

Introduction

How is discrimination influenced by lexical ambiguity and different types of phonetic distance?

- Listeners can be sensitive to distance within phonological categories (Liberman et al. 1957)
- Homophone mates can exhibit phonetic differences (e.g. Gahl 2008, Guion 1995)
- Lexical ambiguity decreases the likelihood of phonologically matching words being identified as the same (Sanker 2019)

This study:

- An AX perception experiment on how sub-phonemic details and lexical contrasts influence discrimination decisions
- *Closely matching vowel duration increases 'same' identifications of phonologically matching pairs, but F0 distance has no effect*
- *No effect of lexical ambiguity on responses overall or interacting with acoustic distance*

Regression model

	Estimate	Std. Error	z value	p value
(Intercept)	2.6	0.239	10.9	< 0.0001 ***
LexicalAmbig Ambiguous	-0.145	0.189	-0.769	0.442
Manipulation Duration	0.686	0.211	3.25	0.00117 **
Distance Further	0.039	0.132	0.296	0.767
ContrastPosition Onset	-0.0558	0.187	-0.298	0.766
NeighborhoodDensity	-0.00825	0.00501	-1.65	0.0997.
LexicalAmbig Ambiguous * Distance Further	0.0863	0.181	0.478	0.633
Manipulation Duration * Distance Further	-0.614	0.175	-3.5	0.000461 ***

Table 1: Mixed effects logistic regression model for accuracy ('same' responses)

Intercept: LexicalAmbig = unambiguous, Manipulation = F0, Distance = close, Contrast Position = coda. Random effects: participant, word

Significant effect of manipulation type: Higher accuracy with duration manipulation

Significant interaction between manipulation type and manipulated distance: Lower accuracy with larger differences, but only in the Duration condition

Marginal effect of neighborhood density: Lower accuracy with higher density (the lexically ambiguous and unambiguous groups were matched to have comparable mean neighborhood density)

No other effects

Methodology

- **Task** Identification of word pairs as 'same' or 'different' (48 native English listeners)
- **Stimuli** (phonologically matching pairs)
 - 128 English words, two speakers
 - The juxtaposed items in each pair differed in speaker, to encourage phonological decisions
 - Two conditions of **lexical ambiguity**:
 - (a) ambiguous (e.g. *made-made*, cf. *maid*)
 - (b) unambiguous (e.g. *cat-cat*)
 - Two conditions of **acoustic manipulations**:
 - (a) F0: half of pairs were manipulated to have equal mean F0 and half differed by 70 Hz
 - (b) vowel duration: half of paired items had equal duration and half differed by 100 ms
- **Fillers** (phonologically distinct pairs)
 - Differing in a single segment: onset contrasts for half of subjects (e.g. *pile-file*), coda contrasts for the others (e.g. *leaf-leave*)

Effects of manipulation type and acoustic distance

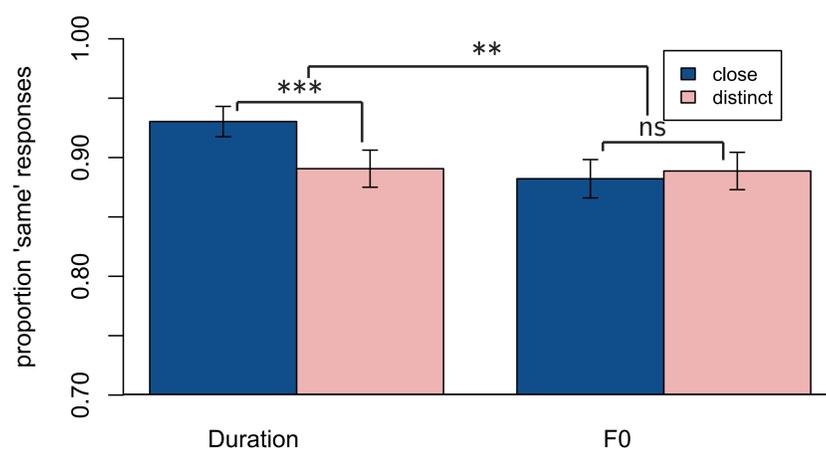


Figure 1: Accuracy, by manipulation type and acoustic distance

Distance in vowel duration influenced listeners' decisions; pairs with distinct vowel durations were more likely to be identified as different (93.0% vs. 89.1%)

The distance in mean F0 had no effect on identifications (88.2% vs 88.9%)

Fewer 'same' responses in the F0 condition than the vowel duration condition (88.5% vs. 91%)

Effects of lexical ambiguity

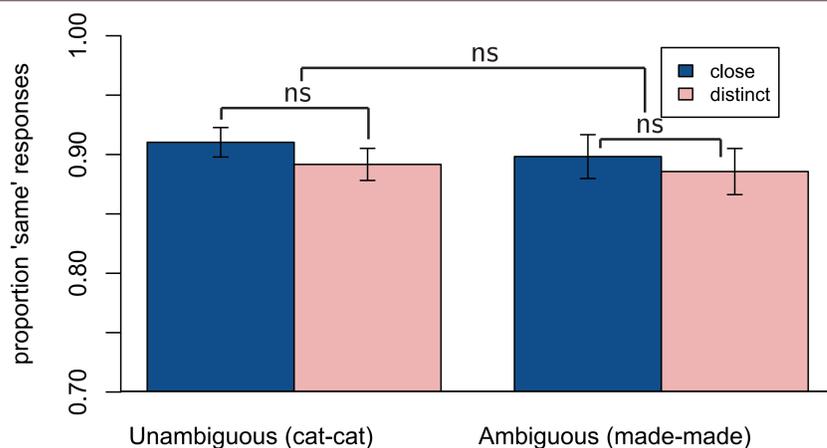


Figure 2: Accuracy, by lexical type and acoustic distance

There was no significant effect of lexical ambiguity, though accuracy was slightly higher for lexically unambiguous items (90.1% vs. 89.2%)

There was no interaction between ambiguity and acoustic distance

Conclusions

Effects of within-category distance

- Sensitivity to within-category acoustic distance is particular to the type of difference
- Only vowel duration influenced responses in this task, though both vowel duration and F0 are components of English contrasts

Effects of lexical ambiguity

- Attention to these details is not mediated by lexical ambiguity and the expectation of contrast
- It is possible, however, that listeners' attention to other details would behave differently
- There was no overall effect of lexical ambiguity on accuracy – effects found in previous work could be due to neighborhood density rather than ambiguity itself

References

- Gahl, S. 2008. Time and thyme are not homophones: The effect of lemma frequency on word durations in spontaneous speech. *Language* 84: 474–498.
- Guion, S. 1995. Word frequency effects among homonyms. *Texas Linguistic Forum* 3: 103–16.
- Liberman, A., Harris, K., Hoffman, H., & Griffith, B. 1957. The discrimination of speech sounds within and across phoneme boundaries. *J Exp Psychol* 54: 358–368.
- Sanker, C. 2019. Effects of lexical ambiguity, frequency, and acoustic details in auditory perception. *Atten Percept Psychophys* 81: 323–343.