



Tapping in American English: Context matters

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Background

- How important is context in recognizing phonological variants in online word recognition?

| Type of variant | Context matters? | Reference |
|-------------------------------|-------------------|---|
| Unreduced canonical forms | No | e.g. Pitt et al. 2011, Ranbom & Connine, 2007 |
| Assimilated forms | Yes | e.g. Gaskell & Marslen-Wilson, 1996 |
| Other distant variants of /t/ | Glottal stop [ʔ] | Yes Pitt et al. 2011 |
| | Deletions | Yes Pitt et al. 2011 |
| | Tap (word-medial) | Yes Pitt et al. 2011 |
| Tap (word-final) | No? | Ranbom et al. 2009 |

Word-final tapping in American English:

- /t/ → [r] / [-cons] __ (#)[+syll, -stress] (Kahn, 1980)

Ranbom et al., 2009: Recovery of tapped word-final coda /t/

- Tap variants presented in licensing (preceding a vowel) and non-licensing (preceding a consonant) contexts
- No effect of context** on accuracy or reaction time

Problem for single abstract representations:

- Models rely on context to compensate for surface variants
- Inference models (e.g. Gaskell & Marslen-Wilson, 1996)
- Optimal perception model (Mitterer, 2011; also see Norris & McQueen, 2008)
- Performance should be poorer if a variant is presented in a phonological context that does not license it.

- Ranbom et al.: **Both** the canonical stop and tap variants are directly represented in the lexicon. → **Multiple abstract representations**

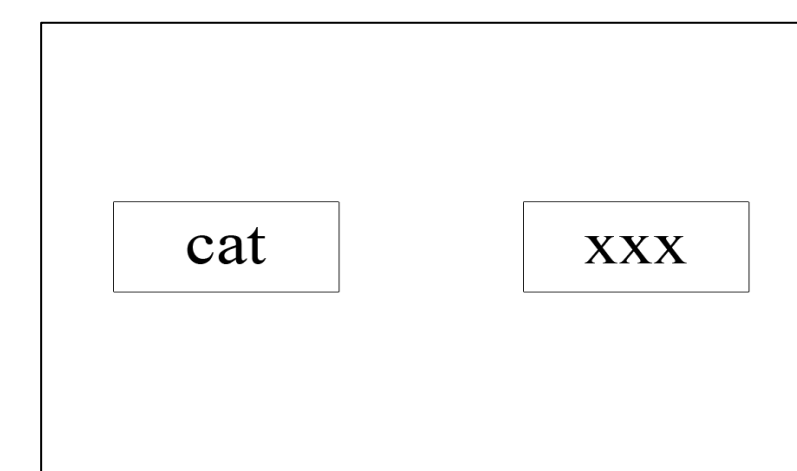
- Listeners were near ceiling on tap performance (>98%)
- Listeners could have relied on top-down information (e.g. *lunch* below):
 - E.g. For those of you who would like to eat, early lunch will be served

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Methods

- Three experiments (20 native English participants in each)
- Targets: 30 monosyllabic /t/-final English words, e.g. *bat* (also 30 monosyllabic /d/-final words, not presented here)
- Visual Stimuli: Visual targets of *printed* words paired with distractor text of 'X's (matched for orthographic length)



- Stimuli:
 - Click on the word ___ now! (favours stop variant)
 - Click on the word ___ again! (favours tap variant)

