Redevelopment of a Morphological Class

Josef Fruehwald

University of Pennsylvania

PLC35
March 30, 2011

Introduction

- Modeling variation at multiple levels → cleaner variation model.
- Interesting grammatical insights.

TD Deletion

Basic Facts

As is well known, syllable final coronal stops in clusters variably delete.

- $C\left\{ \begin{array}{c} t \\ d \end{array} \right\}]_\sigma \rightarrow C\emptyset]_\sigma$

Some well known factors which influence whether or not this deletion takes place are the left and right context.

- Preceding Segment
  Sibilants > Stops > Nasals > Fricatives > /l/
- Following Segment
  Consonant > Liquid, Glide > Vowel; Pause

TD Deletion

Basic Facts

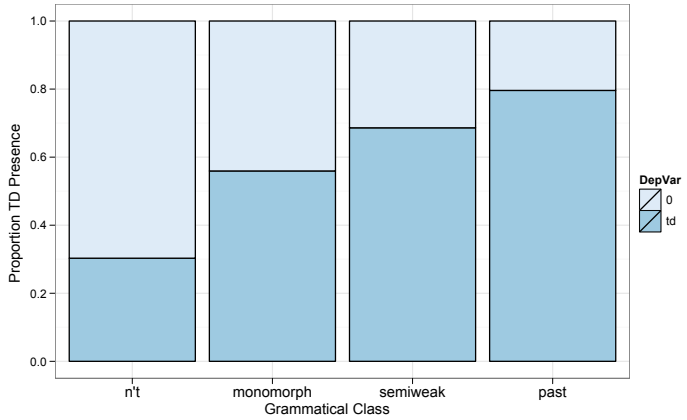
Morphological Context

The morphological context also affects the rate of TD Deletion. The literature has traditionally divided the morphological contexts that TD deletion is sensitive to into four categories.

- Regular Verbal Morphology (e.g. *packed*)
- Semiweak Verbal Morphology (e.g. *kept*, *swept*)
- Monomorphemes (e.g. *west*)
  - That is, anything that is not verbal morphology.
- *not* contraction (e.g. *don't*)

TD Deletion

Basic Facts



Data from the Buckeye Corpus, Pitt et al. (2007)

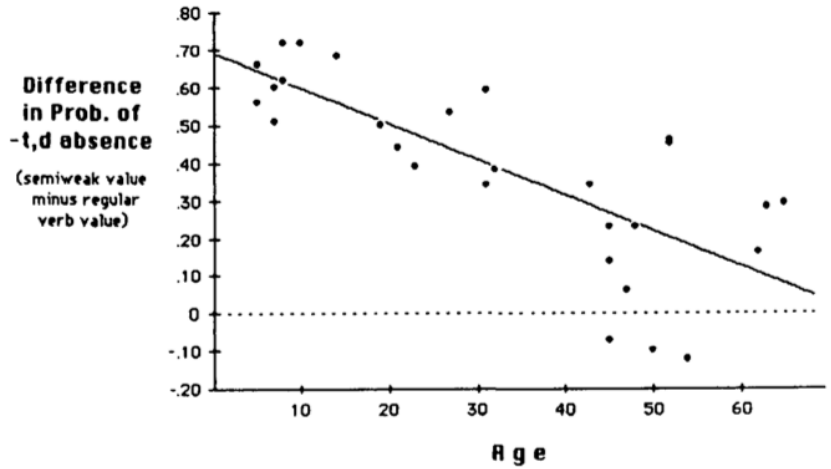
TD Deletion

Age Graded Semiweak Verbs

One really interesting result in the sociolinguistic literature is that the rate of deletion in semiweak verbs is age graded. That is, older speakers tend to have a smaller difference between the semiweak and regular past tense verbs, and younger speakers tend to have a large difference (Guy and Boyd 1990).

