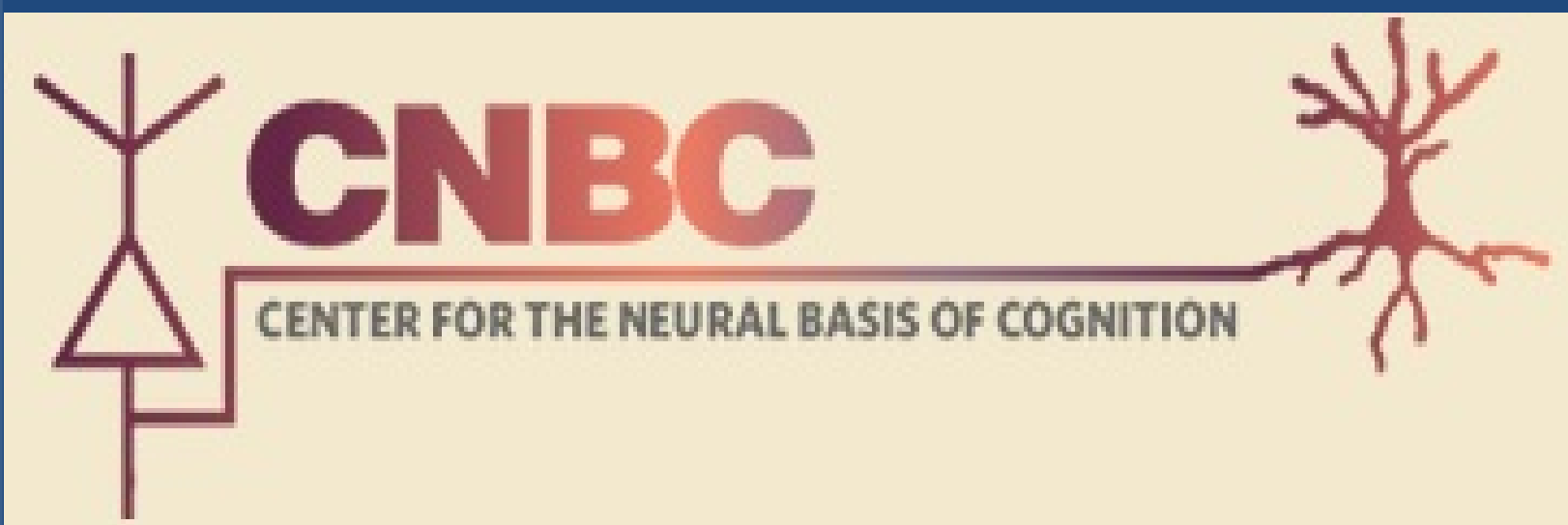# Listening Situation modulates lexical and acoustic context effects in phonetic categorization

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Multiple sources of context are known to influence speech categorization. Typically, context-dependent speech perception is studied by manipulating a single type of context (e.g., acoustic, lexical). In natural speech, multiple sources of information are present.

1. How does the combination of different types of context influence phonetic categorization?
2. Is listeners' reliance on various sources of available context modulated by attention?

The present experiments manipulated
- ACOUSTIC context
- LEXICAL context
- situational context/ attention

