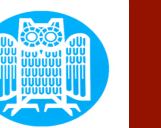


The influence of stimulus preview on phonological competition: Evidence from synonyms

Alissa Melinger¹ & Andrea Weber²

¹University of Dundee, ²Saarland University
a.melinger@dundee.ac.uk



Introduction

In the visual-world paradigm, participants are commonly presented with the stimulus pictures and their intended names during a preview session. What are the implications of presenting picture names to listeners, given that many objects have several possible names (e.g., *sofa/couch* or even *tulip/flower*)?

Spoken word recognition processes are driven by the acoustic input. Candidates that match the input compete for recognition. Does pre-exposure to one potential picture name facilitate and/or inhibit the activation of other potential names? The influence of 'expectation' on word recognition has been widely studied, but usually within the context of a sentence, which complicates isolating effect loci (e.g., Dahan & Tanenhaus, 2004). Feed-forward models of spoken word recognition (e.g., Norris, 1994) would not predict 'expectations' to influence early recognition processes.

Questions

Does pre-exposure to one possible object name inhibit alternative object names? Or are spoken word recognition processes insulated from listeners' 'expectations'.

Predictions

If pre-exposure to object names influences eye-movement behavior in the test phase, competition effects should be modulated by the preview type.

If pre-exposure to one object name inhibits accessibility of alternative object names, competition effects should be reduced when the target is a phonological neighbor of the alternative, non-previewed, name.

Method

- 20 German object pictures with two synonymous names were selected as competitors (e.g., *Akkordeon/Ziehharmonika* 'accordion'). Competitors were paired with targets whose names overlapped phonemically in onset either with the subordinate competitor name (e.g., target *Zielscheibe* /tsi:l.ʃe:ibə/ 'dartboard', Exp 1 & 2) or the dominant picture name (e.g., target *Akrobat* /ak:ʁoβat/ 'acrobat', Exp 3).
- Target-competitor pairs were displayed together with two phonemically unrelated distractors (e.g., *Birne* /bɪ:vn̩/ 'pear' and *Kirche* /kɪ:çə/ 'church'). See Figure 1
- 40 fillers trials with no phonemic overlap between object names were added.
- Spoken instructions told participants to click on the targets ("Klicke auf ...").
- 32 native speakers of German participated in each experiment.
- Trials were divided between two blocks. Each block was preceded by a preview session. We compared the influence of the following preview conditions:
 - **Experiment 1:** One block previewed pictures with their subordinate names; another block had no preview.
 - **Experiments 2 & 3:** One block previewed pictures with their subordinate names; another block previewed the pictures without name information.

