

**Class 1 (2 April 2013): What kinds of variation exist?****To do for Thursday**

- Optional: read Coetzee & Pater 2011
- Check out course web page

**0 First-day-of-class items**

- introducing ourselves
- syllabus (first 1.2 pages only; we'll do the course outline at the end)

**Overview:** Free (token) variation vs. lexical (type). For today we'll use only simple, non-quantitative models.

**1 Idealized free (token) variation—it's possible that no real language has this**

- Suppose a language has an optional vowel harmony process:  
/álkat+i/ → [álkat-i] or [álket-i] (V becomes [-lo] before high vowel)
- It's "free" variation because...
  - The same speaker can produce both variants, for any word.
  - There is no meaning difference between the variants, though they may represent different degrees of formality, different speech rates, etc.
  - One variant may be more frequent, but the rate is the same for all target morphemes, and for all triggering morphemes (if target and trigger are in different morphemes):

[álkat-i]	70%	[álket-i]	30%
[móbak-im]	70%	[móbek-im]	30%
[sélab-ik]	70%	[séleb-ik]	30%

- Exception to the above: there might be other phonological factors that affect the rate of variation, but words with the same phonological properties will behave alike:

*e.g., suppose that stress matters—stressed V is less likely to undergo harmony*

[semát-i]	90%	[semét-i]	10%
[lukár-im]	90%	[lukér-im]	10%
[sikáb-ik]	90%	[sikéb-ik]	10%

- Why did I use an imaginary language? Because it's hard (impossible?) to find a real example.

**2 Idealized lexical (type) variation**

- Suppose a language has two different ways to ensure that adjacent obstruents match in voicing ( $\begin{smallmatrix} *[-\text{sonorant}] \\ [\alpha \text{ voice}] \end{smallmatrix} \begin{smallmatrix} [-\text{sonorant}] \\ [-\alpha \text{ voice}] \end{smallmatrix}$ ):

/sif+z/ → [sif-s]	change second C
/wof+z/ → [wov-z]	change first C

- In the simplest form of lexical variation...
  - Each word has just one behavior—the variation is across items, not within items.

### 3 Modeling idealized free variation (not quantitative yet)

#### Variable rules

- $V \rightarrow [-\text{low}] / \_\_ C_0 [+high]$ , *optional*
  - That is, we just label the rule as optional.

#### Variable constraint ranking

- Jagged line (not standard notation): ranking of these two constraints *varies*
  - On some occasions,  $*[+low]C_0[+hi] \gg \text{IDENT}(\text{low})$
  - On other occasions,  $\text{IDENT}(\text{low}) \gg *[+low]C_0[+hi]$

	/álkat-i/	*[+low]C <sub>0</sub> [+hi]	IDENT(low)
☞ a	[álkat-i]	*	
☞ b	[álket-i]		*

- How is the jagged line different from the dashed/dotted line you often see in tableaux?

### 4 Free variation as stylistic variation

- Classic work in sociolinguistics: how “variable rules” are affected by social factors.
  - Famous graph showing how New York City English speakers pronounced /θ/:

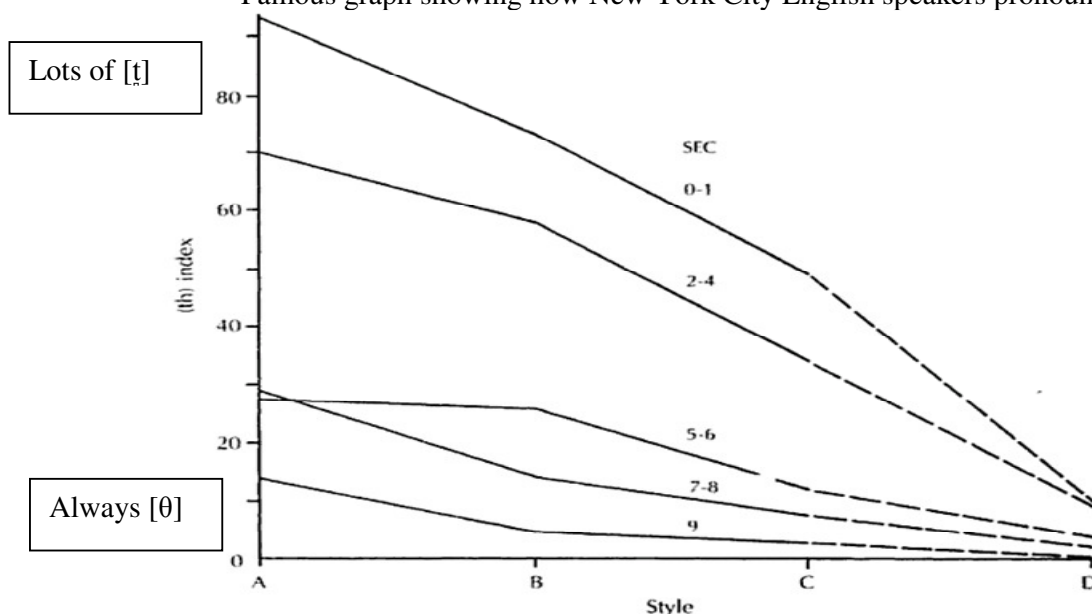


Fig. 4.1. Class stratification of a linguistic variable with **stable** social significance: (th) in *thing, through, etc.* Socioeconomic class scale: 0-1, lower class; 2-4, working class; 5-6, 7-8, lower middle class; 9, upper middle class. A, casual speech; B, careful speech; C, reading style; D, word lists.

