Retire those Christmas capes!

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Theory

- TRACE: feedback connections from word units to phoneme detectors and from phoneme detectors to feature detectors
- MERGE: Task-specific decision module that is informed by phoneme (and feature) and word units; no feedback from word units to phoneme (or feature) units

Interpretation

- Feature layer represents some pre-linguistic level of representation: auditory or inferred articulatory

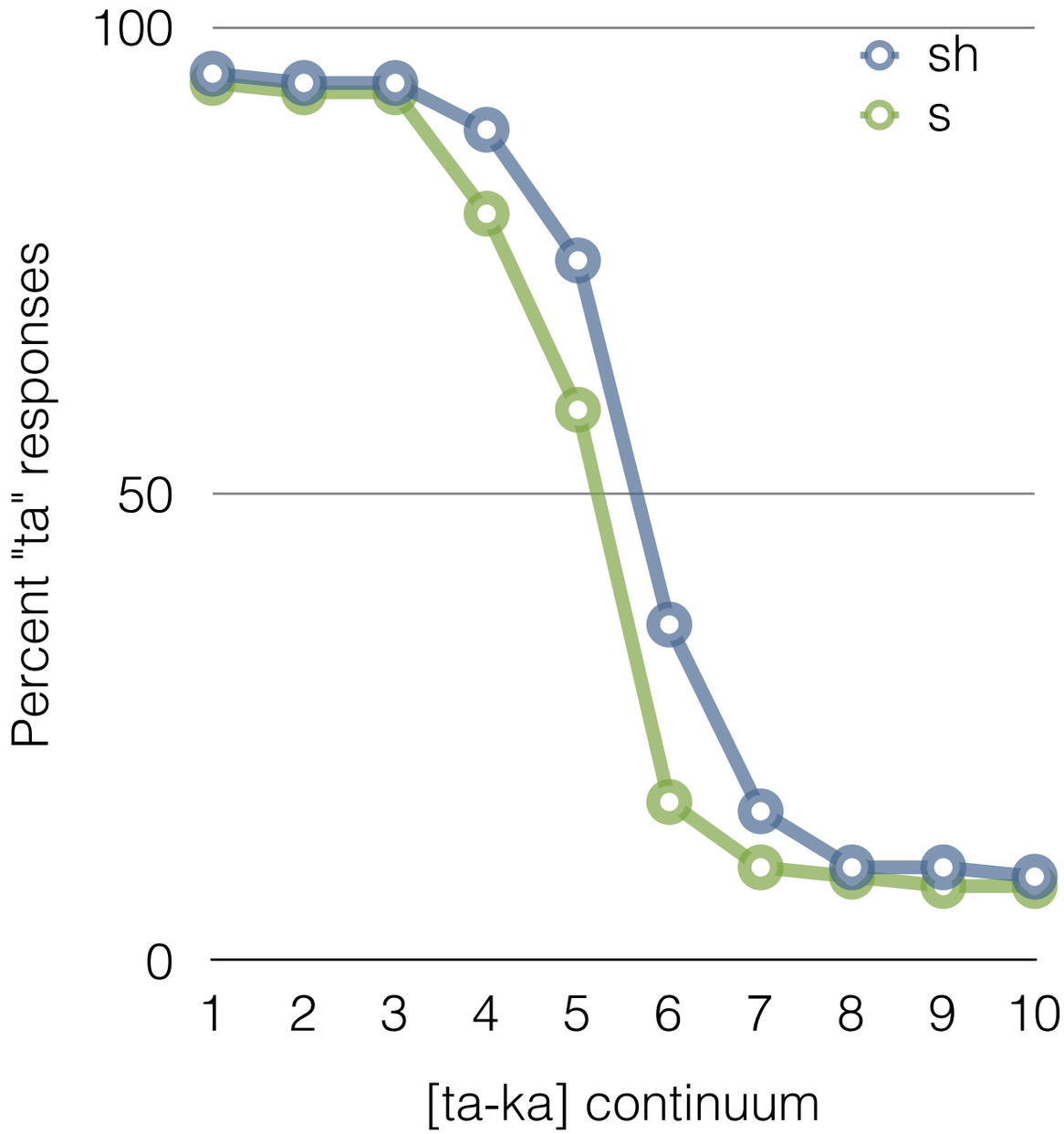
- Goal: Find something that we agree happens in pre-linguistic representations and see if it can be affected by lexical knowledge

- Compensation for coarticulation: non language-specific effect on categorization