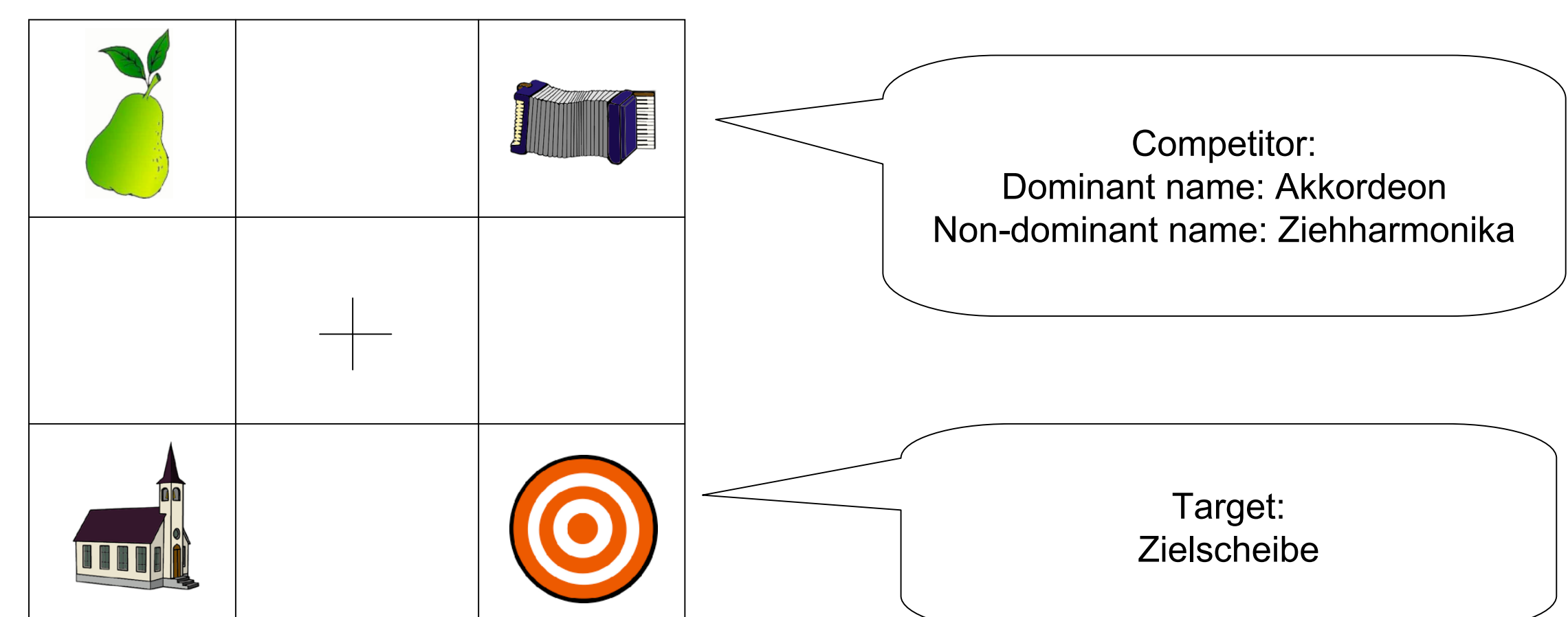


Figure 1: Example display with pictures.

Results

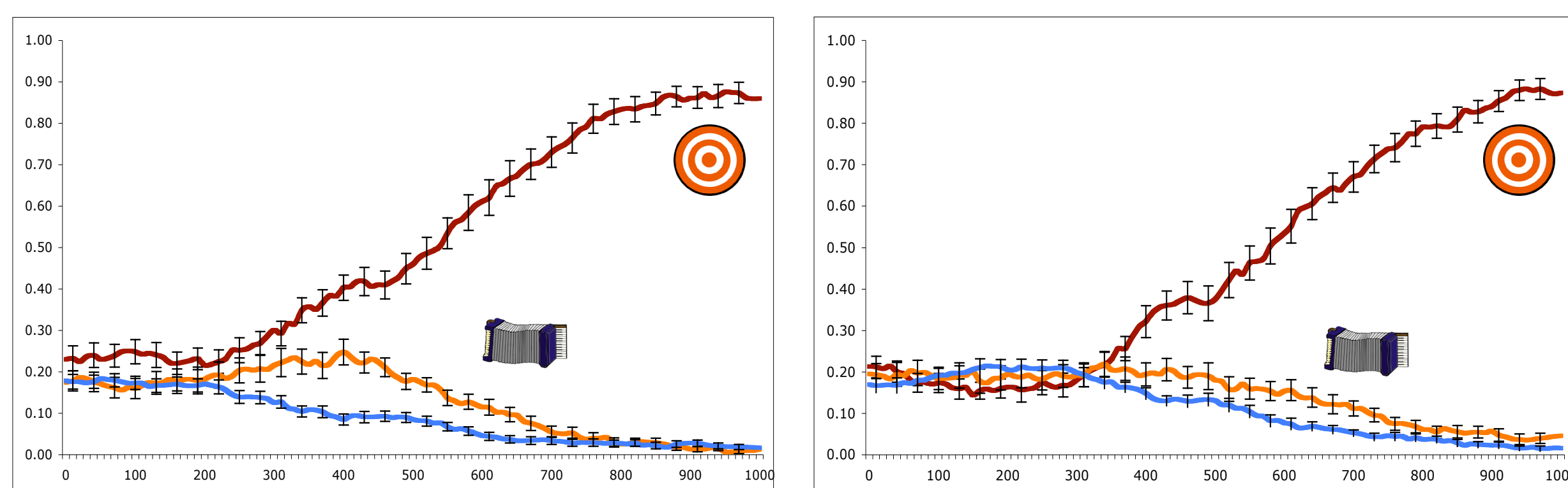


Figure 2, Experiment 1: Left panel - subordinate name preview. Right panel - no preview.