Labov 1972 p. 113

- Labov's early approach
  - $/\theta/ \rightarrow [-\text{continuant}]$ , optional rule
  - rate of applying rule =  $a + b * \text{Class} + c * \text{Style}$ 
    - Different people have different baseline rates of applying rule ( $a + b * \text{Class}$ )
    - But they vary the same way in response to “style” ( $c * \text{Style}$ , where Style A=0, B=1, etc.)
- As we'll see later in the course, this approach was soon replaced with logistic regression.

## 5 Some classic sociolinguistic findings on free variation, told through Labov's graphs

A. Though they may use a variant at different rates, members of a speech community can agree about what it “means”—they respond in a similar way to context/style:

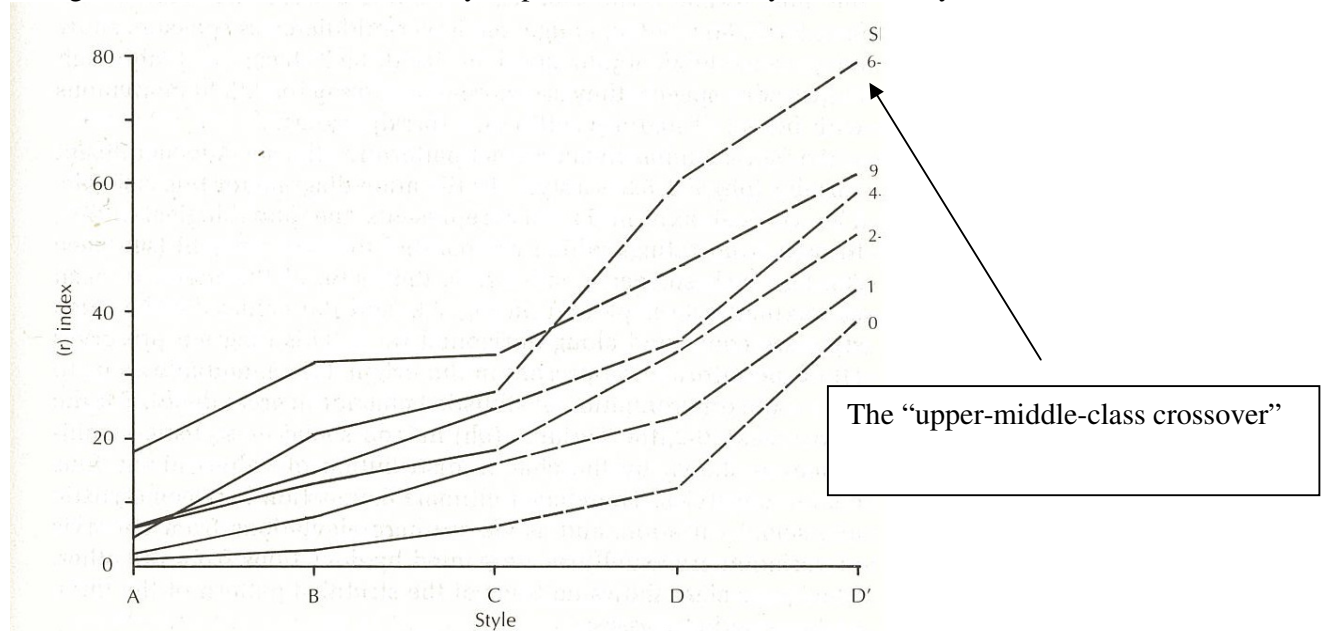


Fig. 4.2. Class stratification of (r) (see p. 114).

Labov 1973, p. 125

B. The “curvilinear” distribution—another common class trend:

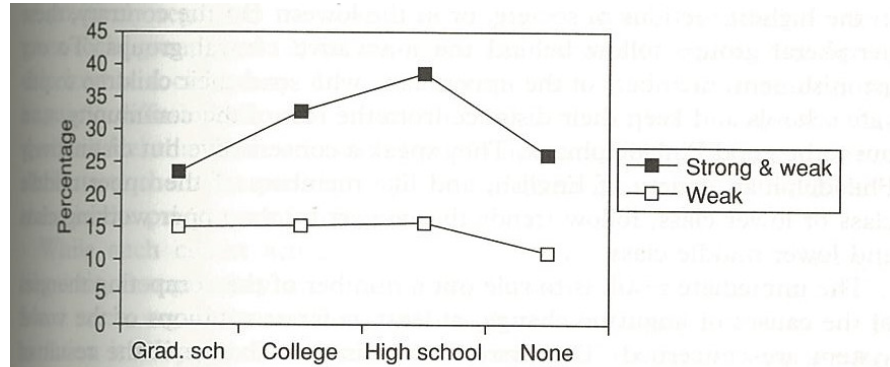


Figure 5.17 Strong and weak palatalization of /t,d/ in Cairo Arabic by educational classes (from Haeri 1996, graphs 11–12)

