

Class 18: Getting phonological evidence; course wrap-up

To do: just project

- Presentations Monday—prepare a handout!
- Papers due week from Friday—hard copy preferred, PDF ok if you're travelling

Overview: How can we find out what generalizations are real to the speaker? How can we find out whether some generalizations are better than others?

1 Back to the Chomskyan basics¹

- Let a **grammar** consist of (at least)²
 - a function that labels any utterance as **grammatical** or **ungrammatical**.
 - a function that assigns truth conditions to any utterance
 - The grammar might be implemented as a lexicon and a list of rules, or a set of constraints, or something else.
- Let a **linguistic theory** be a function that, given a (finite) set of utterances (the **learning data**), produces a grammar.³
- These functions should ideally be accompanied by algorithms for calculating them.

So...

- a descriptively adequate grammar captures the psychologically real generalizations
- the real prize, an explanatorily adequate theory, will, given typical learning data, return an descriptively adequate grammar

But how do we figure out what the psychologically real generalizations are?????

2 Example: English noun plurals

<i>cat</i>	k ^h æt	k ^h æts	<i>pea</i>	p ^h i	p ^h iz
<i>sack</i>	sæk	sæks	<i>cow</i>	k ^h au	k ^h auz
<i>dog</i>	dæg	dægz	<i>man</i>	mæn	mɛn
<i>grub</i>	gɹʌb	gɹʌbz	<i>foot</i>	fʊt	fɪt
<i>dish</i>	dɪʃ	dɪʃɪz	<i>wife</i>	waɪf	waɪvz
<i>fudge</i>	fʌdʒ	fʌdʒɪz	<i>whiff</i>	wɪf	wɪfs
			...		

¹ Mostly Chomsky 1965 pp. 25-27 but an amalgam of various Chomsky works, simplified and colored by my own views.

² We probably want the grammar to do much more. It could, given an utterance, return a gradient “goodness score” rather than a simple binary judgment. Given one utterance and some instruction, it could return some other utterance (e.g., *cat* + PLURAL = *cats*). And there’s a lot more to meaning than truth conditions! (Chomsky also requires a grammar to assign a structural description to an utterance, but I wonder if this is begging the question: a structural description can be used to explain more-observable properties of a sentence like its truth-conditions, but we don’t know *a priori* that it’s necessary.)

³ Chomsky’s definition of a linguistic theory is weaker: it need only define the set of possible grammars, independent of learning data. This allows Chomsky to define the term **descriptively adequate theory**, which is a theory that includes, as possible grammars, a descriptively adequate grammar for every language—but does not necessarily return that grammar given learning data for that language.

- Possible grammars

I. (just list every word you know)

k ^h æt	k ^h æts	p ^h i	p ^h iz
sæk	sæks	k ^h au	k ^h auz
dag	dagz	mæn	mæn
gɪʌb	gɪʌbz	fʊt	fit
dɪʃ	dɪʃiz	wɑɪf	wɑɪvz
fʌdʒ	fʌdʒiz	wɪf	wɪfs

I.e., the grammar's judgment function accepts utterances containing those items in positions where a plural is required (*I like cats*); its truth-condition-assigning function assigns the appropriate truth-conditions to utterances containing the items in the right column (*I like cats* is true iff I like members of the cat group—it has nothing to do with whether I like members of the dog group).

II. Add *-s* to everything, except for these exceptions:

dag	dagz	k ^h au	k ^h auz
gɪʌb	gɪʌbz	mæn	mæn
dɪʃ	dɪʃiz	fʊt	fit
fʌdʒ	fʌdʒiz	wɑɪf	wɑɪvz
p ^h i	p ^h iz

III. Add *-z* to everything, except for these exceptions:

k ^h æt	k ^h æts	mæn	mæn
sæk	sæks	fʊt	fit
dɪʃ	dɪʃiz	wɑɪf	wɑɪvz
fʌdʒ	fʌdʒiz	wɪf	wɪfs
	

IV. Add *-əz* after “sibilant” sounds, *-s* after non-sibilant [–voice] sounds, and *-z* otherwise, except for these exceptions:

mæn	mæn
fʊt	fit
wɑɪf	wɑɪvz
...	...