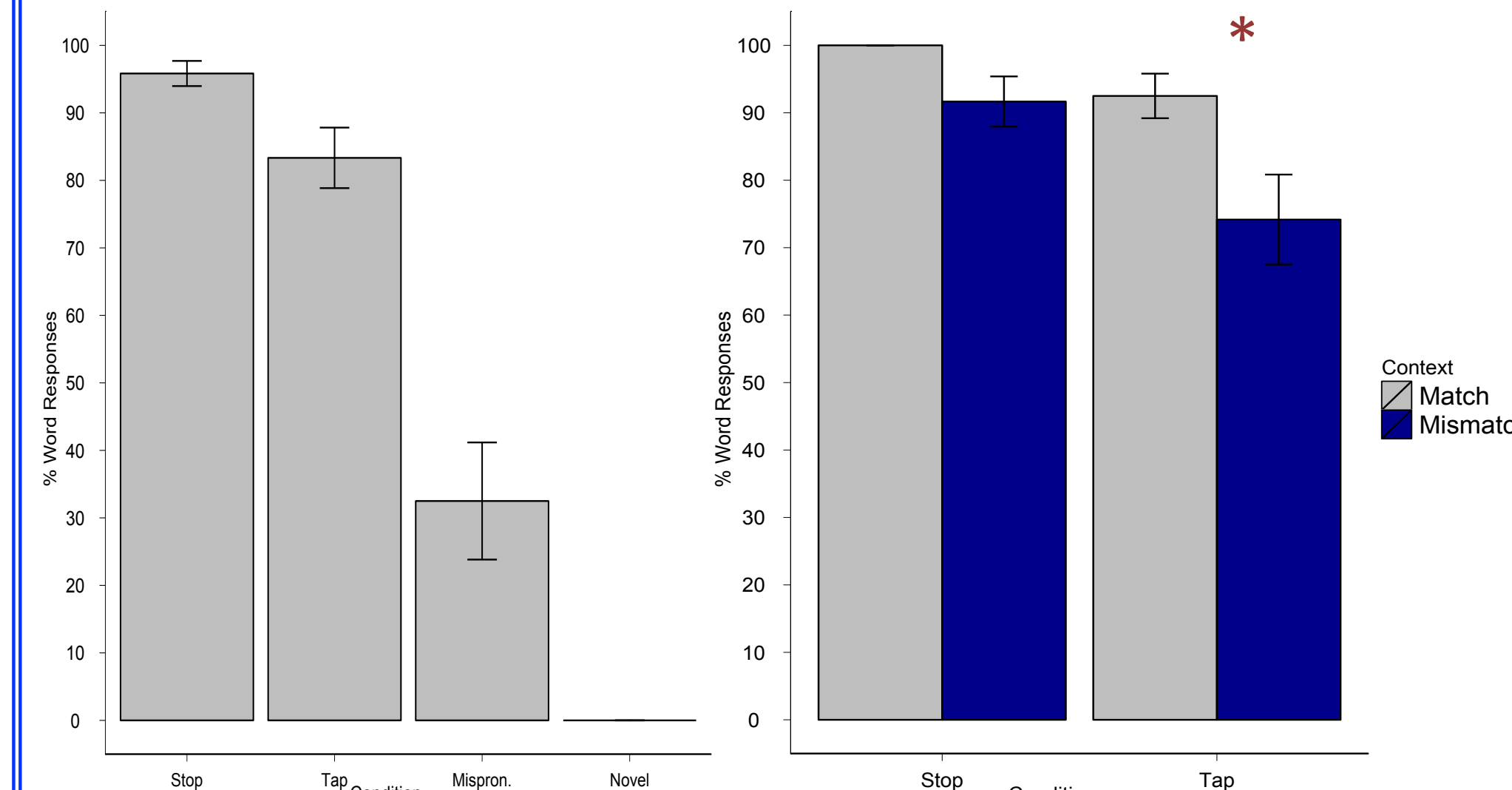
| 'bat' /bæt/ | Stop | Tap |
|------------------|-------------|-------------|
| Match context | [bæt] now | [bær] again |
| Mismatch context | [bæt] again | [bær] now |

- Stimuli were spliced and placed in mismatch contexts
- Additional conditions (presented in both frames):
 - Mispronunciation:** One-feature place mispronunciations (e.g. *bap* for *bat*)
 - Novel:** Phonologically-dissimilar label for /t/ word (e.g. *son* for *jet*)
 - Fillers:** Monosyllabic non-/t/-words (e.g. *bin*)
- Initial practice block of 3 trials (no feedback)
- Analyses included ANOVAs on accuracy data (Expt. 1) and Growth Curve Analysis (GCA; Mirman et al., 2008) for fixation data (Expt. 2 & 3)

Expt. 1: Word identification

- Listeners asked to **click** on the word they heard.

