This was due to the fact that the informativity of the gerund (if expressed) can only be evaluated by the readers post-hoc, i.e. upon reading the direct object.

In contrast, measuring the reading times of the gerunds (when present) would not lead to an accurate representation of the impact of the parameter of informativity on the perception of the target sentences.

Why reading time?

Reading time is understood as a proxy of the expectedness of the direct object in the specific context of the target sentence.

We predicted the reading times of the direct object to be lower for target sentences in which no gerund was present than for target sentences in which an informative gerund was present because the presence of the definite determiner would lead the readers to anticipate a direct object related to the general scenario established in the introductory sentence.

In other words, the referent 'sword' is already pre-activated in the reader's mind when reading the introductory sentence.

Why reading time?

Likewise, we expected reading times of the direct object to be lower for target sentences in which an uninformative gerund was present than for target sentences in which an informative gerund was present due to the high degree of mutual informativity between uninformative gerunds and their preferred direct objects.

Thus, the referent 'sword' is more likely to be expected after mention of the gerund *forging* than after *choosing*.

What about immediacy?

Finally, similarly to the corpus study, we expected this informativity effect to be moderated by the variable immediacy: the complementizer *as soon as* is more likely to trigger a discourse progression reading than the complementizer *a while after*.

Consequently, if an addressee-based reanalysis of FINISH constructions as a marker of discourse progression has taken place we would expect reading times on the object to be even lower for target sentences with an uninformative gerund and the complementizer *as soon as*.

The experiment

A Latin square design was employed. All 54 participants were exposed to all of the six conditions three times, but without reading the same target sentence more than once. Participants were also exposed to 18 filler stories.

The experiment was programmed on the online experiment platform Ibx (Drummond 2020) as a non-cumulative self-paced reading moving-window experiment.

The participants read each story word by word, only seeing one word at a time and progressing by pressing the space bar. In this manner, the precise reading times for each word in the story could be monitored.

The results

The $n=972$ sentences read by the 54 participants in the experiment were filtered according to standard experimental practices. The final dataset comprised $n=848$ responses.

This final dataset was submitted to a statistical analysis using linear mixed-effect regression modeling.

Regarding the variables that are relevant to our predictions, the analysis only found a significant effect for the main effect of the variable GERUND.

The main effect of SUBORDINATION, as well as the interaction between GERUND and SUBORDINATION, were not found to affect the reading times of the direct objects in the target sentences.

The results

The analysis of the data from the reading-time experiment confirmed our prediction regarding the reading times on the direct object with respect to the influence of the presence and informativity of the gerund.

Reading times for the object were lower for target sentences involving an uninformative gerund or in particular, no gerund, than for target sentences involving an informative gerund.

The results

This is due to the difference in informativity of the action associated with these different conditions.

- Low reading times for sentences without a gerund are due to the fact that the referent of the direct object can easily be established from the general scenario introduced in the introductory sentence (e.g., 'medieval fair' - 'sword').
- The relatively low reading times of sentences with an uninformative gerund are due to the high degree of mutual informativity between the gerund and the direct object (e.g., 'to forge' - 'sword').
- In contrast, an informative action such as 'to choose' leads to a greater uncertainty in the reader's expectation regarding the referent of the direct object. This uncertainty is reflected in longer reading times of target sentences involving informative gerunds.

However, no evidence for an influence of the variable IMMEDIACY, reflecting the difference between immediate succession ('as soon as') or time-lapsed succession ('a while after') of the events in the subordinate and main clause on the reading times of the direct objects.

Even more crucially, no evidence for an interaction effect between GERUND and IMMEDIACY was found, indicating that the effect by informativity is not moderated by the difference between immediate and time-lapsed succession.

Consequently, our analysis does not give evidence for the assumption that a addressee-based reanalysis of the use of gerunds in English FINISH constructions has taken place.

While our corpus study has shown that speakers routinely employ gerunds in order to highlight discourse progression, addressees have not reanalyzed this usage of gerunds as indicating **solely** discourse progression.

Rather, in English, addressees are still mainly sensitive to the parameter of informativity, failing to pay attention to the parameter of immediacy.

Due to this lack of an addressee-based reanalysis of the construction, it seems that unlike Early Spanish FINISH constructions, it is highly unlikely for English FINISH constructions to grammaticalize into markers of recent past.

Summarizing

- Our corpus study of Spanish – and historical linguistic theory – led us to tell a few stories about how and why *acabar* + direct object acquired an overt verb, and thereafter grammaticalized into an anterior construction.
- Since our stories were about cognition and interaction, we thought it worthwhile to check whether the same factors are operative in speakers of other languages.
- A corpus study showed that our hypotheses were largely borne out, with the crucial difference that unlike Spanish, English speakers do use finish-constructions in narrative progressions, but these constructions are still mainly sensitive to the informativity of the finished event.
- In other words, and crucially, English did not develop a close association between anterior temporal contexts and uninformative overt verbal complements.

Summarizing

- This means that the presumed preconditions for a coerced reanalysis are not present in English.
- Our perception experiment confirmed that English addressees are sensitive to the presence and informativity of gerunds, but not to the narrative progression function.
- Since this aspect was proposed to be crucial for the grammaticalization of the Spanish anterior, it makes sense that English did not grammaticalize an anterior out of 'finish' and is unlikely to do so.

Conclusions

Some general implications

Historical linguists tend to want to explain how and why language change occurs.

This is very important not only for historical linguistics but also for typologists.

There are plenty of functional explanations on offer for nearly every type of historical change.

Some general implications

Typically, these explanations are consistent (at least ideally) with the data.

But this is not enough.

Historical linguists should treat their stories about speakers, listeners, children, communities, or whatever as hypotheses to be tested.

There are plenty of methods to test hypotheses, such as corpus research, modelling, psycholinguistic experiments, and more.

Thank you for your attention!