TD Deletion

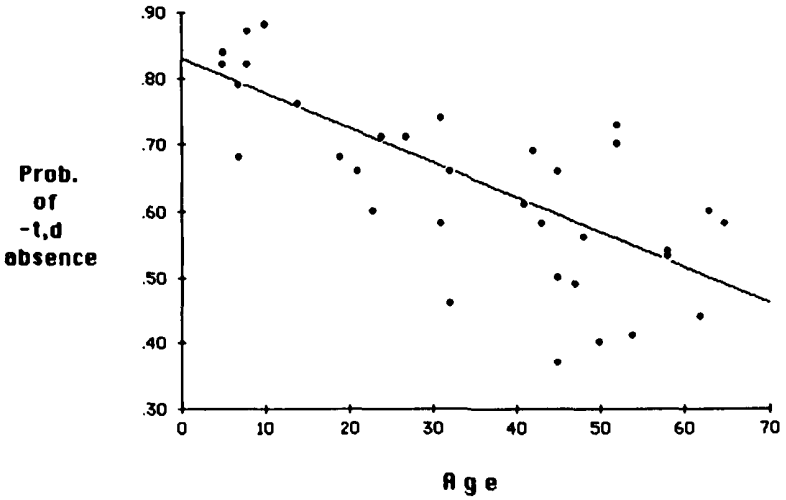
Difference between Semiweak and Past Tense



Guy and Boyd (1990)

TD Deletion

Rate of Semiweak Deletion



Guy and Boyd (1990)

TD Deletion

Age Graded Semiweak Verbs

Why this is probably not a language change

1. TD Deletion is stable variation, and the other morphological classes do display this age graded pattern.
2. Given the time when Guy and Boyd's field work was done, if this were a change, it should now be completed.
3. The age profile of language changes in progress exhibit a late adolescent peak (Labov, 2001; Tagliamonte, 2009), which is not present here.

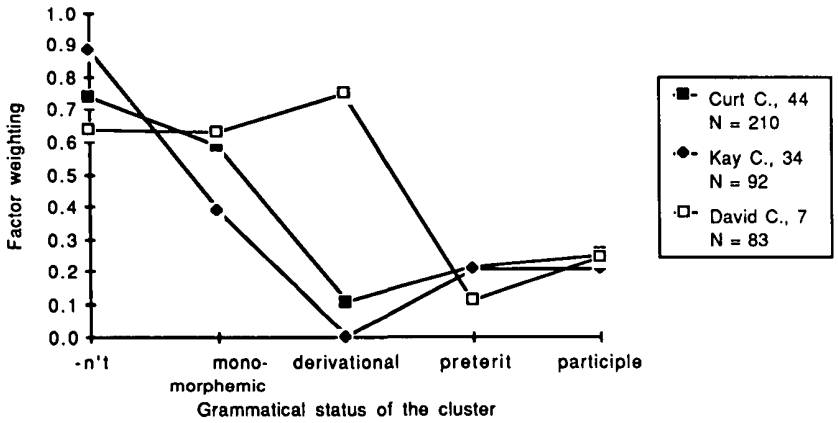
TD Deletion

Age Graded Semiweak Verbs

Adolescents' high rate of deletion in semiweak verbs is surprising, because there is strong positive evidence in their input that they should delete less.

TD Deletion

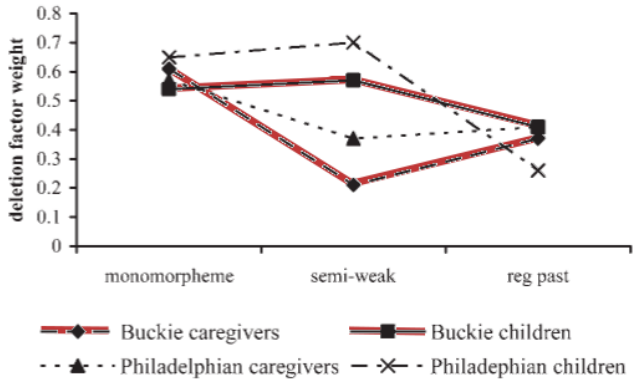
Age Graded Semiweak Verbs



Labov (1989)

TD Deletion

Age Graded Semiweak Verbs



Philadelphia Data: Roberts (1997)
Buckie Data: Smith et al. (2009)

TD Variation

Clearly, accounting for this pattern requires

- a model of morphology/phonology interaction.
- a model of variation.