Compensation

- Articulations (Mann, Fowler, Viswanathan): respond with POA that differs from that of the fricative context because **coarticulation** probably affected stop's true POA

- Audition (Lotto, Holt, Kingston): respond with alternative that **contrasts** auditorily with fricative context (mechanism debated)



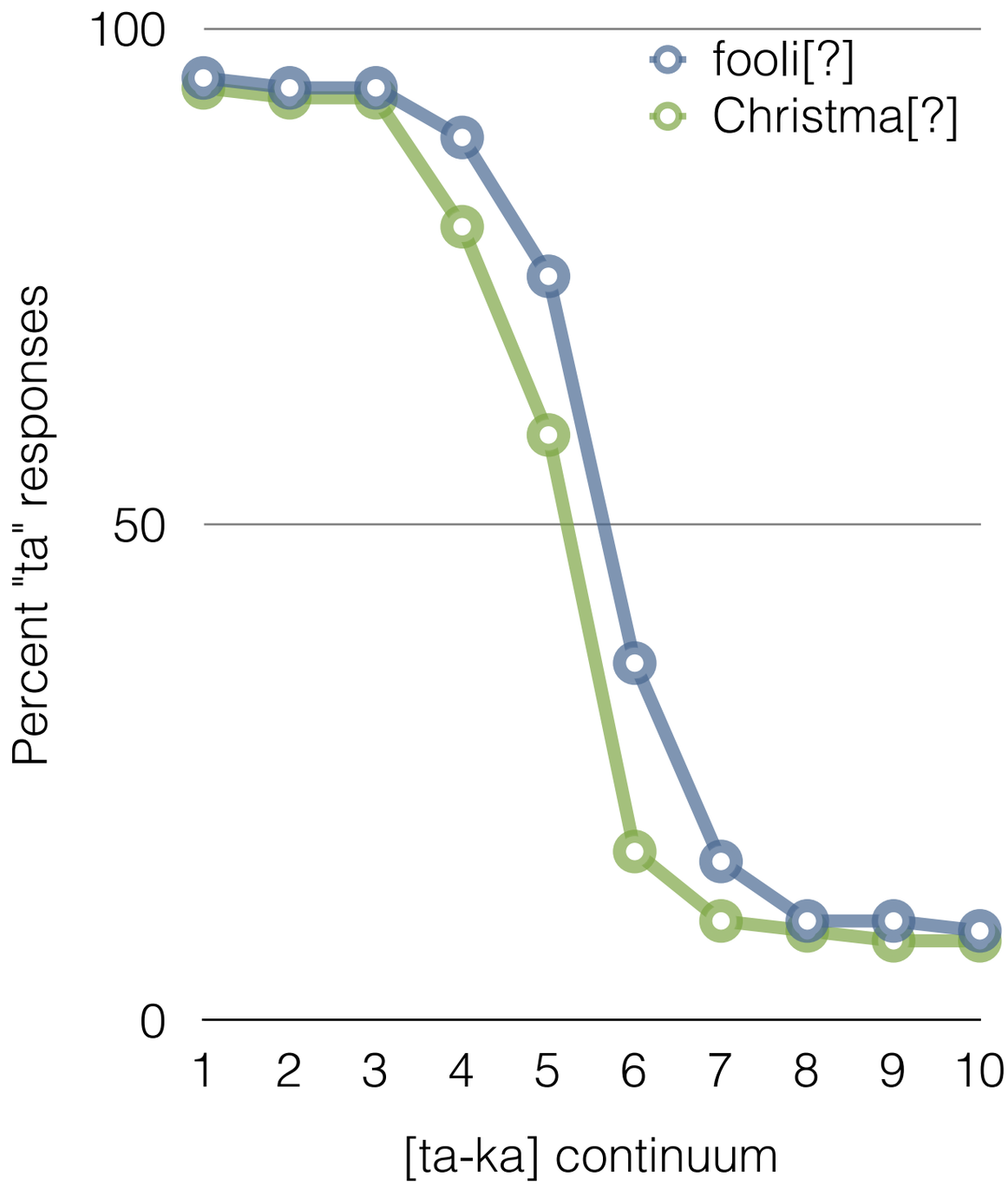
Elman & McClelland '88

- Ganong effect should bias percept of ambiguous fricative from [s-S] continuum towards alternatives that complete words rather than nonwords: [?] = "**sh**" in **fooli**_, [?] = "**s**" in **Christma**_