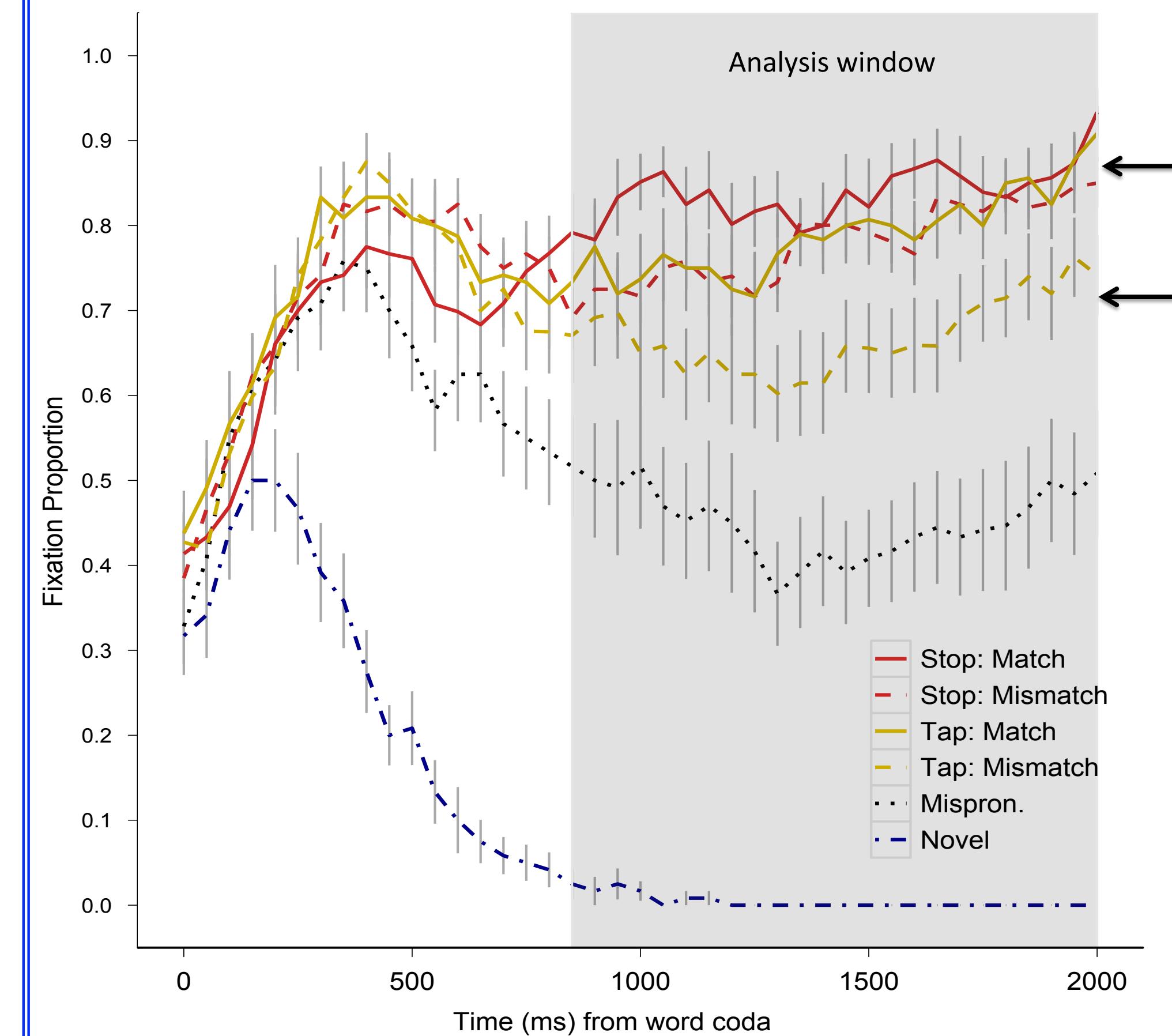
- % Word responses:
 - Tap condition: **Match > Mismatch**



Expt. 2 & 3: Eye-tracking

Listeners asked to **look** at the word they heard.