Morphological Model

Previous Models

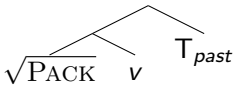
- Phonological TD deletion is sensitive to morphological class. Classes = {Monomorpheme, Semiweak, Regular}
- For children, Semiweak = Monomorpheme

My proposal

- Phonological TD deletion is sensitive to morphological class. Classes = {Not Verbal Morphology, Verbal Morphology}
- There are competing hypotheses about what the exponent of T_{past} is for semiweak verbs, leading to divergent behavior in children that persists into adult speech.

Morphological Model

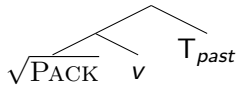
I'm assuming that both the semiweak and regular past tense have a structure like this:



- $\sqrt{\text{PACK}}$: Uncategorized root
- v : Category determining head
- T_{past}: Past tense head

Morphological Model

Forming the past tense

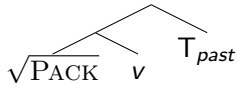


Vocabulary Insertion

$T_{past} \leftrightarrow \emptyset$ / $\{\sqrt{\text{SING}}, \sqrt{\text{GIVE}}, \ldots\}$
$T_{past} \leftrightarrow$ t / $\{\sqrt{\text{KEEP}}, \sqrt{\text{LEAVE}}, \ldots\}$
$T_{past} \leftrightarrow$ d

Morphological Model

Forming the past tense



Stem Readjustment

iy → ɛ / T_{past} {√KEEP, √LEAVE, √BLEED, ...}

Morphological Model

Forming the past tense

Two morphological processes then contribute to forming the semiweak past tense:

1. Vocabulary Insertion of /-t/
2. Stem Readjustent

Only one morphological process forms the regular past tense:

1. Vocabulary Insertion of /-d/

TD Deletion

Some Facts

- Children diverge from their parental input, having high rates of deletion in semiweak verbs.
- Children converge to their parental input in other morphological contexts.

Suggestive

- Children's divergent behavior is due to a countervailing generalization.

TD Deletion

Hypotheses

- Children have higher rates of TD Absence in the semiweak verbs, because their initial hypothesis is that these verbs have only a stem change, and ∅ suffix.
  (i.e. √KEEP+T_{past} → /kɛp/)
- They do not entertain this ∅-VI hypothesis for regular verbs.

Note, a ∅ exponent of T_{past} is independently necessary for verbs like *sing* and *give*.

TD Deletion

Hypotheses

Children have two competing hypotheses for the semiweak past tense:

Hypothesis 1

$T_{past} \leftrightarrow \emptyset$ / $\{\sqrt{\text{SING}}, \sqrt{\text{GIVE}}, \sqrt{\text{KEEP}}, \ldots\}$
$T_{past} \leftrightarrow$ t / $\{\ldots\}$
$T_{past} \leftrightarrow$ d

TD Deletion

Hypotheses

Children have two competing hypotheses for the semiweak past tense:

Hypothesis 2

$T_{past} \leftrightarrow \emptyset$ / $\{\sqrt{\text{SING}}, \sqrt{\text{GIVE}}, \ldots\}$
$T_{past} \leftrightarrow$ t / $\{\sqrt{\text{KEEP}}, \ldots\}$
$T_{past} \leftrightarrow$ d

As people get older, they are more likely to select this second hypothesis, creating the age graded pattern.

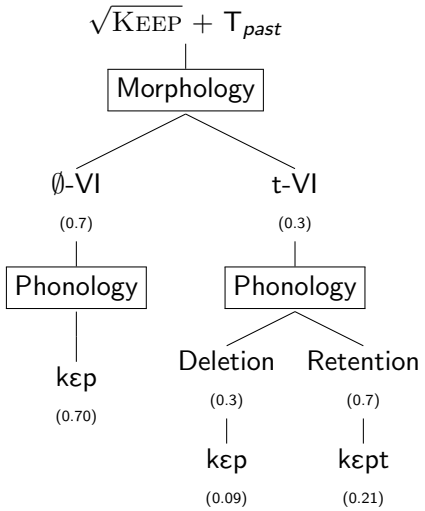
TD Deletion

This is similar to Guy and Boyd's analysis, except they hypothesized a three stage developmental model.

