Experiment 3b (replication)

This is a replication of Experiment 3 of Pitt and Samuel (2005) without catch trials.

Method

The stimuli were the monosyllables from Experiment 1 and the trisyllables from Experiment 2. The former were chosen to test whether monosyllables could generate more activation than that already found. The time-compressed trisyllables were chosen because they exhibited reduced activation in the early RT bins. We wanted to assess whether a change in instruction would make these weaker lexical effects rebound to the level obtained with the uncompressed stimuli.

Procedure. The testing setup was similar to that of Experiment 1. Listeners sat in front of a computer monitor and used two keys on a computer keyboard (z, /) to categorize the final fricative. Presentation software (http://nbs.neuro-bs.com/) controlled stimulus delivery and response collection. Instructions from Experiment 1 were augmented with information about feedback on response speed. After each block of 32 trials, one of three phrases appeared on the computer screen, “too fast”, “good pace”, and “faster.” Participants were instructed to adjust their response speed if the feedback was not “good pace.”

After a few rounds of pilot testing, “good pace” was defined as a 400 ms window that began a few hundred milliseconds after fricative offset. Durational differences between monosyllables and trisyllables were too great to use the same window for both word lengths. Word length was therefore split between groups of participants. For monosyllables, the lower and upper boundaries of the window were 900 and 1300 ms

measured from word onset, respectively. For the trisyllables, the values were 1050 and 1450 ms. After every 32 trials, mean RT was calculated and the appropriate feedback given.As in Experiment 1, each step on each continuum was presented 20 times. With word length now between participants, there were only half as many trials in the experiment (8 steps x 20 observations x 8 continua = 1280). Stimuli were presented in 20 passes through the 64 randomized trials defined by the crossing of 8 steps and 8 test continua. Testing was completed in one session, with rest breaks after every 33% of the trials. There were 20 practice trials followed by a 50-trial warm-up block to allow RTs to stabilize prior to calculating the first mean RT. The first test block followed immediately.

Participants. Listeners were 24 undergraduates enrolled in Introductory psychology at Ohio State University. None reported any hearing or language difficulties.

Results and Discussion

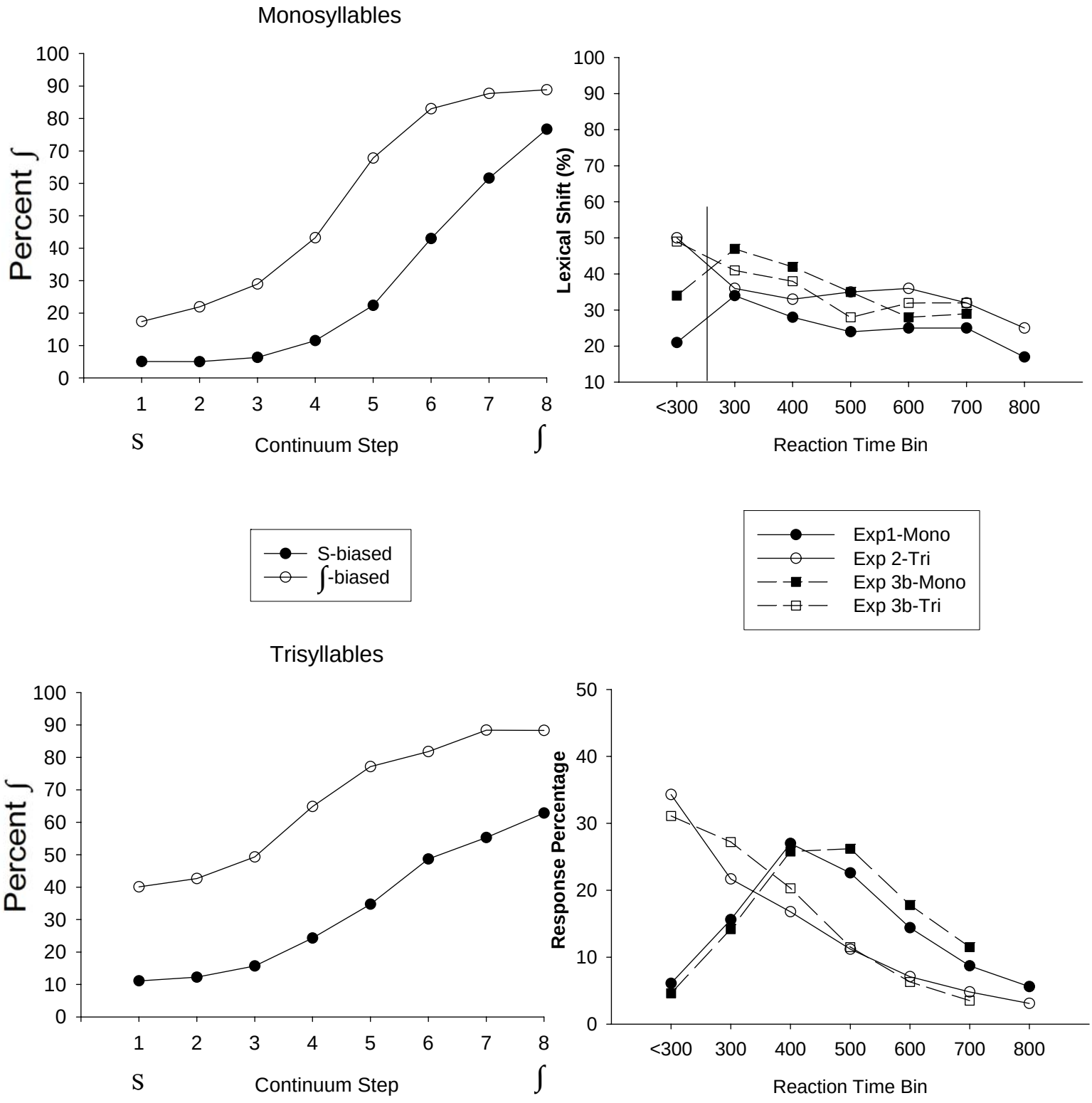
The left side of Figure 1 shows the overall labeling functions for the monosyllables (top) and the trisyllables (bottom). The right side of the figure shows the data using the response-partitioning technique. For the latter, the corresponding functions from Experiment 1 (for monosyllables) and Experiment 2 (for trisyllables) are shown for comparison. Looking at the overall shifts, the changes in the experimental procedure had the intended effect of increasing the size of the lexical shift, but only for the monosyllables. The size of the shift obtained with trisyllables barely budged, which resulted in the word-length effect disappearing. Monosyllables yielded a shift of 35%, $t(23)=14.74$, and trisyllables a shift of 37%, $t(23)=6.42$. The 2% differences between them was not reliable ($F<1$). The impact of the change in instruction can be assessed by comparing shifts across experiments. The monosyllabic shift was 9% larger than that