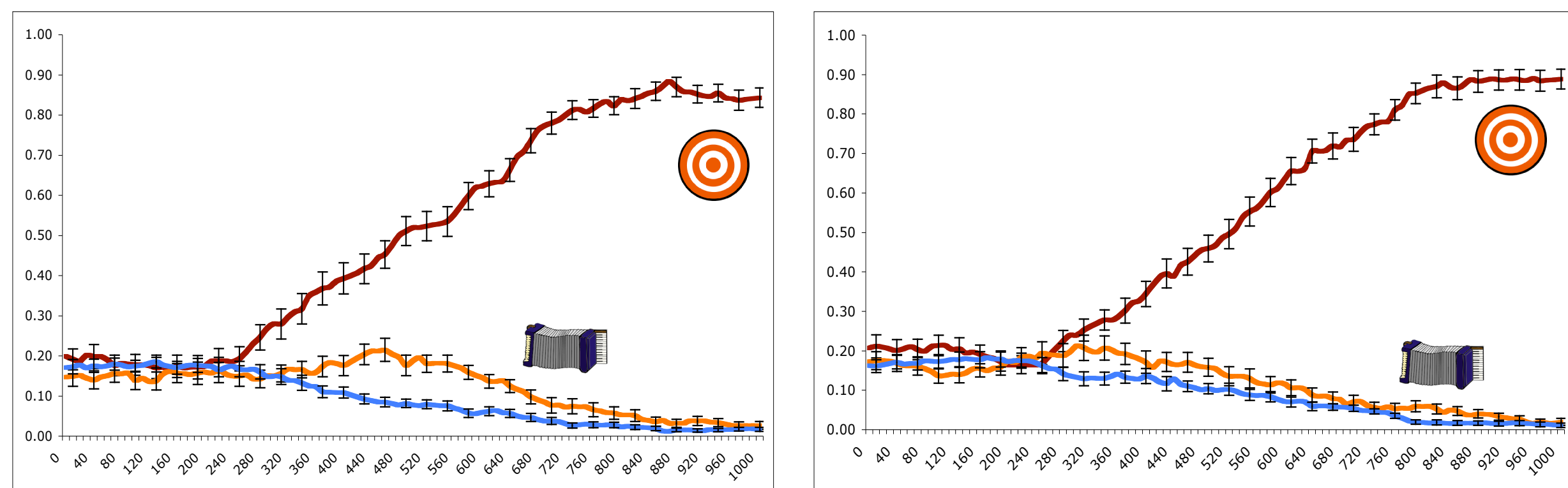


Figure 3, Experiment 2: Left panel - subordinate name preview. Right panel - picture only preview.