1. kɛp = no TD
2. kɛpt = Monomorpheme
3. kɛp#t = Past Tense

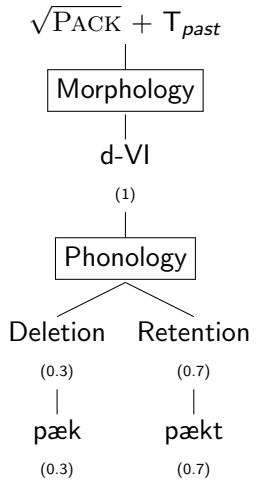
I am proposing that it is unnecessary to posit the second intermediate stage, since a mixture of the first and third produces the same quantitative result.

TD Deletion



TD Deletion

Compare



TD Deletion

Plausibility

This proposal does not introduce any new mechanics to explain variation. Rather, it is a straightforward competing grammars analysis (Kroch, 1989, 1994). The developmental pattern is also compatible with parameter learning work done by Yang (2002). It also does not rely upon any novel morphological assumptions.

TD Deletion

Evidence in Adult Speech

- Regressive Devoicing Data.
- Variance in Semiweak TD Rates.

TD Deletion

Regressive Devoicing

Some verbs undergo regressive devoicing when /t/ is affixed, specifically *leave* and *lose*. If the speaker chooses the ∅-VI grammar, then the only way to get the past tense of *leave* to be *lef* is to posit an additional morphological devoicing of /v/.

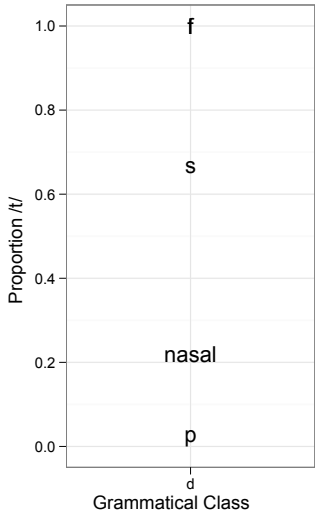
- C# → [-voice] / $T_{past}\{\sqrt{\text{LEAVE}}, \sqrt{\text{LOSE}}, \dots\}$

Hypothesis

Children are more likely to choose the t-VI grammar rather than the ∅-Grammar for these verbs, so as to avoid positing this additional morphological process.

TD Deletion

Regressive Devoicing

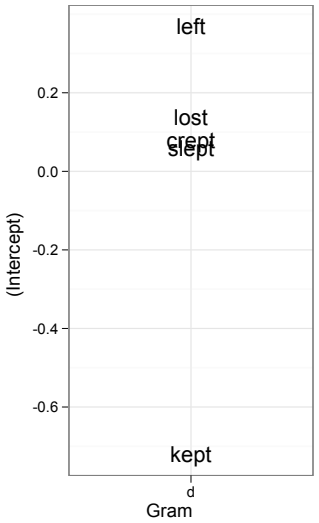


These are the proportional rate of t-presence for the semiweak verbs grouped by the stem final consonant from Guy and Boyd (1990) from speakers under 14. Notice that /f/ and /s/ have the highest rate of t-presence, which is especially surprising for /s/.

TD Deletion

Regressive Devoicing

`td ~ PreSeg + FolSeg + Gram + LogFreq + (1|Word)`

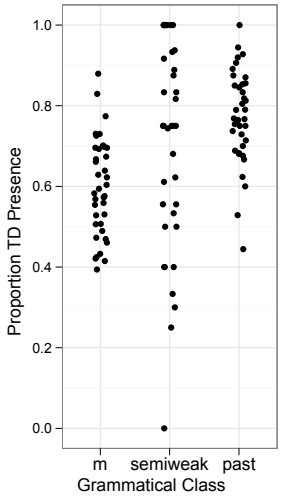


After accounting for segmental context, grammatical class, and frequency, *left* and *lost* have more unexplained /t/ presence than *crept*, *slept* or *kept*, where voicing assimilation is vacuous.

Data Source: The Buckeye Corpus (Pitt, et al. 2007)

TD Deletion

Semiweak Variance



Data from the Buckeye Corpus, Pitt et al. (2007)

There is a lot more variation by speaker in the rate of TD deletion, which we would expect given variation at two different levels.

An Ansari-Bradley Test comparing e-logit transformed rates found a significant difference between the semiweak variance and the regular variance ($p = 0.0004$).

Regular and monomorphemes were not significantly different in variance ($p = 0.07$).