found with the identical stimuli in Experiment 1, F(1,50)=6.85. The 2% difference between the trisyllabic shifts of Experiments 2 and 3b was not statistically significant (F<1) [4]. One interpretation of the different impact of the instructional procedure is that the longer words were already engaging the listeners most of the time, whereas the monosyllables had done so much less in the previous experiments. Examination of the partitioned data on the right side of Figure 1 provides a finer-grained picture of the effects of the response deadline (note that because participants were responsive to the imposed RT window, they produced too few responses greater than 800 ms to warrant plotting points in the 800 ms bin). As Figure 1 shows, the deadline procedure had a dramatic effect on the results for the monosyllables: The drop in shift size across bins is as steep for the monosyllables as it is for trisyllables, in fact even more so. For the monosyllables, shift size drops 18%, from 47% to 29%, from the 300 to 700 ms bin, F(4,92)=7.37. The drop for the trisyllables was only 8%, from 41% to 32%, and was not reliable, F(4,92)=1.06, p=.38. However, word length and RT bin did not interact. In a two-way ANOVA comparing them, only the main effect of reaction time bin was reliable, F(4,92)=4.49.

Looking at shifts across experiments, for the monosyllables (filled symbols), shifts from bin 300 through 500 were substantially larger in Experiment 3b than in Experiment 1. Only at the 600 ms bin do they converge. This interaction was reliable, F(5,250)=3.29. The main effects of experiment and RT bin were also significant, F(1,50)=3.74 and F(5,250)=16.47, respectively. In contrast, the two trisyllabic functions (open symbols) are intertwined across all partitions, yielding only a main effect of RT bin, F(5,250)=2.94, p<.02.

The RT distributions are in the lower right panel. Note that the distributions for the monosyllables are quite similar for Experiment 1 and Experiment 3b. This finding is rather surprising, as it shows that the larger lexical shifts found with the monosyllables in the current experiment were not due to a change in participant response speed. Rather, shifts increased in size because participants were more likely to base their responses on the developing lexical representations under the conditions of Experiment 3b. Lexical influences in phoneme classification appear to be highly malleable when responding to monosyllables, so much so that shift size can approach that of trisyllables.

Pitt, M.A., & Samuel, A.G. (2005). Word Length and Lexical Activation: Longer is Better. Submitted to HPP:JEP.


Monosyllables
Percent ∫
Continuum Step
S
∫
S-biased
∫-biased
Lexical Shift (%)
Reaction Time Bin
<300
Exp1-Mono
Exp 2-Tri
Exp 3b-Mono
Exp 3b-Tri
Trisyllables
Response Percentage