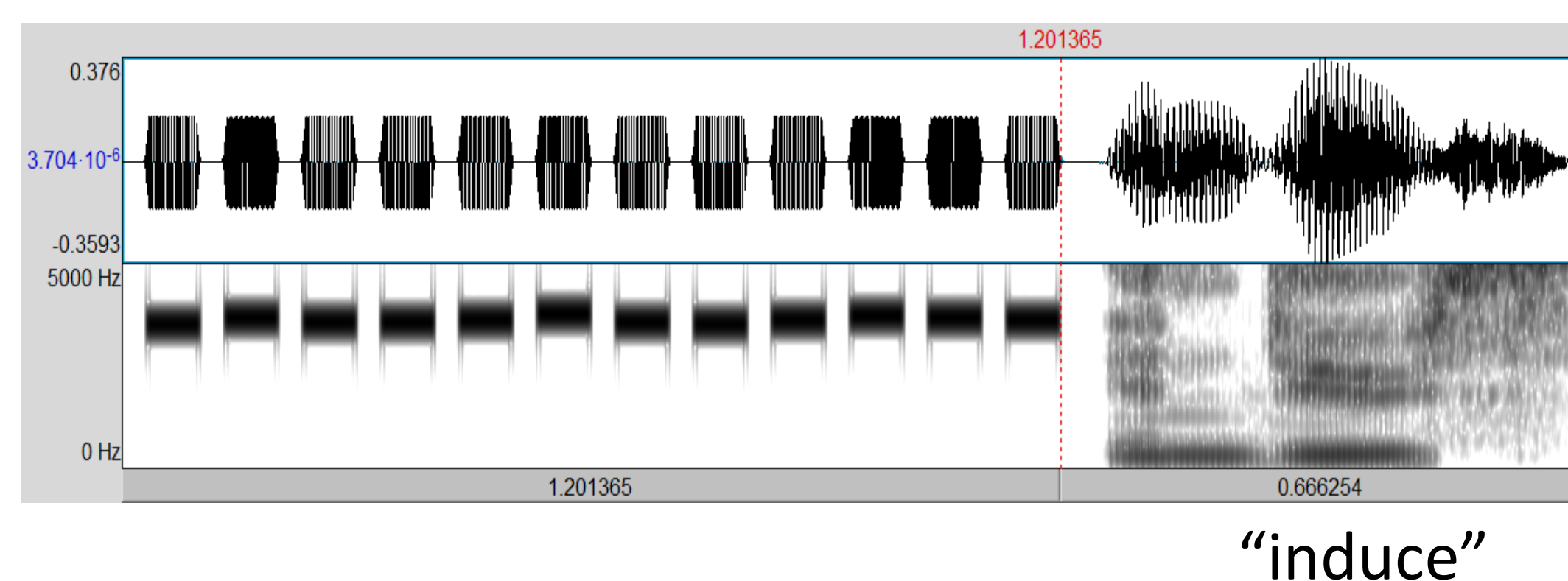## Task: categorization of English /s/ and /ʃ/

Main difference in spectral distribution of energy/ spectral center of gravity; values for male English speaker in this study

/s/ 6222 Hz (sd 222 Hz)
/ʃ/ 3954 Hz (sd 405 Hz)

Fricatives in word-nonword pairs
aboli[ʃ] – aboli[s], indu[s] – indu[ʃ] -> lexical context

Words were preceded by sequences of 12 nonspeech tones with means one standard deviation above the spectral mean for /s/ or below the spectral mean for /ʃ/ -> acoustic context

"induce"

Acoustic context effects

Based on previous research (Holt, 2005), we predicted that the long-term average spectrum of a sequence of 12 nonspeech tones produces a spectrally contrastive influence on /s/- /ʃ/ categorization

high mean -> fricative perceived "lower" -> /ʃ/
low mean -> fricative perceived "higher" -> /s/