V. Change final /f/ to [v], and then add *-əz* after “sibilant” sounds, *-s* after non-sibilant [–voice] sounds, and *-z* otherwise, except for these exceptions:

mæn	mæn
fʊt	fit
wɪf	wɪfs
...	...

2.1 Which generalizations are real? How about a wug test.

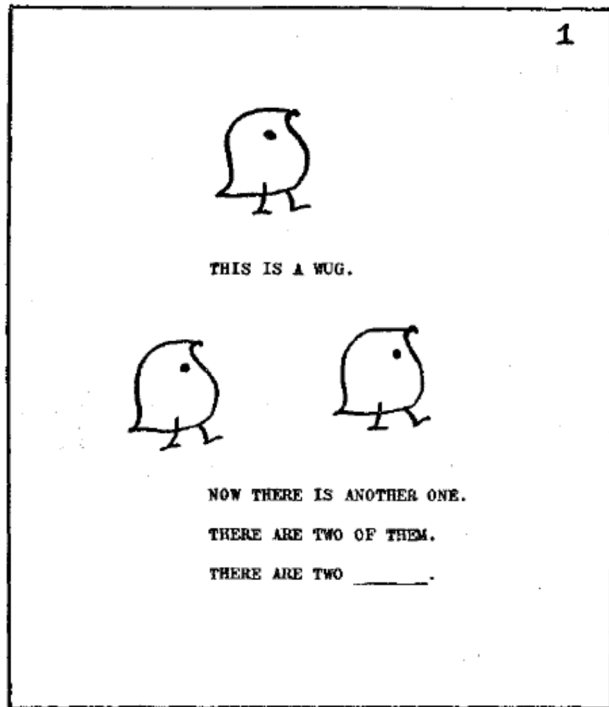


Figure 1. The plural allomorph in /-z/.

(Berko 1958, p. 154)

- Berko found that English-speaking adults (all highly educated, in her sample) consistently give the following plurals when presented with invented words (pp. 155-158):

wʌg	wʌgz	lʌn	lʌnz
gʌtʃ	gʌtʃɪz	nɪz	nɪzɪz
kæz	kæzɪz	kɪɑ	kɪɑz
tɔɪ	tɔɪz	tæs	tæsɪz

? Which of the grammars above could be descriptively adequate, given these data?

? The adults disagreed about this word—what might we conclude?

heaf	hifs, hivz
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3 Why is it hard to develop a descriptively adequate theory in phonology?

- Words that the speaker already knows are uninformative!
 - They don't tell us anything about what generalizations the speaker has learned—she may have simply memorized that word.
- Constructing novel phonological situations to put speakers in is difficult.
 - Contrast this with syntax, where it's easy to construct sentences that—presumably—the speaker has not encountered before.
- We often can't be sure that these novel situations really test what we want them to test.
- Let's look at some methods beyond the wug test for probing speakers' knowledge...

4 Novel words from other languages—loan adaptation as a natural wug-test

- What do speakers do with words imported from other languages (loan adaptation), or when learning other languages (L2 phonology)?
- Context is less controlled than in *wug* test:
 - who did they first hear the word from?
 - do they know the spelling in the original language?
 - how well do they speak the foreign language?
 - are there established conventions for borrowing words from this language?

Russian

- Kenstowicz & Kisseberth 1979, p. 46—native words:

<i>dative sg.</i>	<i>nominative pl.</i>	<i>nominative sg.</i>	
xlebu	xleba	xlep	'bread'
gribu	griby	grip	'mushroom'
grobu	groby	grop	'coffin'
čerepu	čerepa	čerep	'kull'
xolopu	xolopy	xolop	'bondman'
trupu	trupy	trup	'corpuse'
sadu	sady	sat	'garden'
prudu	prudy	prut	'pond'
cvetu	cveta	cvet	'color'
zakatu	zakaty	zakat	'sunset'
razu	razy	ras	'time'
zakazu	zakazy	zakas	'order'
lesu	lesa	les	'forest'
usu	usy	us	'whisker'
storožu	storoža	storoš	'guard'
dušu	dušy	duš	'shower'
rogu	roga	rok	'horn'
porogu	porogy	porok	'threshold'
raku	raky	rak	'crayfish'
poroku	poroky	porok	'vice'