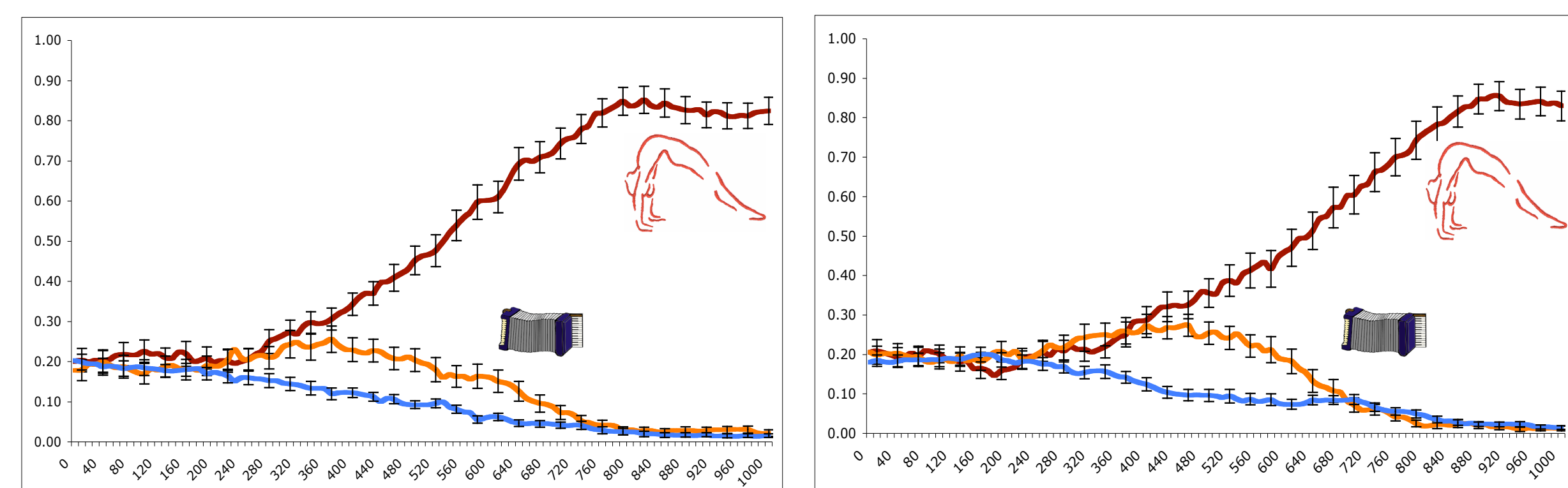


Figure 4, Experiment 3: Left panel - subordinate name preview. Right panel - picture only preview.

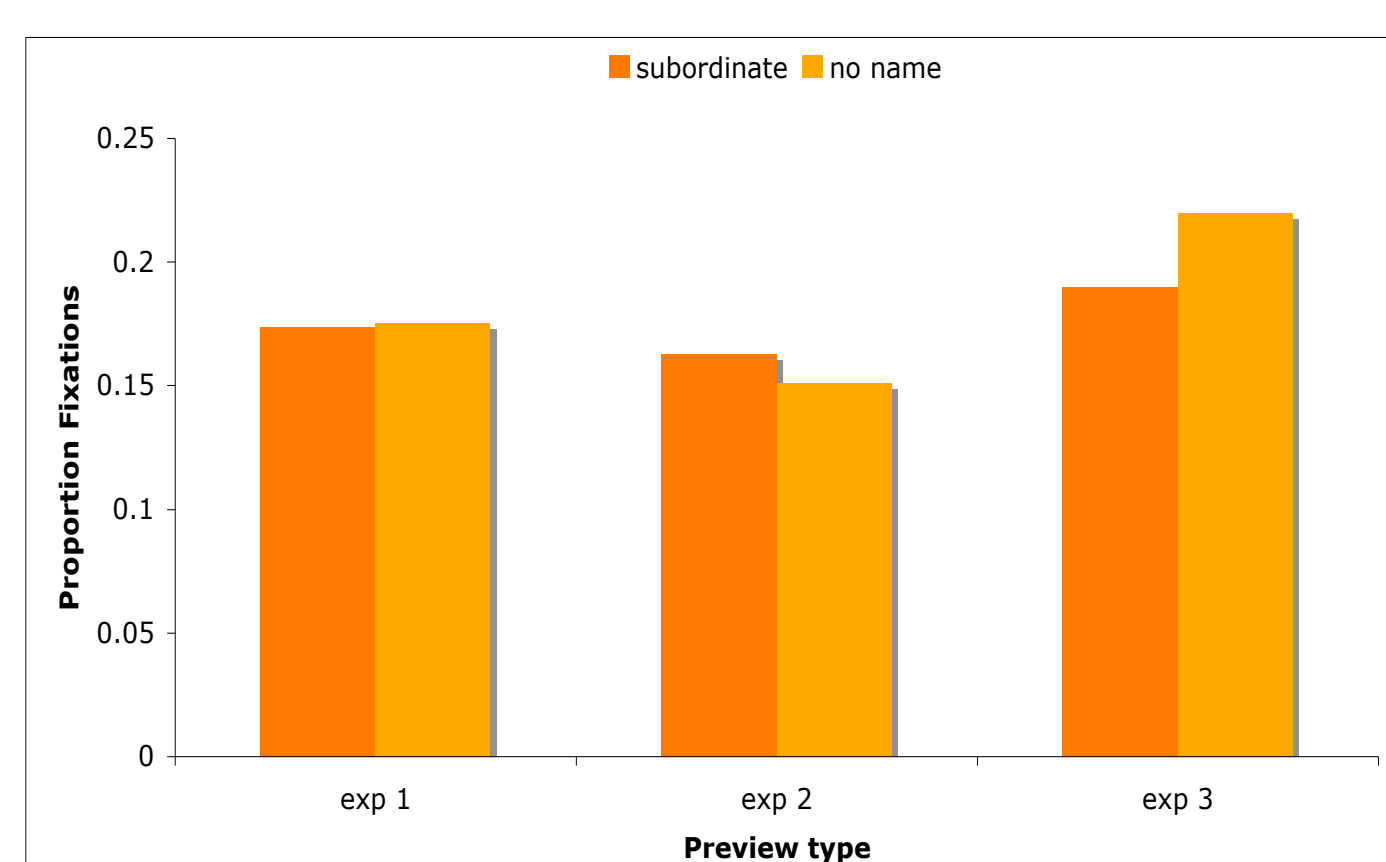


Figure 5: Proportion fixations to the competitors in both preview conditions across the three experiments