Labov 2001, p. 189

- C. Changes just getting started show little effect of sex, age (everyone is near 0%), nor do completed changes (everyone near 100%). It's at the intermediate stages that we can observe such differentiation best:

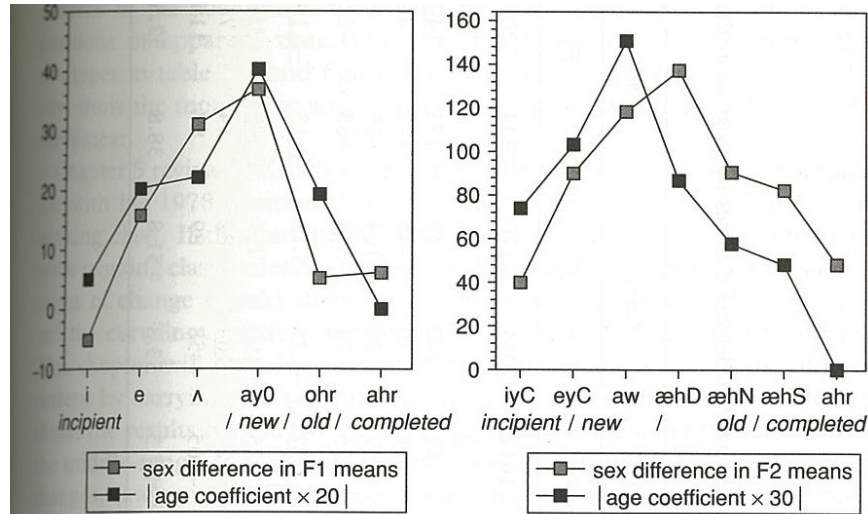


Figure 9.1 a Mean gender differences in F1 and age coefficients for six Philadelphia sound changes. b Mean gender differences in F2 and age coefficients for six Philadelphia sound changes

Labov 2001, p. 295

- Similarly, some social groups tend to hit the floor or the ceiling—then the middle groups show the most differentiation by style:

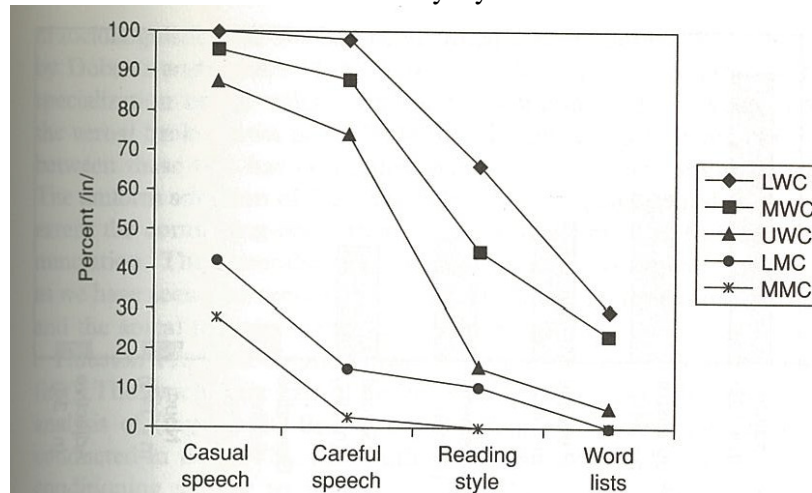


Figure 3.3 Social and stylistic stratification of (ing) in Norwich (from Trudgill 1974b)