- K&K report that words borrowed into Russian behave the same way (p. 53):

<i>dative</i>	<i>nominative</i>	
garažu	garaš	‘garage’
gazu	gas	‘gauze’
klubu	klup	‘club’

- Moreover, final devoicing can be seen in a typical Russian accent when speaking English (p. 53)
 - Of course, when a Russian speaker gets more proficient in English they may suppress this
 - But this tends to be at least a phase that Russian learners of English go through
- Russian lacks /dz/, /ʃ/, /ʎ/. So what do Russian learners typically do with these sounds?
 - K&K report (p. 337), for speakers who have already mastered /ʃ/ in other environments,

<i>badge</i>	ba[č]
<i>judge</i>	[j]u[č]

- Cf. the *Bach* test (What is the plural of [bax]?), proposed by Lise Menn (Halle 1978).

🔍 Let’s discuss pros and cons of this approach

(See Peperkamp 2005 for a model of loan adaptation that requires more than just the normal grammar.)

5 Explanatory adequacy

- Suppose we could somehow achieve description adequacy for real languages
 - figure out the “significant” generalizations in those languages.
- To build our linguistic theory, we still need to know which generalizations people tend to extract from learning data.
 - Are some preferred to others?
 - Are there hard limits on learnability?

For example

- Suppose we’re convinced by the wug test that English speakers’ grammar includes “use the [əz] form of the plural after sibilants”.
 - Exposed to the English data, they prefer a grammar with that generalization to one without it.
- But we know nothing about the learnability of “use the [ɪz] form of the plural after **non**-sibilants”.
- How can we investigate the relative learnability of generalizations?

6 Typology?

- Chomsky & Halle 1968 (“SPE”) proceed more or less according to this logic:
 - Assume that languages change when members of one generation learn a slightly different grammar from the grammar that generated the data they were exposed to.
 - Further assume that these changes involve learners’ constructing a more-preferred grammar than what would be strictly consistent with the learning data.
 - Therefore, if a certain phonological phenomenon is predominant cross-linguistically, it must be because learners prefer it (and therefore have introduced it into many languages).
 - Thus, we can tell what learners prefer by inspecting cross-linguistic tendencies.

? I’m sure you can think of a lot of problems with this approach (see Blevins 2003, Ohala 1992)

7 Poverty-of-the-stimulus experiments

(See Wilson 2006, White 2012 for other nice artificial-language cases; Zuraw 2007 for within-language)

- Kim 2012
 - Teach people two alternations in an artificial language:
 - mapi + alop + a → mapalopa (‘dog’s kiwi’)
 - nat + ipul + a → natʃipula (‘monkey’s watermelon’)
 - In testing phase, sneak in some items like
 - kito + ilip + a → ?

? Discuss possible outcomes and what they’d tell us.

8 Surfeit-of-the-stimulus experiments

- Becker, Ketrez & Nevins 2011
 - Turkish has words whose final C alternates in voicing...
 - [kebab] ‘kebab-citation’ [kebab-u] ‘kebab-accusative’
 - ...and words whose final C doesn’t alternate in voicing
 - [ketʃap] ‘ketchup-citation’ [ketʃap-u] ‘ketchup-citation’
 - Turkish speakers could have learned various generalizations about whether a final obstruent alternates in voicing under suffixation.
 - When tested on new words, they showed evidence of generalizations referring to syllable count and place
 - e.g., monosyllables tend not to alternate
 - labial Cs tend to alternate

- But they didn't show evidence of knowing generalizations about preceding vowel quality.
 - more alternation after a high vowel ← *true in lexicon but no effect in wug test*
 - Becker & al.'s conclusion:
 - constraints like $*\begin{bmatrix} V \\ +hi \end{bmatrix} \begin{bmatrix} C \\ -voice \end{bmatrix} V$ just don't exist.
 - But constraints like $*VpV$ do.
- 9 Processing of native-language rules (Zhang & Lai 2006)**
- Chinese languages often have **tone sandhi**
 - when two syllables are put together into a word, their tones change:

(2) Mandarin tone sandhi:

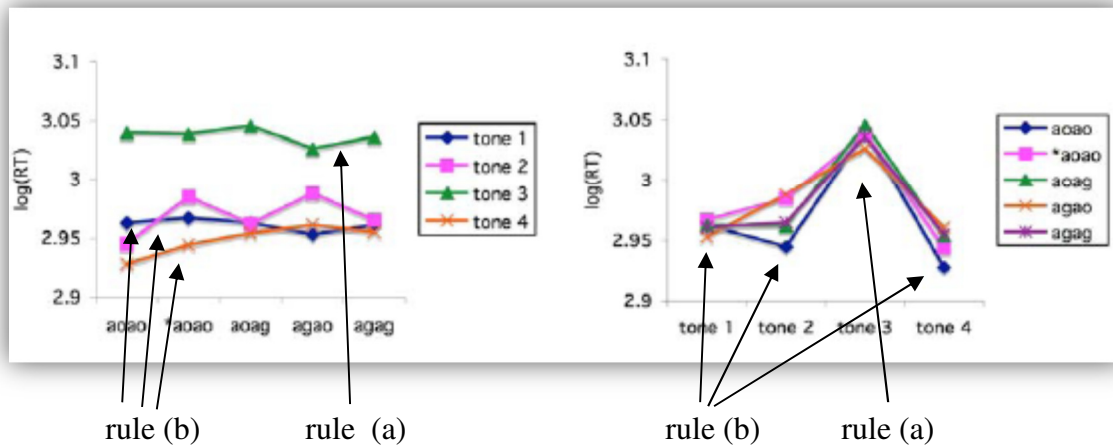
a.	213 → 35 / ___ 213	
	xaw213-tɕju213 → xaw35-tɕju213	'good wine'
	tʂan213-lan213 → tʂan35-lan213	'exhibit'
b.	213 → 21 / ___ {55, 35, 51}	
	xaw213-ʂu55 → xaw21-ʂu55	'good book'
	xaw213-tən35 → xaw21-tən35	'good person'
	xaw213-kʰan55 → xaw21-kʰan51	'good-looking'

(Zhang & Lai p. 80)

- Various reasons to think that rule (b) should be “better” than rule (a):
 - Both rules simplify a complex contour, so that it is easier to realize in a shorter time
 - being nonfinal makes the first word shorter—see Zhang 2000.
 - But (a) also involves raising of pitch, which increases articulatory demands in a short time.
 - (b), on the other hand, involves straightforward simplification of the original tone
 - (Zhang & Lai discuss other reasons...)
- Mandarin speakers use both rules very frequently—but is (b) nevertheless “easier” than (a)?

Experiment

- Zhang & Lai presented Mandarin speakers with a variety of real and “wug” combinations.
- Subjects hear the two syllables and had to pronounce them as a single word.



(Zhang & Lai p. 96)

- Subjects responded more slowly (higher values) when applying rule (a), for all types of words (real and wug).
 - (There are other interesting results concerning how the words were produced.)
- Zhang & Lai’s conclusion: Mandarin speakers have learned both rules, but have more difficulty using the “unnatural” one.

10 If we have time: Literary invention

- Also challenging to interpret, but has the advantage of getting speakers out of zone of memorization

Imperfect rhyme in Japanese rap lyrics (Kawahara 2007; see also Steriade 2003 on imperfect rhymes in Romanian translated poetry):

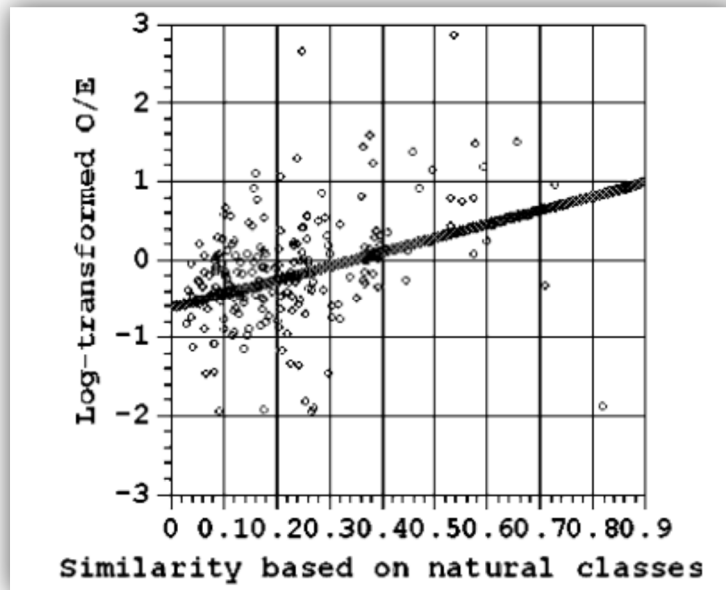
(2) *Mastermind* (DJ HASEBE feat. MUMMY-D & ZEEBRA)