- Acoustically-determined fricative identities affect stop categorization

- Looks like lexically-determined fricative identities do so as well

- Confirms a positive prediction of TRACE



Pitt & McQueen '98

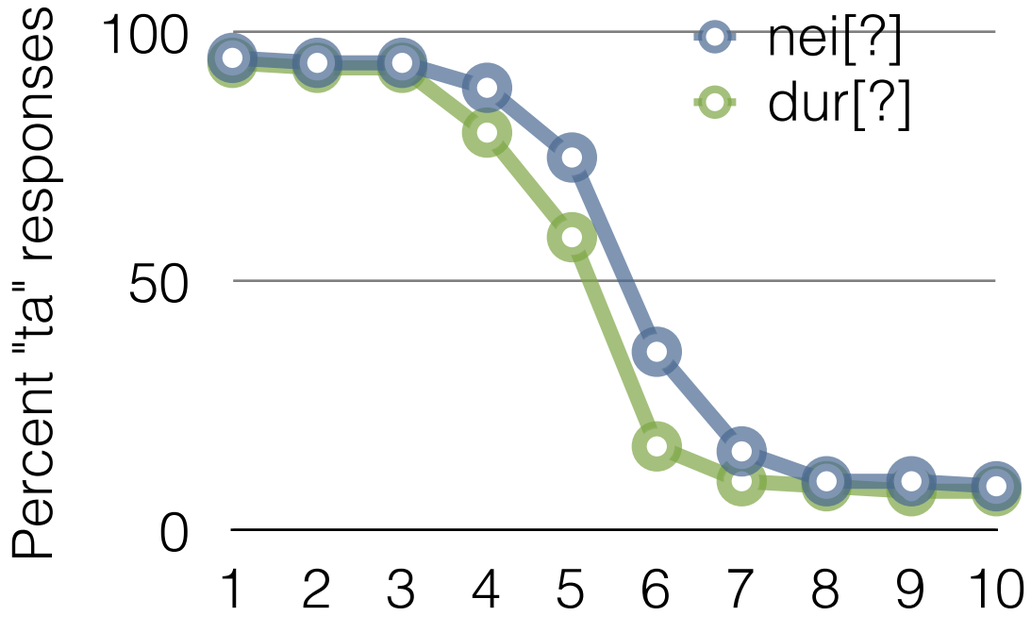
- Confound in E & M '88 items: [S] more frequent after [I] (foolish), [s] more frequent after [uh] (Christmas)

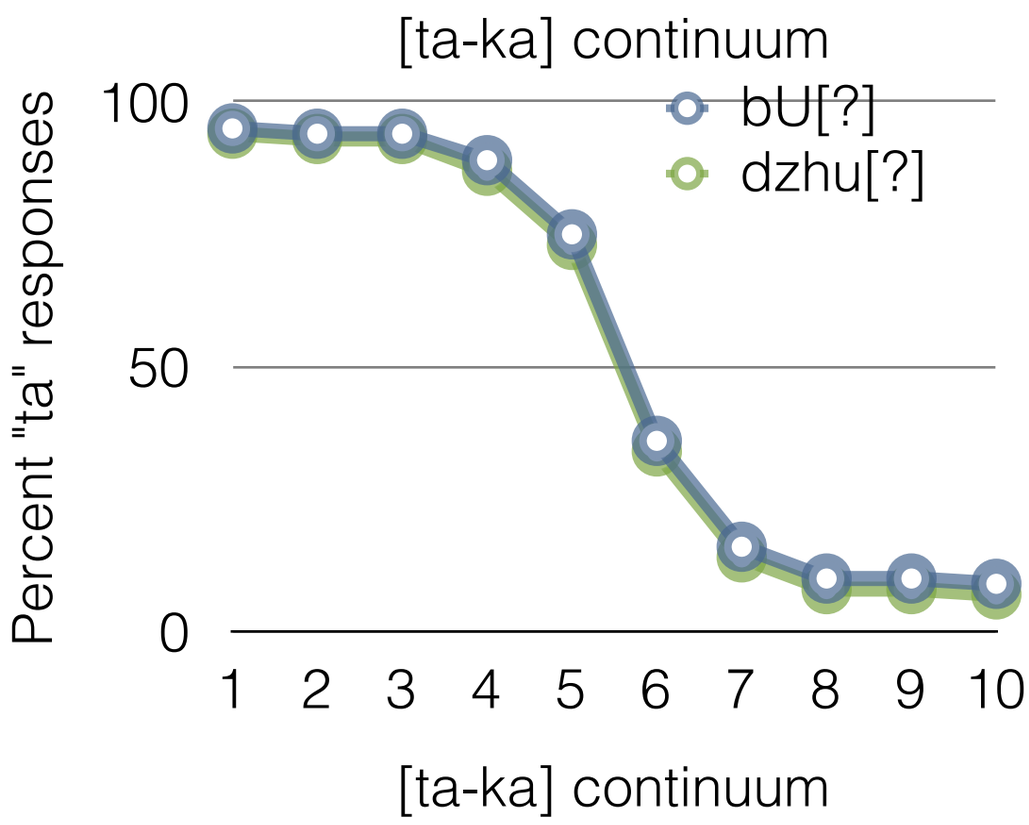
- So fricative identity could be set by knowledge of transitional probability biases rather than the Ganong effect