Labov 2001, p. 87

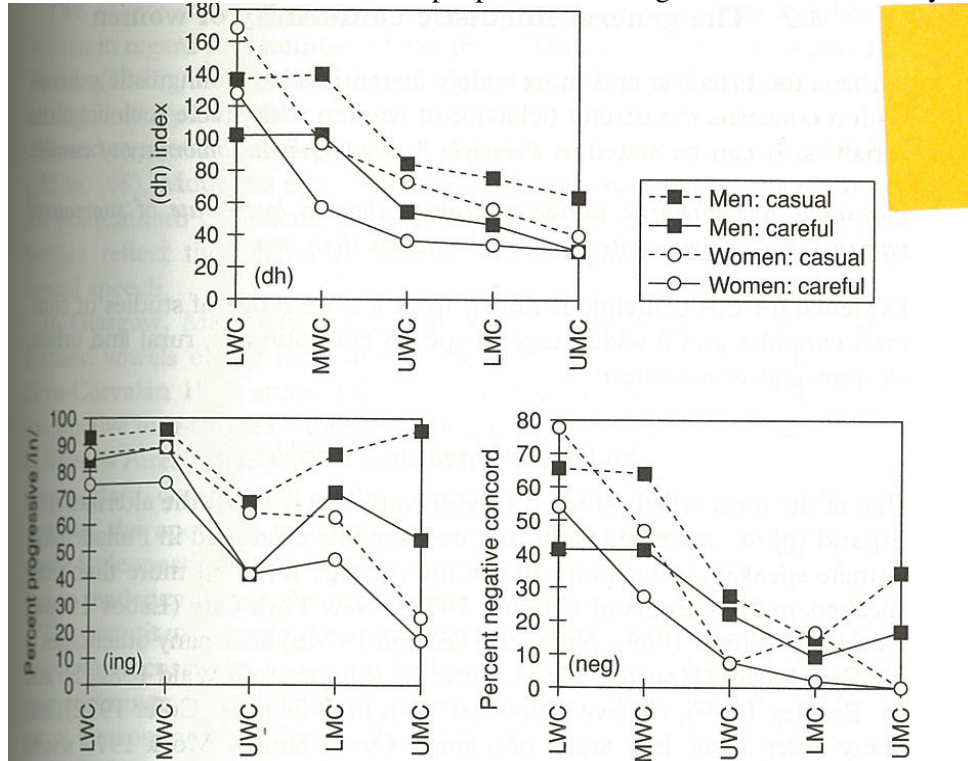
**A. Gender differences: even people who live together don't necessarily talk alike:**

Figure 8.1 Gender differentiation of three stable sociolinguistic variables by socioeconomic class and style in the Philadelphia Neighborhood Study

Labov 2001 p. 265

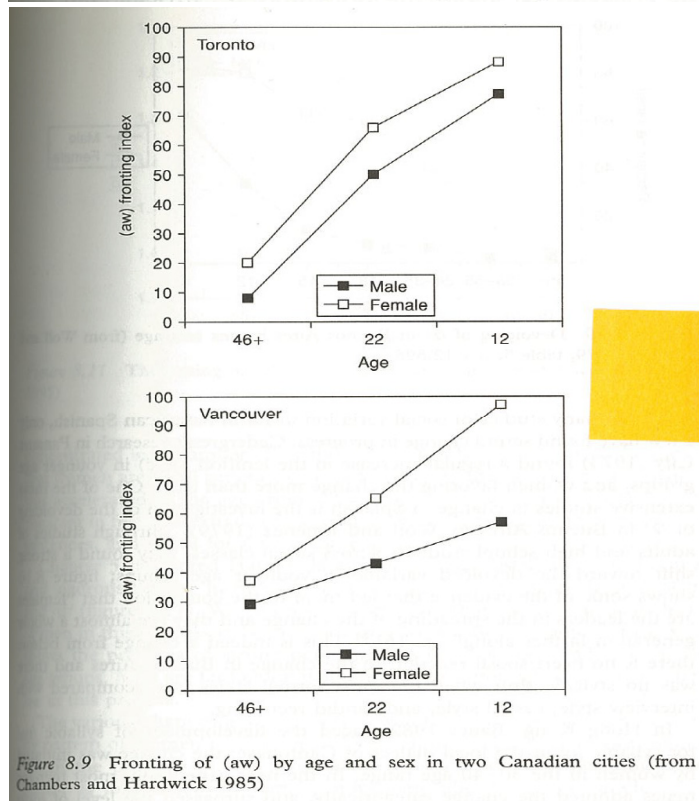


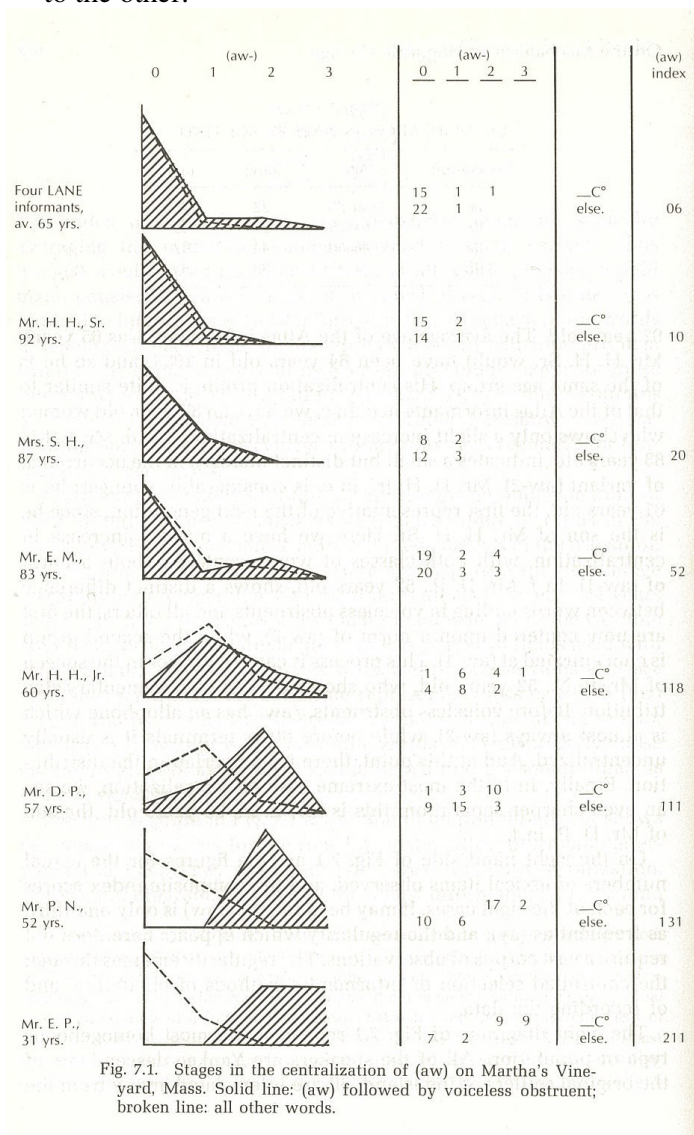
Figure 8.9 Fronting of (aw) by age and sex in two Canadian cities (from Chambers and Hardwick 1985)