a.	kettobase	<u>kettobase</u>		
	kick it	kick it		
	‘Kick it, kick it’			
b.	kettobashita	kashi	de	<u>gettomanee</u>
	funky	lyrics	with	get money
	‘With funky lyrics, get money’			

(Kawahara p. 115)

- Unlike typical English rhyme where stressed syllable to end should be similar
 - *I hate parading my serenading* (Cole Porter, You’re the Top)
- Instead, whole word or phrase should be similar

- Overall, sounds that belong to more natural classes together occur more often in rhymes:



(Kawahara p. 121)

Cluster splittability

- There is diverse evidence that languages treat *sp*, *st*, *sk* as less splittable than other cluster (*bl*, *kr*, ...).
- Fleischhacker 2006: reduplication, loan adaptation, (also puns)
 - e.g., Farsi: *esparta* ‘Sparta’ vs. *pelutus* ‘Plutus’
- Is there a real preference for grammars that don’t split *s{p,t,k}*?
 - or is it just a matter of mis-hearing or mis-articulation?
- Minkova 2003: evidence from alliteration in Middle English.
 - When words that start with 2 or more consonants alliterate, poets allow C_1C_2 to alliterate with just C_1 (*sl...s...*; *dr...d...*; *b...br...*):

<i>ðurh slipne niπ / sawle bescufan⁴</i>	<i>Beo 184</i>
<i>druncen 7 dolhwund. / Næs ða deað πa gyt⁵</i>	<i>Judith 107</i>
<i>πe πær baldlicost / on πa bricge stop⁶</i>	<i>Maldon 78</i>

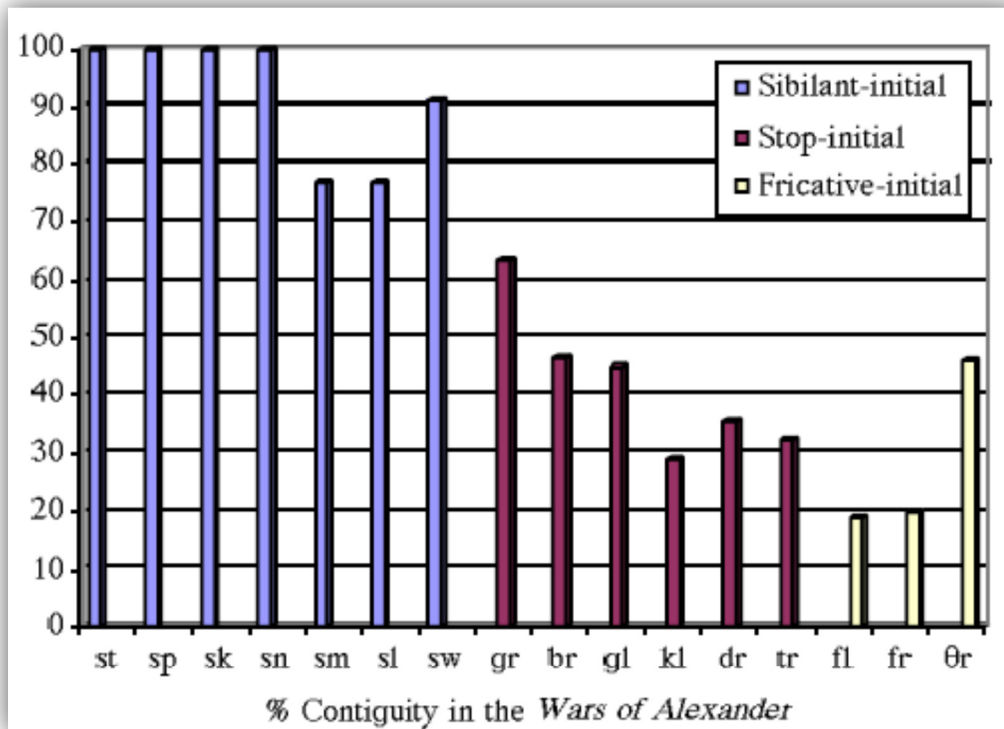
(Minkova 2001 p. 1)

