Testing Variation in the lab: The Case of *ing*-allomorphy

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Phonology Conditioned Allomorph Selection and Locality

- Localist theories (Bobaljik 2000, Embick 2010) : only information about syntactically local morphemes can influence allomorph choice.
- Globalist theories (e.g., standard versions of OT): predict that non-local, global information (e.g., about global prosodic shape) can affect allomorph choice.
- This paper shows evidence from phonological effects on the choice of allomorphs for *-ing* that are incompatible with (strong versions of) both localist and globalist theories.
- The results point to a different kind of locality-effect on allomorph choice**: The Locality of Production-Planning,** which is strictly modular in that phonological conditioning of allomorph choice is not mediated through syntax.

ing-Allomorphy

Across dialects, choosing [in] over [iŋ] has been shown to be more likely…

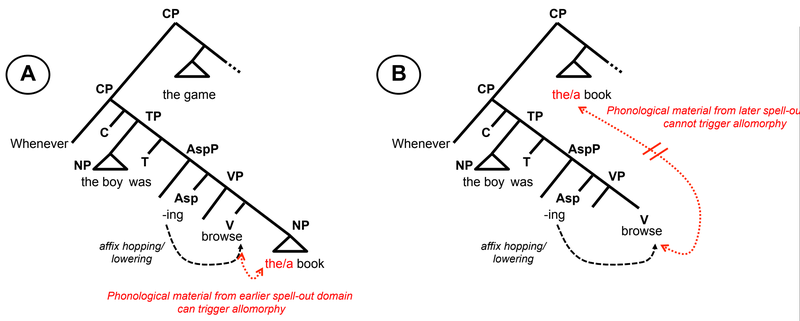
- …in lower socioeconomic classes, in lower registers. Age, sex and ethnic group play smaller roll, there are also lexical effects.
  (cf., Fischer 1958, Labov 1972, Trudgill 1972, Houston 1986)
- **…if a coronal sound follows (Houston 1986)**

Localist Prediction forPhonological Effect:

A strong localist theory would predict that the phonological effect ***should only be observed in syntactically local environments:***

A Phonological Environment Locally Available:
(Whenever the boy was browsing the/a book) the(game would fall off the table.)

B Phonological Environment Locally Unavailable:
(Whenever the boy was browsing) (the/a book would fall off the table.)



The Experiment

- 2x2 design, manipulating syntactic and phonological environment
- So far 40 participants, mostly undergraduate students at McGill, read a total of 40 sentences, each participant saw one condition from each item
- Each participant had time on each trial to read through the sentence, to make sure they understood it and to avoid garden pathing.

A Methodology for Larger-Scale Production Experiments

- Forced alignment facilitates large-scaler production experiments.
- Large production experiments makes it possible to look at probabilistic phenomena (as in variation) and taking the phonetic context into account
- This method is less apt for certain **sociological factors** like stye (since it's close to reading),but **valid for certain linguistics factors** (as in this study).

① Data Collection

- scripted in matlab in whichtrials are presented in pseudo-random order, with unrelated fillers.
- On each trial, a soundfile is recorded, the subject is asked to say the sentence as if in a conversation.

② Sifting and Truncation

- File is checked for whether the participants said the right thing without major disfluencies and cut to size.
- Aided by a praat script that estimates beginning and end of the recorded speech, silence at begin and end is cu

③ Forced Alignment

- The data is annotated by forced alignment, using HTK (using scripts by Kyle Gorman, UPenn)
- The HTK aligner is trained on 10hr of lab speech collected in our lab.

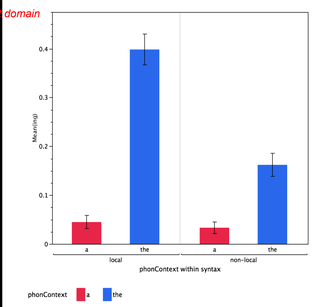
④ Annotation

- A praat script bring up the relevant portion of eachsoundfile and an annotator makes the decision whether [in] or [iŋ] was used based on perception.
- The relevant portion of the soundfile includes the part corresponding to /verb+ing/ and 10ms of the environment.
- The annotators are blind to the condition—but there might be acoustic cues that might reveal the phonological context and syntactic contexts, so true blindness to condition is not possible.

⑤ Mixed Model Regression

- Mixed Model Logistic regression using LMER function in R, with participant and item as random effects.

Results (Logistic Mixed Model Regression)



- There is a **main effect of** phonology, confirming Houston's (1985) findings
- Novel effect: an apparent **main effect of syntax**.
- The interaction is significant, as **expected by localist approach**.
- However, the Phonological environment contributes significantly **even within non-local environment**, which is **unexpected under the localist approach**.

Quantitative Effect of Boundary Strength

- Moreover: **quantitative correlation** between boundary strength (as measured by durational cues and pause duration) and likelihood of [in] choice: **stronger boundary > less [in].**
- This quantitative difference is significant **within both syntactic conditions**.. Model comparison shows that dropping syntax and keeping quantitative measures does not affect model (Chi2(6)= 2.11,p<0.16) while dropping quantitative measures makes a big difference (CHI2(6)=41.6, p<0.0001

Dicsussion

- The phonological effect in non-local condition **is incompatible with a strong localist theory** (but may be compatible with Embick 2008, who distinguishes competition for grammaticality from competition for use).
- The quantitative effect is **also not expected under a globalist theory**: there is no reason why phonetic distance (or syntactic locality) should make a difference.
- The data is compatible with a **strictly modular view** without need for a mediation of phonological domains through syntax:

  Phonological effects on allomorph choice are constrained **purely by segmental phonological context**—however:

  Phonology of a following word can only have an effect if the production plan of the following word is already available at the point of the of next word is already available at the point of allomorph choice.

  Factors influencing production planning are: syntactic/semantic structure, the frequency and predictability of the upcoming constituent, working memory, …

Labov (1972): Model for two linear social effects social economic class (SEC) and speech style (STYLE):

$$p_0 = a*SEC + b*STYLE + C$$

The extended model, accounting in addition for the phonological effect and it's interaction with production planning:

$$p = \ldots + d * PHON*PROD + e * PROD$$

PHON is the phonological context, PROD the likelihood of planning the upcoming word before the time of allomorph choice. Item and subject effects are excluded for simplicity (except SEC). Both were significant as random effects in the mixed model.

What this Approach can Explain in Addition:

- The production approach predicts that the phonological effect on *ing*- allomorphy **has to be** variable: we know independently that production planning is limited, consistently planning across multiple syntactic phrases is impossible.
- Only those cases of phonologically conditioned allomorph choice can be categorical in which the phonological environnment is reliably present at the time of allomorph choice (e.g., stem+suffix: very 'categorical'; an/a + noun less so, …).

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