Labov 2001 p. 281

See Labov for examples from Iran, Korea, Argentina, Spain, Egypt...



**B.** At intermediate diachronic stages, there can be a lot of gradience from one phonetic pole to the other:



Labov 1973, p. 168

**C.** When we're caught in a change in progress, strange things happen.

- The "Bill Peters effect" (Labov 1994 reporting on Herold 1990): an 80-year-old Pennsylvania English speaker who had a clear *cot-caught* distinction in spontaneous speech, but just about merged the two vowels when reading minimal pairs—this was typical of his cohort.

A. We are to some extent fossils of our younger selves, but we also change, shifting along with the trend and perhaps settling down after youth:

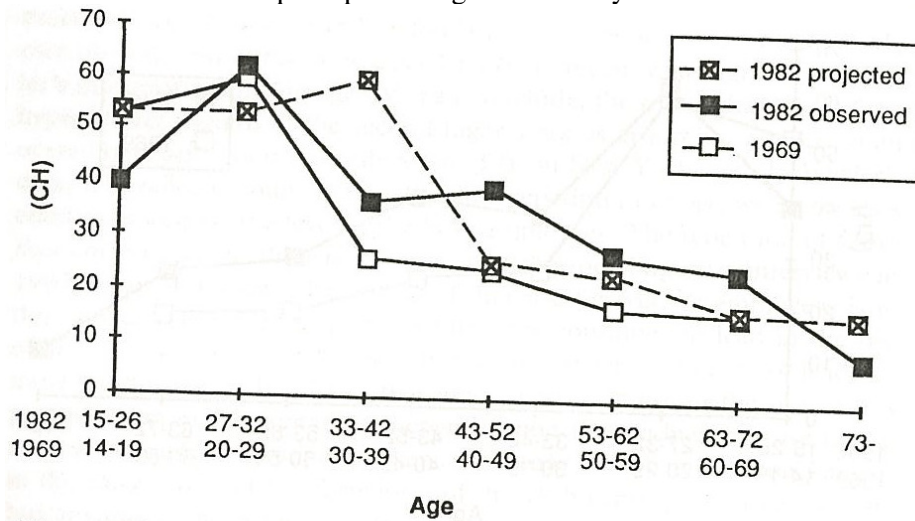


Figure 4.8b. Model of generational change of (ch) in Panama City: Projected and observed values for Cedergren's restudy

Labov 1994, p. 96

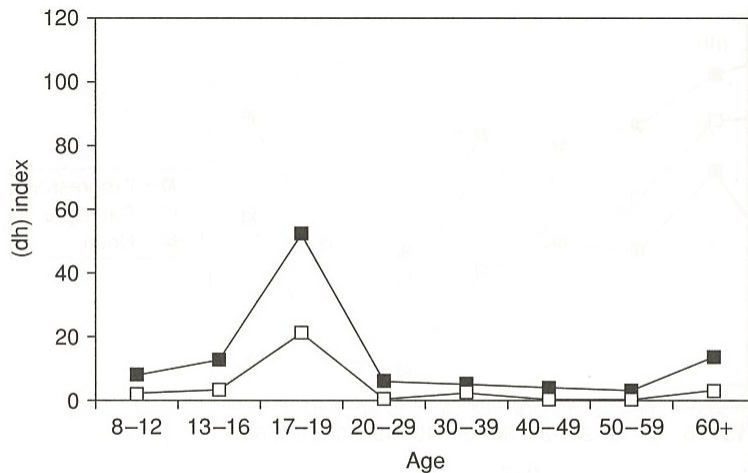


Figure 3.9 Distribution of intervocalic (dhv) by age and style in the Philadelphia Neighborhood Study

Wave of change about to hit, or youthful exuberance, soon to fade?