Lexical context effects

phoneme categorization in word-nonword continua -> more word responses

aboli[ʃ] – aboli[s] -> more /ʃ/ responses
indu[s] – indu[ʃ] -> more /s/ responses
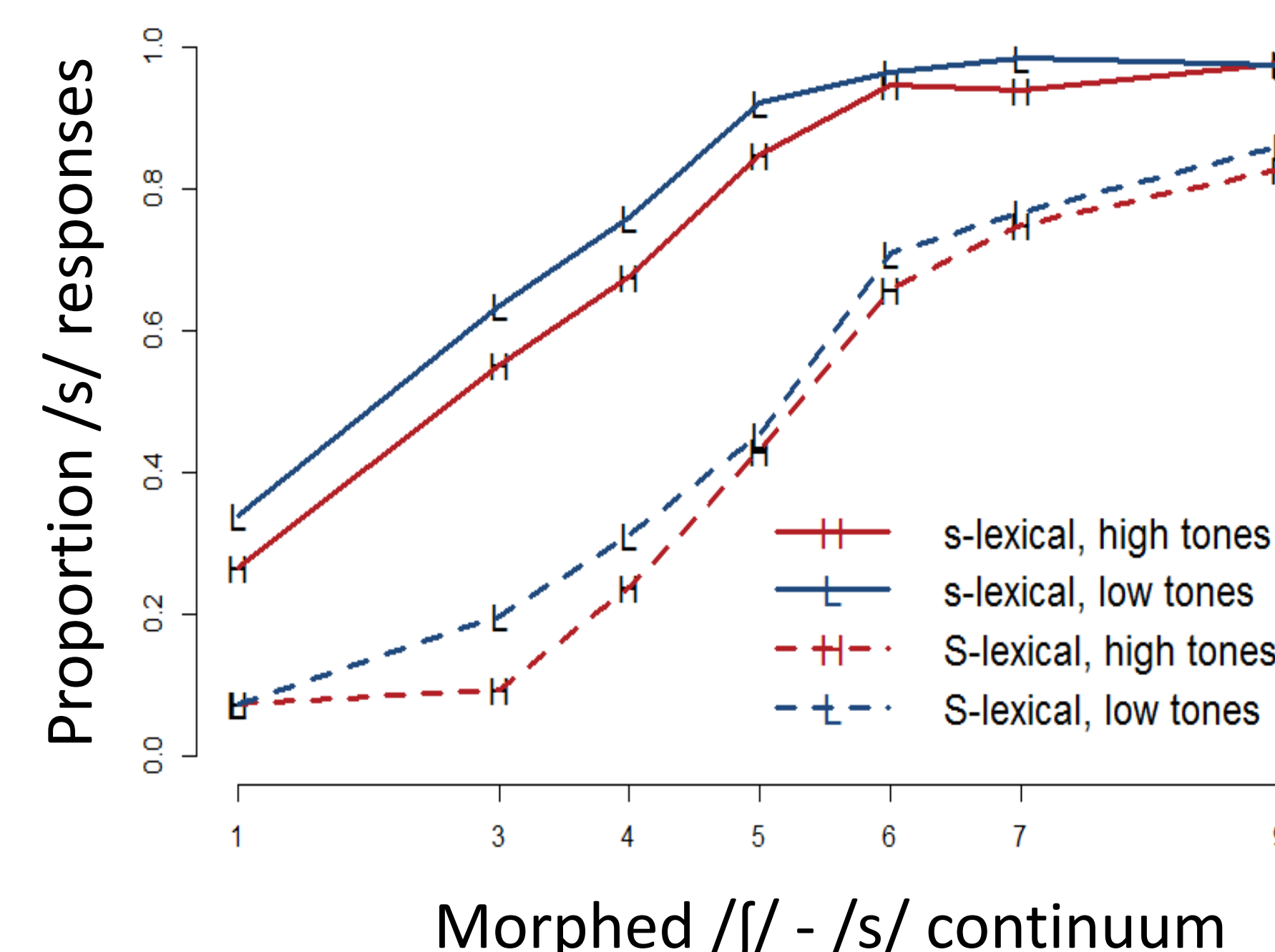
Situational context: attention

Previous research (Mirman et al. 2008) suggests that manipulating the diversity of words in a stimulus set will modulate the impact of lexical context by directing attention to the lexical level of representation.

Number of words -> more words -> stronger effect
Exp. 1: 40 words -> strong lexical effect
Exp. 2: 4 words -> weaker lexical effect