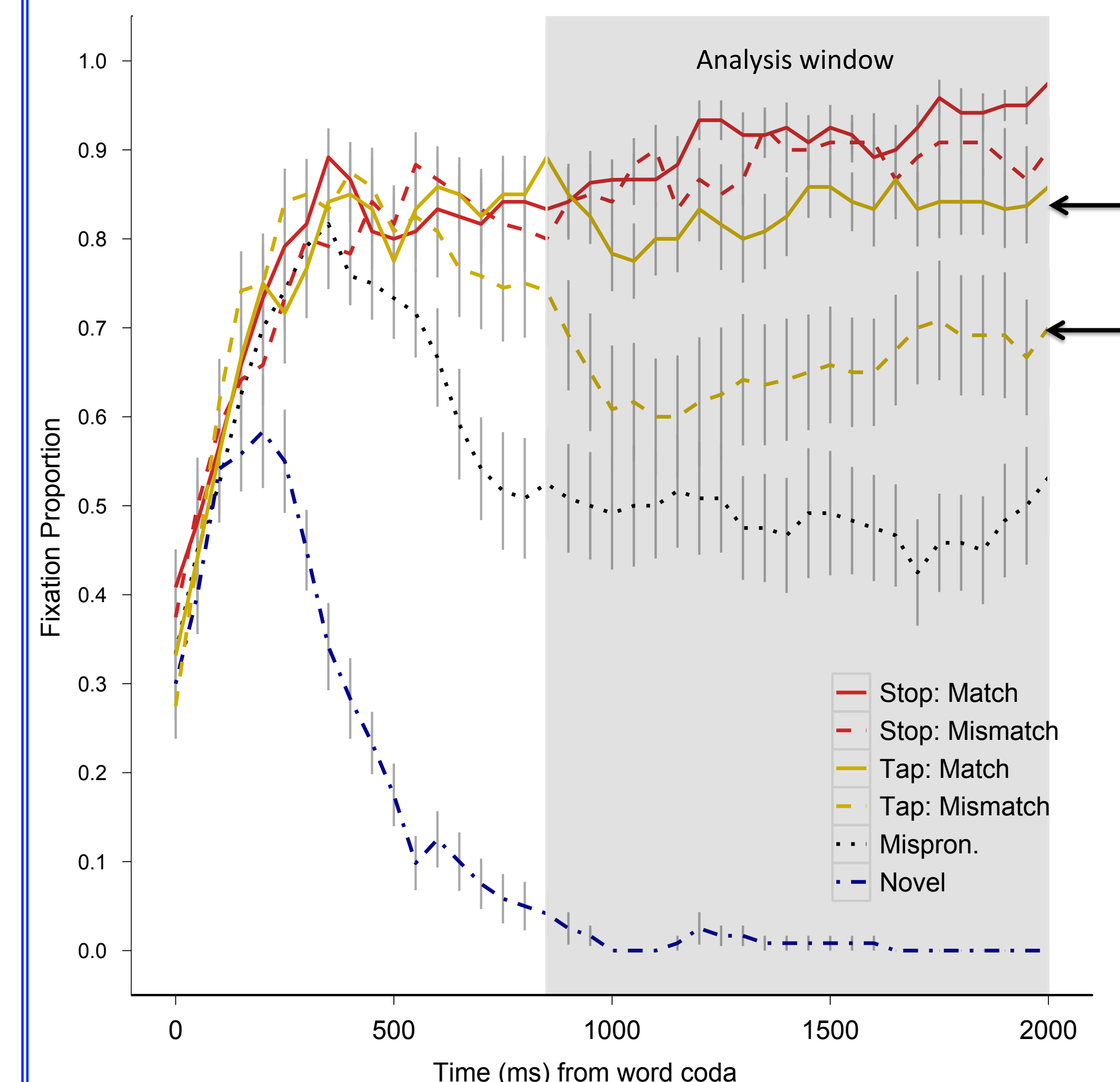
Experiment 2: Only **mismatch** stimuli were cross-spliced



- Tap condition: **Match > Mismatch**
- Tap in a mismatch context > mispronunciation

Experiment 3: All stimuli were cross-spliced

- Replicated results from Experiment 2,
- So context effects ≠ splicing effects



- Tap condition: **Match > Mismatch**
- Tap in a mismatch context > mispronunciation

Summary

- Context **does not matter** for canonical stop variants
- Contra Ranbom et al., context **matters** for non-canonical tap variants
 - Tap in a mismatch context < tap in match context (contra Ranbom et al. 2009).
 - A tap in a mismatch context > mispronunciation
 - Recognition is **gradient**

Implications

Challenge for an account with multiple abstract representations (Ranbom et al., 2009)

- Do we need different representations given context effects?

Necessary components of a single representation account:

- Role for input frequency in context**
 - Predicts (2a): Tap in match (70%) > tap in mismatch (17.6%; Ranbom et al., 2009)
 - Predicts (2b): Tap in mismatch > mispronunciation
 - Taps in mismatch context occur more than mispronunciations (~0%)
- Role for perceptual similarity to the representation**
 - Predicts (1): No effect of context for canonical variant
 - Tap in match (70%) > stop in mismatch (30%)
 - Stop not the most frequent in prevocalic context, but **perfect** match for lexical representation
 - Explains gradient activation by mispronounced target words (vs. novel) (see also Swingley, 2009)
 - Maybe predicts (2b) as well - taps more similar to /t/ than mispronunciations?

Future directions

- Do we see the same context effects with tapped /d/-final words, given how perceptually similar /d/ and tap are (de Jong, 1998; Herd et al., 2010)?
- If listeners are biased to interpret a tap as a /d/, then we should not see any effects of context.

Selected References

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