Labov 2001, p. 104

## 6 Lexical variation (recall: each word has its own behavior)

- Tagalog: Austronesian language from the Philippines with ~17 million native speakers (Ethnologue 2005, data from Zuraw 2009's corpus ; see also Schachter & Otnes 1972)

- $d \rightarrow r / V\_V$  :

dunon	'knowledge'	ma-runon	'intelligent'
dinig	'heard'	ma-rinig	'to hear'
dupok		ma-rupok	'fragile'

- But, there are also words like this

da?ig	'beaten'	ma-da?ig	'beaten'
dulas	'slipperiness'?	ma-dulas	'slippery'
da?an	'road'	ma-da?an-an	'passable'

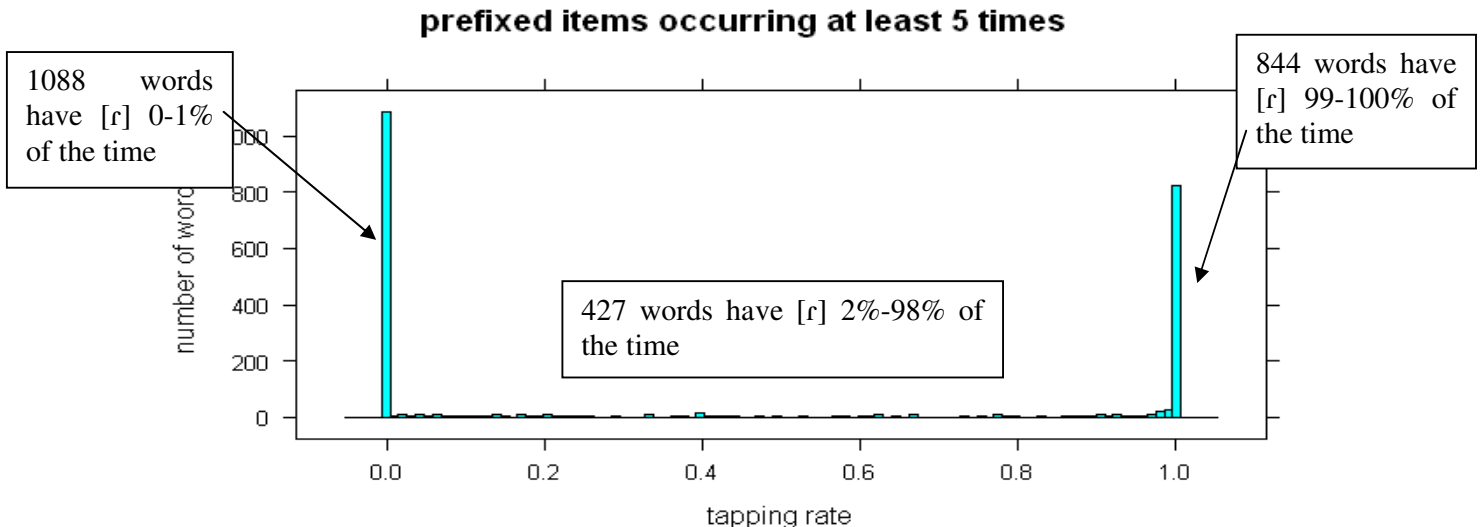
- and like this

dunjis	'dirt on face'	ma-runjis ~ ma-dunjis	'dirty (face)'
dumi	'dirt'	ma-rumi ~ ma-dumi	'dirty'

- How often does each word have each variant?

word	# with <i>d</i>	# with <i>r</i>	% <i>r</i>
ma-_unon	33	9130	99.6%
ma-_inig	97	3517	97.3%
ma-_upok	0	235	100.0%
ma-_ulas	348	23	6.2%
ma-_a?an-an	132	6	4.3%
ma-_a?ig	102	0	0.0%
ma-_umi	319	708	64.4%
ma-_unjis	59	52	46.8%

- Count up how many words are 0-<5%, how many 5-<10%, 10%-<15%, etc., and make a **histrogram**.



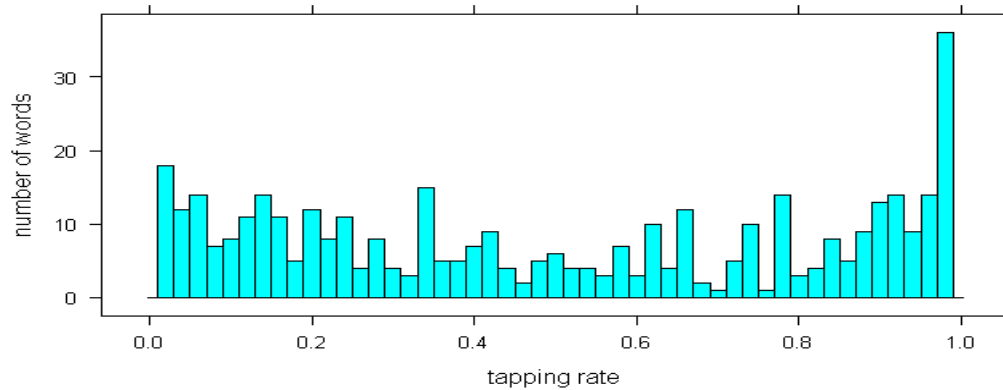
==> Most words have a fixed behavior, though some do vary

- Let's sketch out a grammar with variable constraint ranking. What problems do we run into in modeling these data?
- Let's discuss the pros and cons of simply listing all the prefixed words in the lexicon, with /d/ or /r/ in their lexical entries.