Experiment 1

40 different words (20 /s/, 20 /ʃ/)
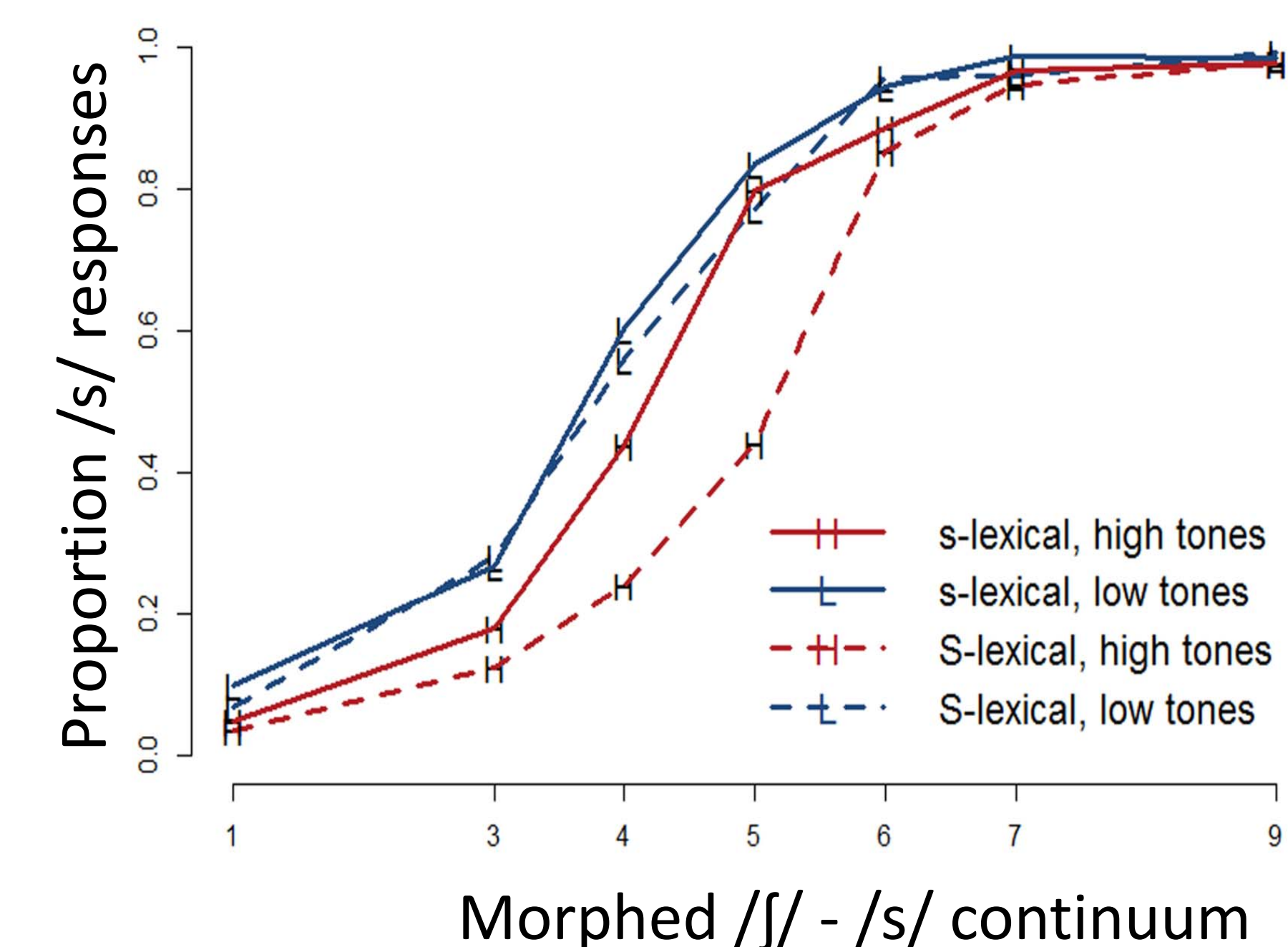highly informative lexical context –> attention on lexical processing

Listeners use lexical and acoustic context
- stronger influence of lexical than acoustic context

Experiment 2

4 different words (2 /s/, 2 /ʃ/): low informative lexical context, many repetitions –> little attention on lexical processing

Listeners use lexical and acoustic context
but interaction of effects
- Acoustic context effect for /s/ and /ʃ/ words
- Effect of lexical context only following the high tone sequence

Listening Situation mainly affects lexical effect.
Acoustic effects are stronger in weaker lexical contexts/ with less attention to lexical context. (although here only for /ʃ/-words –> potential word-specific effect).

Conclusion

Acoustic, lexical, and situational context affect phoneme categorization. Listeners use all information available and weigh cues according to their informativeness in a given listening situation.