Categorical Perception and Expertise: How Experience Changes Face Perception

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Introduction

The role of learning in the formation of category structure has been implicated in several recent studies using face stimuli varying along high-level 'morph' continua (Beale, 1996; Beale & Keil, 1995a, 1995b; Levin & Beale, in preparation), but the role of learning has not yet been explored directly. Beale and Keil (1995a) reported a strong interaction between the level of familiarity of individual face stimuli and the magnitude of the categorical perception (CP) effect, however familiarity varied as the result of prior levels of exposure to these faces. The present study extends these findings by examining the effects of training on CP phenomena for previously unfamiliar faces (see Beale, 1996).

Method

Thirty Eight Cornell University summer session students participated, divided equally among two experimental conditions. Stimuli consisted of two low-familiarity face continua, Burns/Harris (B/H) and Tubb/Atkins (T/A), used by Beale and Keil (1995a).

In each of two experimental conditions, 19 subjects were initially presented with a training session in which they were familiarized with the end-point faces from one of the two face continua. On each trial during training, one of the two end-point faces appeared in one of nine randomly chosen locations on the computer screen. Stimuli were presented in 11 blocks of 18 trials with both faces randomly appearing in each of the nine locations; each face was thus presented 99 times for a total of 198 trials. Subjects responded to each face by pressing the corresponding key on the keyboard ('1' or '2'). A brief tone sounded each time an incorrect response was given.

After completing the training sessions, all 38 subjects were presented with a 'better-likeness' (B-L) task containing face-pairs from both continua randomly intermixed. On each trial of the B-L task, subjects judged which of two stimuli was more like a particular person. Accurate discrimination is thus correctly judging which of the two images is closer to a particular end of the continuum. The B-L task was then followed by two categorization tasks, one for each continuum.

Results

Between subject averages were computed for each image in the categorization tasks; clear categorical shifts were evident. The 33% and 66% cut-offs for the categorical boundary were used to predict performance in the B-L task. Peaks in accuracy were predicted for the two-step pairs in the B-L task that straddled the category boundaries. Accuracy scores were computed and averaged between subjects for both the untrained and trained conditions. Planned comparisons were performed on the accuracy scores of the pairs that crossed the boundary to determine if they differed from the within-category pairs. As predicted the contrasts were not significant for the untrained continua. For the trained continua, the contrast was significant for B/H, but not the T/A continuum.

Discussion

These results demonstrate that CP effects can be acquired through experimental training procedures, as evidenced by the peak in accuracy for the B/H continuum only in the training condition. However, it is unclear why positive training effects were found in only one of the two training conditions. Pre-existing differences in the distinctiveness of the faces might contribute to the difference between the two training conditions; this and other interpretations will be presented, along with additional data from ongoing studies. The broader implications of these findings will also be discussed.

References

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