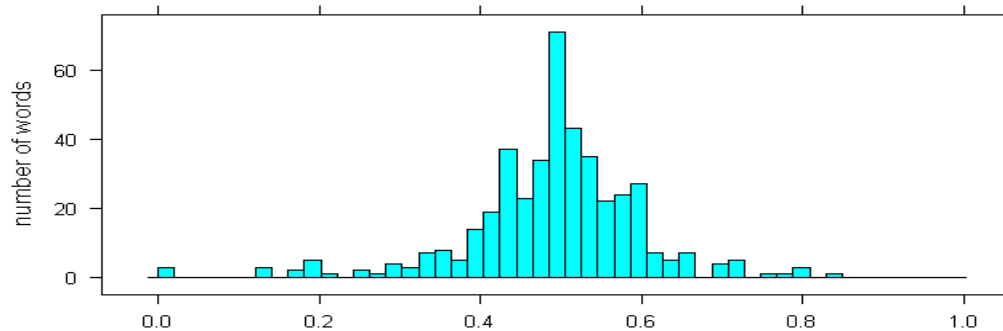
## 7 Mixed variation

- What about the 427 in-between words for Tagalog? Here's a histogram just for them:  
**prefixed items occurring at least 5 times,  
 intermediate tapping rates only**



- If all the words underlying had 50% tapping rate, and we sampled the same number of tokens of each word as found in corpus, we expect a distribution more like this:
  - I guess I should also try generating some different null hypotheses, such as each word's tapping rate is 0% or 100% plus noise.

### one trial of random simulation



- Instead of free variation, it looks like different words have their own tapping rates.

## 8 The “Law of Frequency Matching” (Hayes et al. 2009)

- When a speaker of a language with lexical variation is tested on novel items, “[t]heir responses aggregately match the lexical frequencies” (p. 826)
- Why should this be?
  - Zuraw 2000 offers a modeling answer, which we’ll discuss further when we look at Stochastic OT/Gradual Learning Algorithm
  - Basic idea: even if faithfulness ends up top-ranked/top-weighted, the adult grammar still encodes the lexical pattern in its “subterranean” constraints
  - Not all models predict this to happen in all situations
- When does the “law” get broken?
  - When the constraints needed to encode the pattern are not allowed by UG (Becker, Ketrez, & Nevins 2011), or maybe just disfavored by UG (Hayes et al. 2009)
  - Maybe in some other cases too...

## 9 Lexical variation in the sociolinguistics literature

- Sometimes the lexical variation is actually phonologically conditioned:

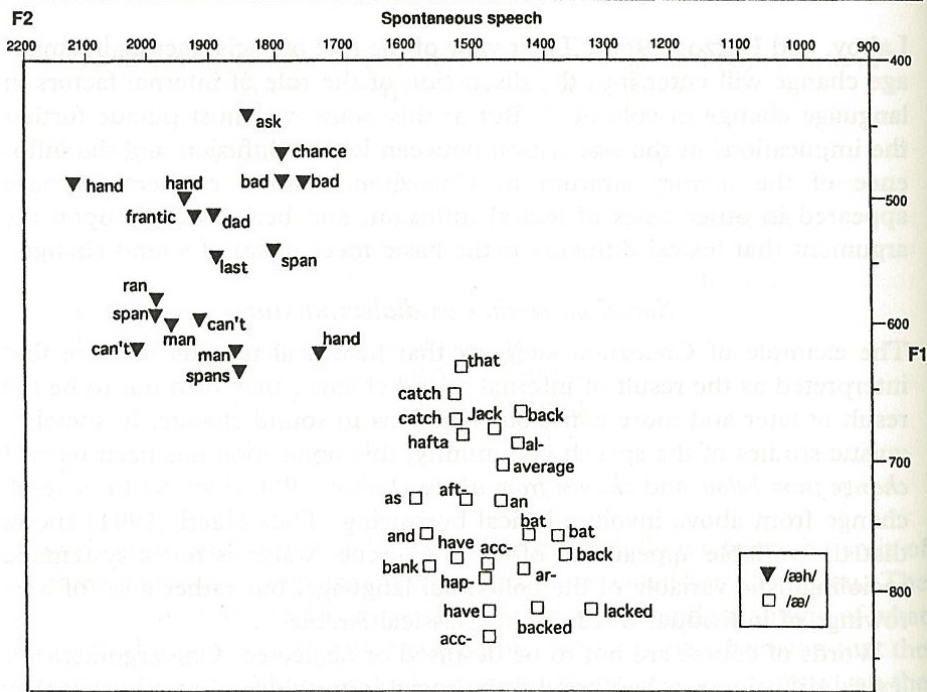


Figure 16.3. /æ/ and /æh/ classes for Leon Alinsky, 30, New York City  
(a) Location of nuclei in spontaneous speech