- Tested TP bias in nonwords: [S] more frequent after [e], [s] more frequent after [ur]

- What is the perceptual locus of knowledge of TPs? Pitt & McQueen: In pre-lexical representations

- Argued for MERGE-TP model





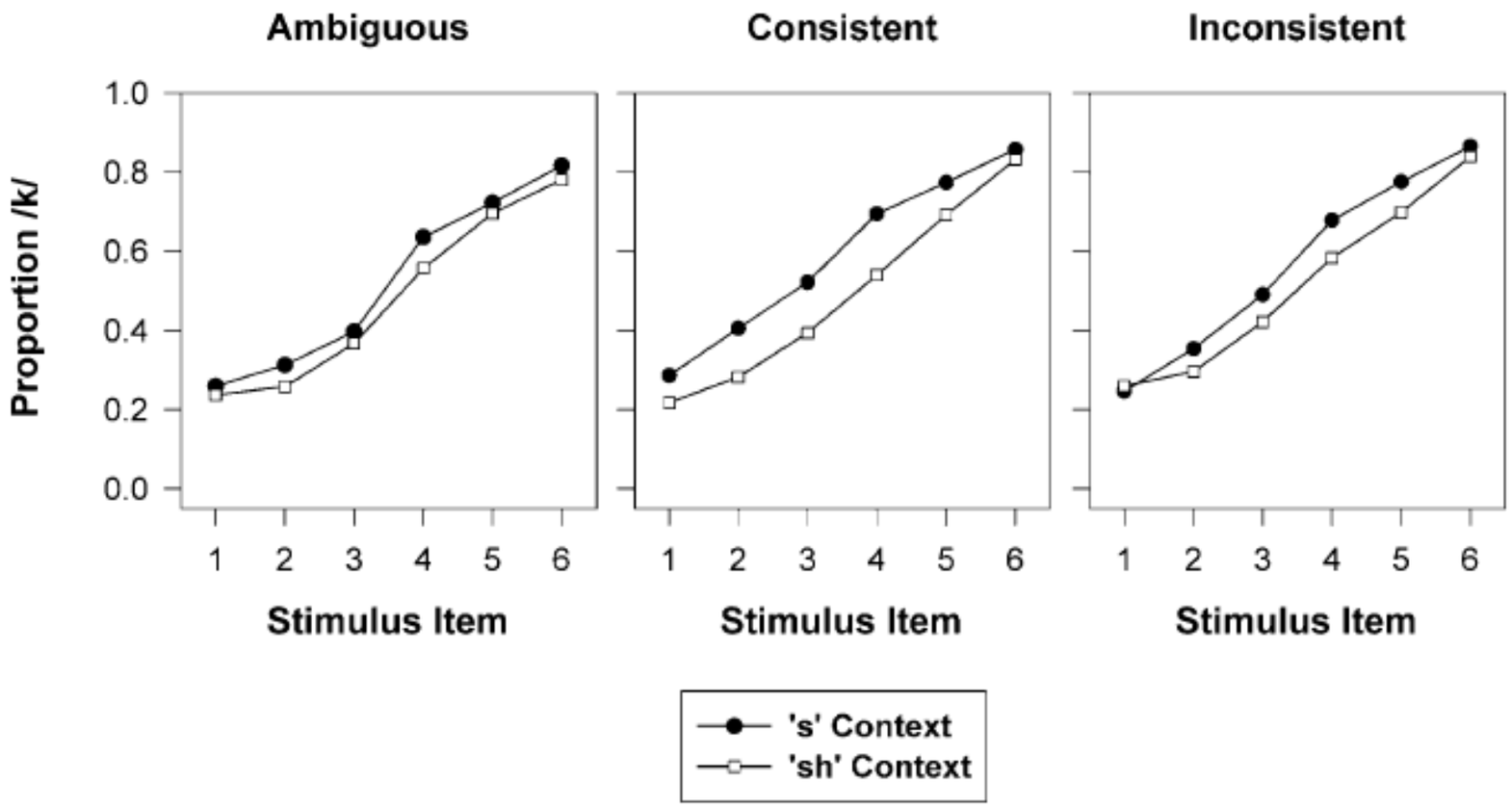
Samuel & Pitt '03

- **Perceptual grouping**: Fricatives at the end of longer words seem to perceptually cohere more with the preceding substring relative to those at the end of short words. Compensation effects: short words > long words

