Corpus data vs. experiments in English phonotactics

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Outline

Collaborators

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- Jordan Brewer
- Lynnika Butler
- Jason Ginsburg
- Ben Tucker

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Are these all in sync with each other? If not, what story do we tell?

English consonants

p		t		k
b		d		g
f	θ	s	š	
v	ð	z	ž	
			č	
			ǰ	
m		n		ŋ
		l		
		r		
w			y	h

All of these can be syllable onsets except the ones marked in red (Hammond, 1999); [ŋ] cannot occur at all and [ž] is marginal.

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  - Pig Latin

Strom [stram]	⟶	[am-stre]
Gwen [gwɛn]	⟶	[ɛn-gwe]
Beula [byulə]	⟶	[yulə-be]

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  e.g. *splash* [splæš], *spree* [spri], *squash* [skwɔš], etc.

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For example, in [kw] in *queen*, [k] and [w] are independently onsets, e.g. in *keel* [kil] and *we* [wi], and [k] is less sonorous than [w].

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But there shouldn't be any clusters that violate the Sonority generalization.

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0	302878
1	630175
2	76270
3	3713

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- But: D. Ohala (1996) shows that complex clusters are simplified to their least sonorous members.

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- It's not clear whether or how sonority shows itself in these domains.

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- Gradient judgments allow us to look even more closely.

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- Neighborhood density: how many actual words are "one segment away" from the form in question?
- For example, *blick* [blɪk] has these neighbors:

click [klɪk]	*flick* [flɪk]
lick [lɪk]	*slick* [slɪk]
brick [brɪk]	*black* [blæk]
bleak [blik]	*block* [blak]
blink [blɪŋk]	*bliss* [blɪs]

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- Both effects also show up in yes-no tasks (Frisch et al., 2000).
- Both effects show up with auditory or visual presentation (Bailey & Hahn, 2001).

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- One way to do that is to carefully select materials so these are all balanced and controlled.
- Match items for neighborhood density and phonotactic probability.

Previous results presented here

C	CC	CCC
zɪlm	twɪlm	skrɪlm
gayθ	stayθ	strayθ
vork	flork	strork
viʃ	kwiʃ	skriʃ
dʒæntʃ	spæntʃ	stræntʃ
basp	plasp	strasp
rarv	klarv	strarv

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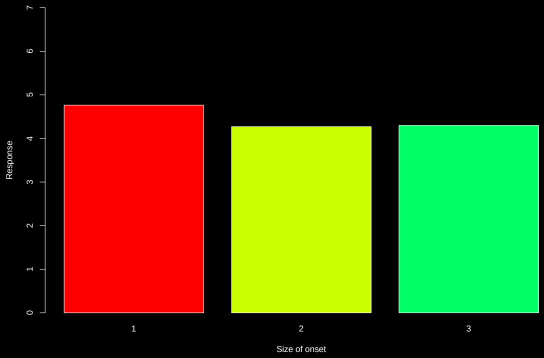
Items matched as closely as possible for neighborhood density and phonotactic probability.

Uh-oh!



But the effect appears to go in the wrong direction.

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- Significant by subjects [$F(2,19) = 4.31$, $p < .01$], but not by items [F(2,18) = 1.27, n.s.].
- If we add in neighbors and phonotactic probability, then:
  - there is an effect of neighbors, also in the wrong direction. By subjects: [$F(2,19) = 7.95$; $p < .000$]; By items: [$F(2,18) = 4.87$; $p < .03$]
  - plus several significant interactions of phonotactic probability and neighbors with onset size.

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- A problem: Did we somehow reverse the scale? Is there some unknown factor that overwhelms the factors we're interested in?
- A significant problem: We can't control neighborhood density or phonotactic probability adequately for this investigation.
- Teaser: There seems to be a typological effect of onset complexity in there somewhere.

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lmube	lmzen	lnfope	lnkiz	lnthem	lntope	lnzape
lshiz	lthiz	lzoog	mlube	mpazz	mruke	mtaz
mthazz	mvupe	mziv	nfape	nkeeb	nzafe	pmazz
pmreeze	rmfeap	rmkoot	rmpeeze	rmthass	rmtofe	rmuke
rmzube	rnguke	rntafe	rntheef	rnvizz	rviss	shliz
thliz	thmazz	thmled	thmrass	thnlem	thnreef	tmaz
tmrofe	tnlope	tnrafe	vmupe	vnrizz	vriss	zloog
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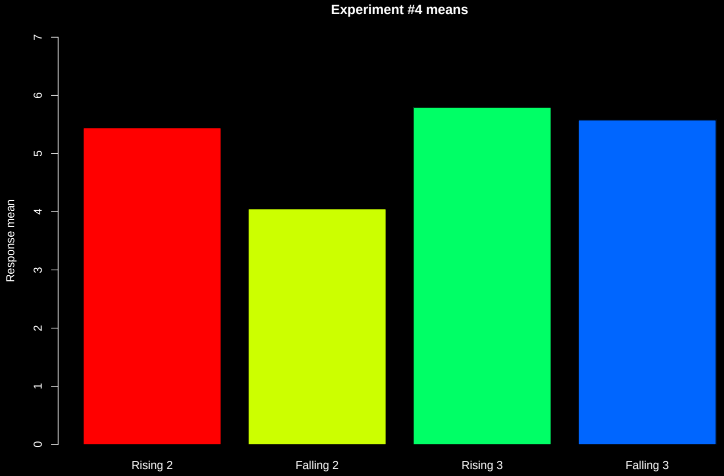
- Factors are size and sonority cline of onset.