TD Deletion

Semiweak Variance

Probabilities Producing Semiweak Surface TD		
Morphological Insertion	$p = ?$	$\sigma_p = ?$
Phonological Retention	$q = 0.78$	$\sigma_q = 0.011$
Rate of Observed TD	$p \times q = 0.69$	$\sigma_{pq} = 0.069$

TD Deletion

Semiweak Variance

Probabilities Producing Semiweak Surface TD		
Morphological Insertion	$p = ?$	$\sigma_p = ?$
Phonological Retention	$q = 0.78$	$\sigma_q = 0.011$
Rate of Observed TD	$p \times q = 0.69$	$\sigma_{pq} = 0.069$

$$p = \frac{pq}{q} = 0.88$$

$$\sigma_{pq} = q^2\sigma_p + p^2\sigma_q + \sigma_p\sigma_q$$

$$\sigma_p = \frac{\sigma_{pq} - p^2\sigma_q}{q^2 + \sigma_q} = 0.098$$

TD Deletion

Semiweak Variance

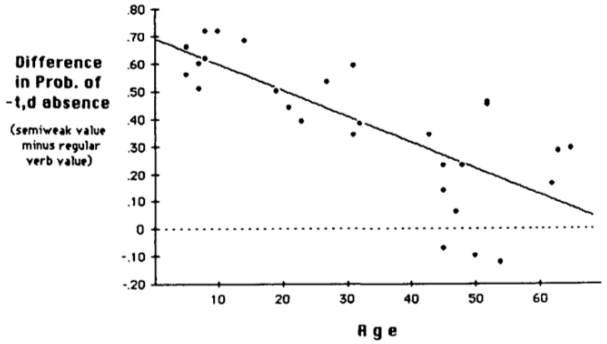
Probabilities Producing Semiweak Surface TD		
Morphological Insertion	$p = 0.88$	$\sigma_p = 0.098$
Phonological Retention	$q = 0.78$	$\sigma_q = 0.011$
Rate of Observed TD	$p \times q = 0.69$	$\sigma_{pq} = 0.069$

There is greater variability across individuals in their rate of t-VI than in their rate of phonological retention.

TD Deletion

Further issues

- Why is the time course for this age grading so long?



- What is the "target grammar"?

Conclusions

- Children diverge from their parental input on semiweak verbs because they have an initial $\emptyset$-VI hypothesis.
- This $\emptyset$-VI hypothesis remains active in adult speech, resulting in a difference between observed TD in semiweak and regular past.
- There is more individual level variation at the morphological level than at the phonological level.
- Phonological deletion is really only sensitive to whether or not the segment is an exponent of verbal morphology.

Conclusions

- Variation at different levels of the grammar can result in the same observable surface forms.
- It is possible to model the variation at these different levels, and doing so can produce interesting grammatical and variationist insights.

Thanks!

References I

Guy, Gregory R. 1980. Variation in the group and the individual: the case of final stop deletion. In *Locating Language in Time and Space*, ed. William Labov, 1–36. New York: Academic Press.

Guy, Gregory R., and Sally Boyd. 1990. The development of a morphological class. *Language Variation and Change* 3:1–18.

Halle, Morris, and Alec Marantz. 1993. Distributed Morphology and the Pieces of Inflection. In *The view from building 20*, ed. Kenneth Hale and S. Jay Keyser, 111–176. MIT Press.

Kroch, Anthony. 1989. Reflexes of grammar in patterns of language change. *Language Variation and Change* 1:199–244.

Kroch, Anthony. 1994. Morphosyntactic variation. In *Papers from the 30th Regional Meeting of the Chicago Linguistics Society: Parasession on Variation and Linguistic Theory*, ed. K. Beals.

References II

Labov, William. 1989. The child as linguistic historian. *Language Variation and Change* 1:85–97.

Roberts, Julie. 1997. The acquisition of variable rules: A study of (-t,d) deletion. *Journal of Child Language* 24:351–372.

Smith, Jennifer, Mercedes Durham, and Liane Fortune. 2009. Universal and dialect-specific pathways of acquisition: Caregivers, children, and t/d deletion. *Language Variation and Change* 21:69–95.

Yang, Charles. 2002. *Knowledge and learning in natural language*. New York: Oxford University Press.