- **Ganong effect**: long words > short words

- Finding lexically-mediated compensation is difficult because the independent effects are supported by **conflicting manipulations of word length**

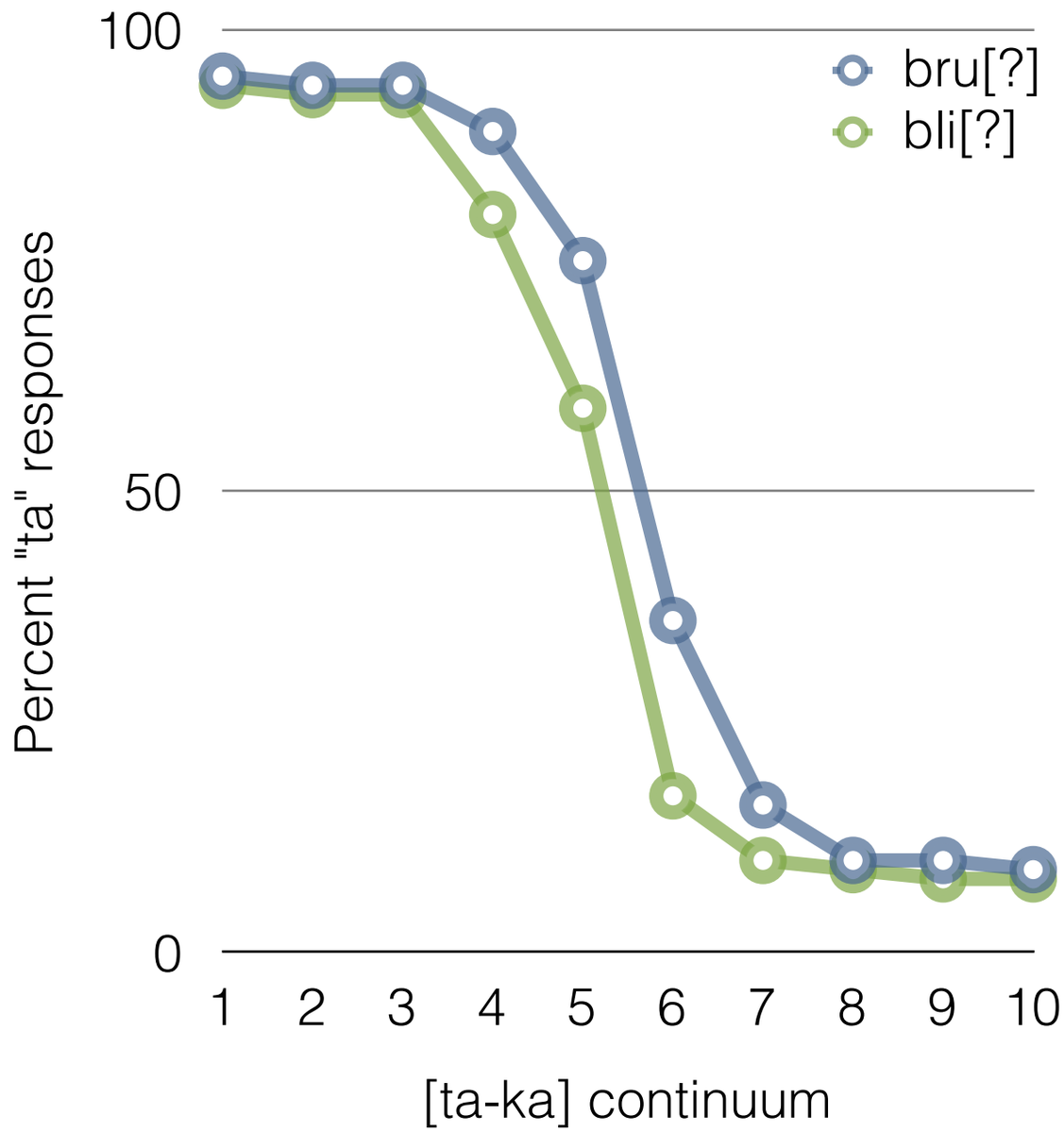
- Nonetheless, after controlling for diphone TP differences, they got small lexically-mediated compensation effects in two of the eight comparisons