Statistical Analyses

- For the time region 0-250 ms after target onset, before eye-movements can be driven by the acoustic target input, the proportion of fixations to competitor and distractor objects did not differ in any of the experiments, (all t 's < 1.1). See Figures 2-4
- For the time region 250-700, we conducted a two factor Anova with preview type and picture type as factors. In all three experiments we found a main effect of picture type (F 's > 14, all p 's < .001), but no interaction with preview (Exp 1: $F_1(1, 31) = 2.5, p > .1$; $F_2(1, 19) = 3.5, p = .078$, Exps 2 & 3: all F 's < 1); participants consistently looked to the competitor objects more than to the distractor objects.
- Planned comparisons revealed that participants looked to the competitor object more than to distractor objects in all preview conditions, although effect sizes differed.
 - **Exp 1:** subordinate name preview: $t_1 = 5.9, p < .001$; $t_2 = 3.9, p < .001$ ($h^1_p = .53$)
no picture preview: $t_1 = 2.0, p = .054$; $t_2 = 1.9, p = .071$ ($h^1_p = .11$)
 - **Exp 2:** subordinate name preview: $t_1 = 3.4, p < .002$; $t_2 = 3.5, p < .002$ ($h^1_p = .27$)
picture only: $t_1 = 2.2, p < .05$; $t_2 = 2.9, p < .01$ ($h^1_p = .13$)
 - **Exp 3:** subordinate name preview: $t_1 = 4.0, p < .001$; $t_2 = 3.3, p < .004$ ($h^1_p = .34$)
picture only: $t_1 = 5.1, p < .001$; $t_2 = 4.3, p < .001$ ($h^1_p = .46$)
- Direct comparisons of the proportion of fixations to competitors in the different preview conditions within an experiment revealed no differences (Exps 1-3: all t 's < 1). See Figure 5
- Comparing fixations to the competitors across experiments but for the same preview type showed more fixations to the competitor when the target is a phonological neighbor of the dominant meaning only when no preview was provided, suggesting that the prior presentation of the subordinate name weakly inhibits the dominant name.
 - Preview of subordinate name in Exp 2 vs 3: $t_1 = 1.0, p > 1$; $t_2 < 1$
 - No preview of name in Exp 2 vs 3: $t_1 = 2.5, p < .02$; $t_2 = 3.5, p < .002$

Discussion

- In all experiments, participants looked at the competitor objects more than at the distractor objects. This behavior was mostly unaffected by the preview manipulation, suggesting that early word recognition processes are largely insulated from preview biasing effect.
- In Experiments 1 and 2, the preview session exposed listeners to the subordinate name of the competitor objects. In the testing phase, we found that the subordinate name was numerically more available after name preview compared to no name preview, but not statistically more available. This numerical boost could just be a weak priming effect. To evaluate whether the dominant name was inhibited, we conducted Experiment 3, in which the target was a phonological neighbor of the dominant name rather than the previewed subordinate name. Here, we find a reversed numerical effect of preview type; preview reduced the competition effect, supporting moderate inhibition.
- The lack of an interaction suggests that preview does not affect competition effects; however the effect sizes imply they might. When the target was a phonological neighbor of the subordinate name, the effect size was larger than without name preview (Exps 1 & 2). In contrast, in Experiment 3, when the target was a phonological neighbor of the dominant name, subordinate name preview reduced the effect size relative to no name preview.
- The results suggest that competition effects are largely unaffected by whether the experimenter introduces the materials with the intended name or not; alternative names are still considered during testing. However, the magnitude of the effects could be influenced. The results from Experiment 3 suggest that the previewed name weakly inhibits alternative names, potentially making a subordinate name more available.