- But *s-stop* clusters alliterate in full:

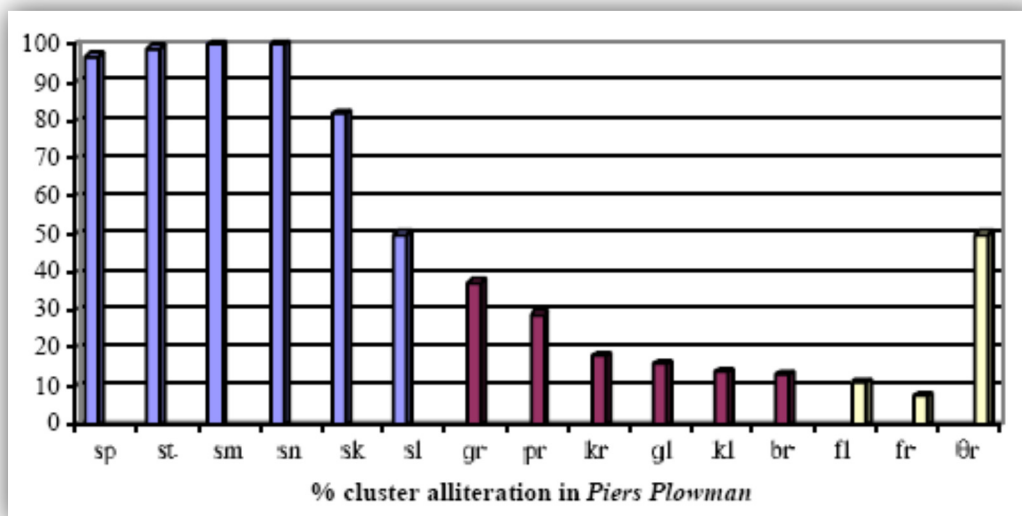
CONTIGUITY in OE (<i>sp-</i>, <i>st-</i>, <i>sk-</i>)	
<i>scaðan scirhame / to scipe foron¹</i>	<i>Beo 1895</i>
<i>stopon stynmode, / stercedferhðe²</i>	<i>Judith 227</i>
<i>and πæt spere sprengde, / πæt hit sprang ongean³</i>	<i>Maldon 137</i>

(Minkova 2001 p. 1)

- How often do different C₁C₂ clusters alliterate with C₁C₂ rather than just C₁:



(Minkova 2001 p. 3)



(Minkova 2001 p. 6)

11 Where have we been?

- **Structure above the segment:** mora, syllable, grid, foot, p-word; prosodic morphology
- **“Downwards” interfaces**
 - phonetic motivation in phonology
 - phonologization of phonetic effects
 - autosegmentalism and its relation to articulation
- **“Upwards” interfaces**
 - phonology-morphology interactions
 - paradigms
 - syntax-phonology interface, phrasal phonology
 - prosodic structure above the p-word
- **“Sideways” interfaces**
 - phonology vs. the lexicon
 - phonology vs. processing

12 Where can you go?

Next quarter

- Phonological Theory III! (Ling 219; Bruce Hayes)
 - the exclamation mark is because it’s rarely offered
- Phonetic Theory (Ling 203; Pat Keating)
- April 6: Junko Itô colloquium
- June 1: Adam Albright colloquium

Any time

- You’re always free to drop by the phonology seminar—you don’t have to enroll and commit to the whole quarter.
 - Journal club episodes are a particularly efficient time to visit: learn about 10 or more phonology articles in just 2 hours!

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