Magnuson *et al.* '03

- Show robustness of lexical feedback by stacking the deck against the Ganong effect

- **Opposing** TP biases: bli_ and bru_



McQueen *et al.* '09

- Confound in training of Magnuson et al.'s listeners: only heard lexically-consistent sequences (**bliss**, **brush**; no **blish* or **bruss*). Were results with ambiguous fricative [?] due to lexical mediation or experiment-internal bias?

- What about **perceptual grouping** (Samuel & Pitt '03)? Ambiguous fricatives may group more strongly with the preceding context than unambiguous fricatives. Therefore, ambiguous fricatives may be **less likely** to trigger compensation effects

- But wait! Perceptual grouping strength should also correlate with lexical status: unambiguous fricative items (actual words) > ambiguous fricative items. Therefore, ambiguous fricatives may be **more likely** to trigger compensation effects

- Control silent gap (remaining variable) -> eliminate **PG** as an excuse for any dissociation b/w Ganong and compensation effects

McQueen *et al.* 09

- Experiment 1: Close replication of Magnuson et al. '03 (lexically-biased training)
- Experiment 2: Anti-lexical training set (blish, bruss)
- Experiment 3: Unbiased training set

Experiment	Measures	Lexical effect on fricatives	Compensation effect after unambiguous fricatives	Compensation effect after ambiguous fricatives		
				Step 9	Step 11	Step 13
1	$F(1,19)$	129.39	13.96	.28	8.71	1.24
	p	<.001	<.001	.60	<.01	.28
	Mean difference	.75	.10	.01	.06	.02
	±95% CI	.14	.05	.05	.04	.05
2	$F(1,19)$	69.69	16.25	.62	.97	4.73
	p	<.001	<.001	.44	.34	<.05
	Mean difference	.55	.08	.01	.02	−.05
	±95% CI	.14	.04	.04	.05	.05
3	$F(1,19)$	64.09	11.54	.19	1.16	.53
	p	<.001	<.01	.67	.30	.47
	Mean difference	.53	.11	.01	.03	.02
	±95% CI	.14	.07	.04	.05	.05

"Talkin 'bout practice…"

- Why do the contents of the training session affect test responses?

  - **Lexicalization of nonwords:** Could reverse the compensation effect (in Exp. 2). But there was no pseudo-Ganong effect (on fricative ID)

  - **Prelexical learning:** TP expectations based on training set. Hearing only blish and bruss sets up [I] -> [S] and [uh] -> [s], which applies to [?]. But TP expectation < lexical bias to explain fricative ID.

Feedback and sensitivity

- Alternatives to Christmas capes: selective adaption (Samuel) or **sensitivity**

- Norris *et al*. '00: "[if feedback] lexical information in a word-nonword continuum should result in improved discriminability (greater accuracy in paired-alternative discrimination …) relative to a nonword-nonword continuum."

- The perceived difference between adjacent stimuli will be greater when one endpoint of the continuum is a word and the other is not than when both endpoints are words (or nonwords)

jTRACE simulation

- Lexicon consisted of the words **hoop, hoot, heap,** and **heat**, which were specified as having equal frequencies

- The simulations all used a five-step continuum between [p] and [t]

- The strength of feedback from the word to the phoneme level was set at its default value of 0.03

- Simulations were run with the word **hoot** present in the lexicon and with it absent: **hoop-hoot** vs. **hoop-*hoot**

Predicted differences between W-NW and W-W continuum

Lat. Inhib.	Cum. d' diff.	Resp. prop. diff.
0.04	0.13	0.017
0.01	0.26	0.049

Kingston *et al.* '07

- AX discrimination task
- d' scores for each pair in each continuum summed
- Stop continua: **no difference** between W-W and W-NW
- Vowel continua: **greater** cum. d' for W-W than W-NW
- Both results defy predictions of (j)TRACE