Results from new experiment



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- Items with onsets that violate the sonority hierarchy are judged as more ill-formed. [by subjects: $F(1, 20) = 75.807$, $p < .000$; by items: $F(1, 64) = 23.521$, $p < .000$]

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- Items with onsets that violate the sonority hierarchy are judged as more ill-formed. [by subjects: $F(1, 20) = 75.807$, $p < .000$; by items: $F(1, 64) = 23.521$, $p < .000$]
- But the factors interact. [by subjects: $F(1, 20) = 47.979$, $p < .000$; by items: $F(1, 64) = 14.886$, $p < .000$]

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- Do other markedness relations play a role?

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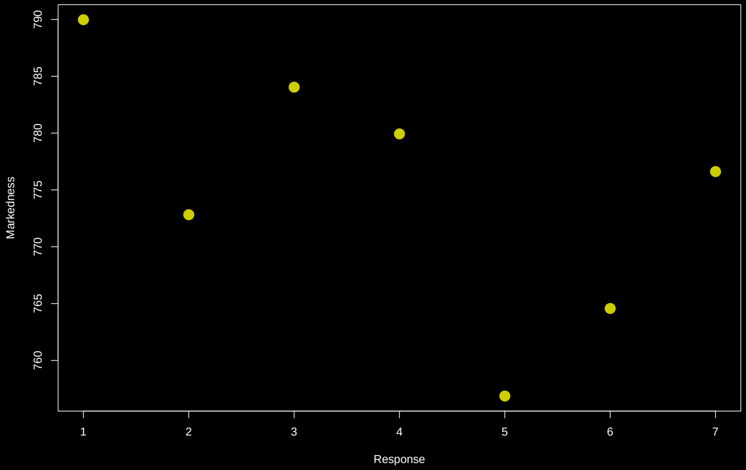
- How to calculate segmental markedness: count the number of times each segment occurs in UPSID. Thanks to Natasha Warner!
- We replicated Bailey & Hahn's visual presentation experiment and found an independent effect of segmental markedness: items containing typologically more marked sounds are judged as less well-formed in the Bailey & Hahn visual presentation replication. [By subjects: phonotactic probability $F(1, 17) = 197.33$, $p < .000$; neighborhood density $F(1, 17) = 46.32$, $p < .000$; markedness $F(1, 17) = 21.96$, $p < .000$] and [By items: phonotactic probability $F(1, 254) = 43.98$, $p < .000$; neighborhood density $F(1, 254) = 10.33$, $p < 0.001$; markedness $F(1, 254) = 4.89$, $p < 0.02$]

The effect of markedness



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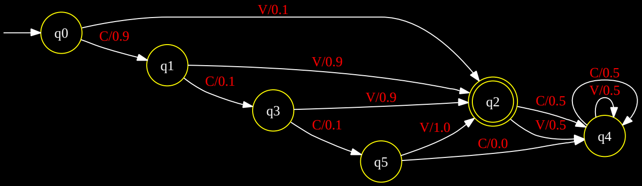
  - Something else for lexical items.

Initial weights for onset size

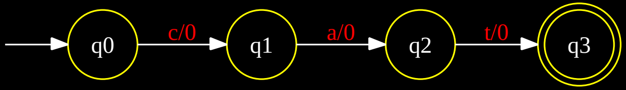


Reweighting by experience

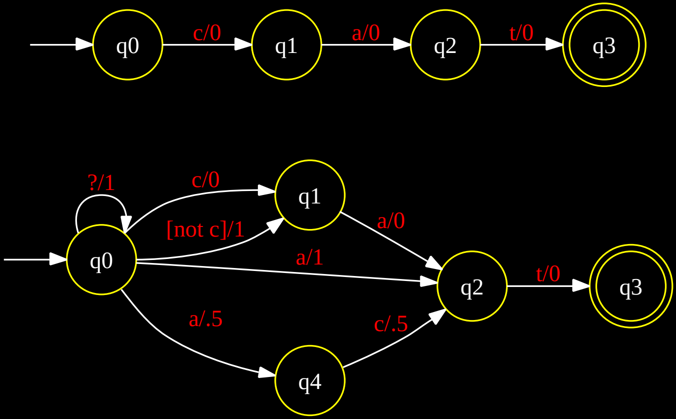
onset	before	after
fV	.009	.09
sfV	.007	.07
sfrV	.005	.05
fnV	.007	.007
fnrV	.005	.005

Weights here are illustrative.

Neighborhood density



Neighborhood density



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- Experiments on adults can involve impossible words.

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- Typology and neighborhood density can be incorporated into judgments by using WFSAs and setting initial weights accordingly.