Labov 1994, p. 454

- But sometimes it's not:

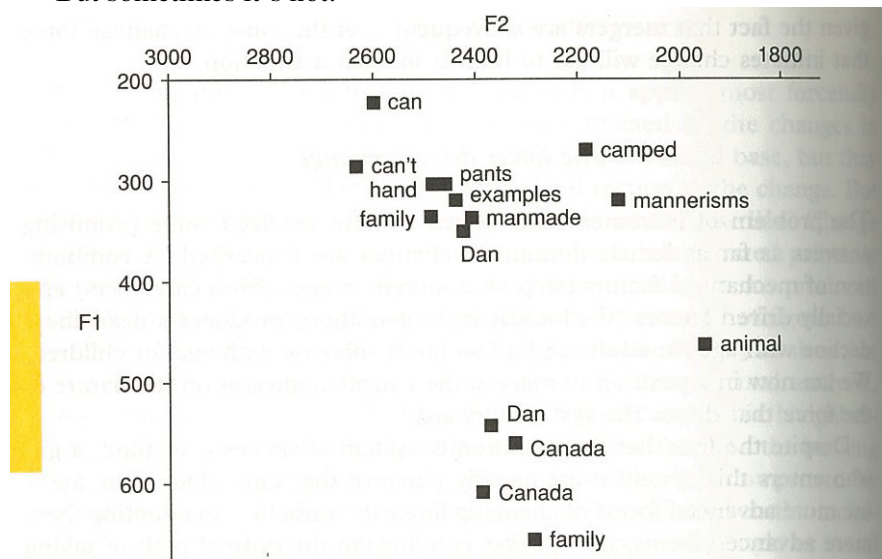


Figure 14.12 Distribution of /æ/ before nasal consonants for Jeannette S., 56, Rochester, NY, Telsur 359

Labov 2001, p. 464

- Mendoza-Denton 2008: certain words can get (arbitrarily?) “chosen” as the ones applying a certain change to which conveys social meaning
  - [i] in *nothing*, *thing*, *everything*, *anything* as markers of Latina gang identity in a California high school—and [ɪ] as a marker of non-gang identity.

## 10 Summary

- We have seen an overview of variation and gotten an idea of what we want quantitative models of variation to be able to do
  - Idealized free variation can be modeled as variable constraint ranking or optional rules
    - But, we need to develop our models of grammar so that they can quantify free variation, including the influence of various factors on a single phenomenon.
  - Lexical variation (and mixed variation) is more challenging: how do we allow each word to surface faithfully but still let the grammar capture variation across words?
- Let's go over the "course outline" in the syllabus to see how we will model these phenomena quantitatively in the rest of the course, and the additional topics we'll treat.

## References

- Becker, Michael, Nihan Ketrez & Andrew Nevins. 2011. The surfeit of the stimulus: analytic biases filter lexical statistics in Turkish laryngeal alternations. *Language* 87(1). 84–125. (15 March, 2012).
- Coetzee, Andries W & Joe Pater. 2011. The place of variation in phonological theory.. In John A Goldsmith, Jason Riggle, & Alan C. L. Yu (eds.), *The Handbook of Phonological Theory*, 401–434. John Wiley & Sons.
- Ethnologue. 2005. *Ethnologue: Languages of the World*, Fifteenth edition. (Ed by.) Raymond G. Gordon.
- Hayes, Bruce, Kie Zuraw, Zsuzsa Cziráky Londe & Peter Siptár. 2009. Natural and unnatural constraints in Hungarian vowel harmony. *Language* 85. 822–863.
- Herold, Ruth. 1990. Mechanisms of merger: The implementation and distribution of the low back merger in eastern Pennsylvania. *Dissertations available from ProQuest*. 1–294.
- Labov, William. 1972. The reflection of social processes in linguistic structures. *Sociolinguistic Patterns*, 110–121. Philadelphia: University of Pennsylvania Press.
- Labov, William. 1973. *Sociolinguistic Patterns*.. University of Pennsylvania Press.
- Labov, William. 1994. *Principles of Linguistic Change: Internal Factors*.. Blackwell Pub.
- Labov, William. 2001. *Principles of Linguistic Change, Vol. 2: Social Factors*.. Blackwell Publishers.
- Mendoza-Denton, Norma. 2008. *Homegirls: Language and Cultural Practice Among Latina Youth Gangs*. 1st ed. Wiley-Blackwell.
- Schachter, Paul & Fe T Otones. 1972. *Tagalog Reference Grammar*.. Berkeley, CA: University of California Press.
- Zuraw, Kie. 2000. Patterned exceptions in phonology.. University of California, Los Angeles phd dissertation.
- Zuraw, Kie. 2009. Frequency influences on rule application within and across words. *Proceedings of CLS (Chicago Linguistic Society)* 43.