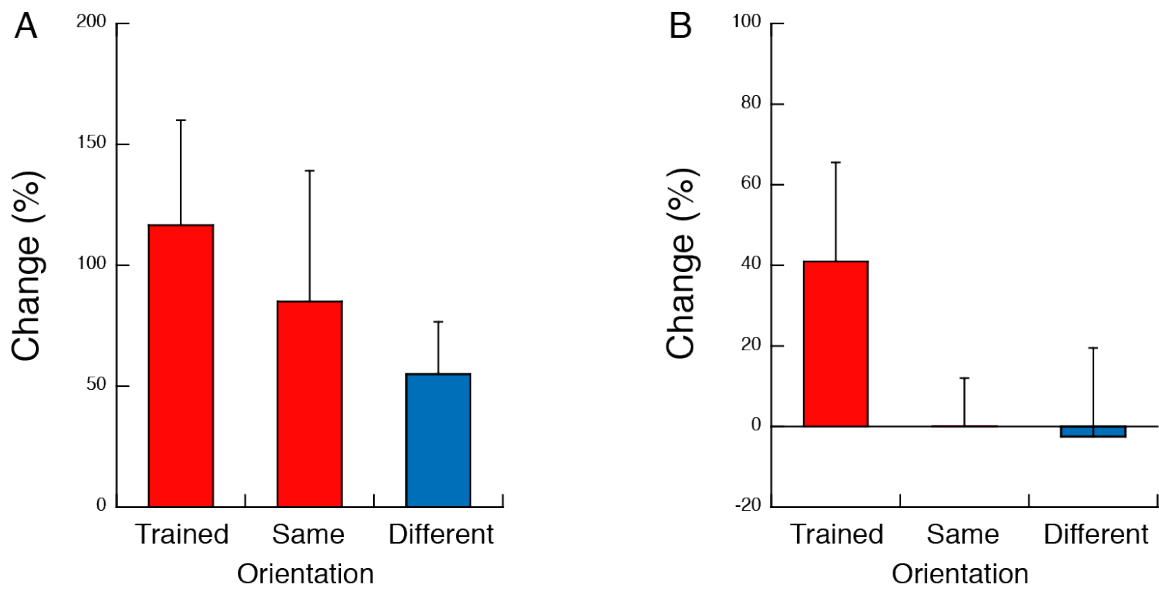
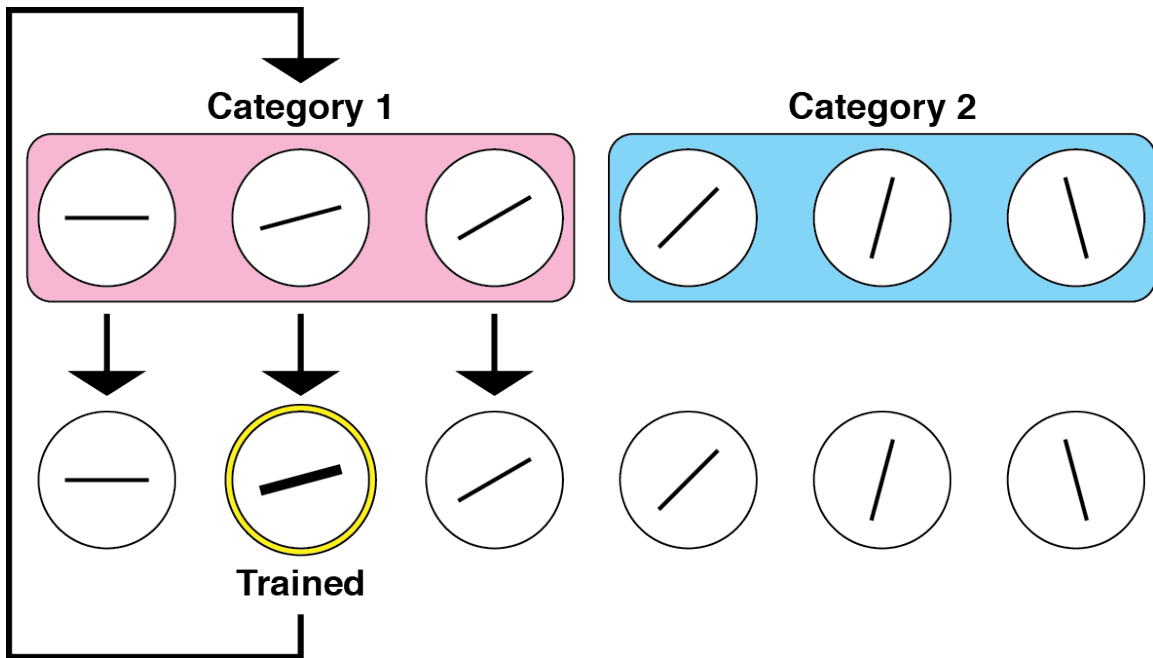


**Figure S1: Results of Control Exps. 1 and 2 and category learning of Exp 1. Related to Figures 1 and 2. A.** Control Exp. 1 without category learning. The mean ( $\pm$ SEM) improvement in correct percentage is shown as a function of the orientation. Performance improvement was obtained only in the trained orientation (one sample t-

test against 0; trained orientation,  $t(8)=2.528$ ,  $p=0.018$ ; same-category orientation,  $t(8)=0.028$ ,  $p=0.489$ , different-category orientation,  $t(8)=0.559$ ,  $p=0.296$ , one tailed, based on the hypothesis). **B.** Control Exp. 2 in which training and tests were conducted with a 2 interval forced choice (IFC) detection task. The mean ( $\pm$ SEM) threshold improvement % is shown as a function of the orientation. The same tendency as in Experiment 1 was obtained. Pairwise t-tests showed there is a significant difference between the same and different-category orientations ( $t(5)=2.568$ ,  $p=0.025$ , one-tailed,  $d=1.048$ ), the same- and different-category orientations ( $t(5)=2.601$ ,  $p=0.024$ , one-tailed,  $d=1.062$ ). However, there was no significant difference between the trained and same-category orientations ( $t(5)=0.654$ ,  $p=0.271$ , one-tailed). These results suggest that CIT also occurs due to training on a 2IFC detection task. This suggests that the results of Experiment 1 are generalizable between different detection tasks. **C.** The mean ( $\pm$ SEM) category learning performance for the last 5 trials for each of 12 orientations. The abutted vertical lines represent the orientations of the category boundaries. The mean performances for the trained orientation, untrained orientation with the same category and untrained orientation with the different category were at or close to 100%. The mean performances of the orientations closest to the category boundaries were lower than the other orientations.



**Figure S2. Supplemental results of Exp. 2. Related to Figure 3.** The mean ( $\pm$ SEM) improvement in  $d'$  in the same location condition in **A** and in the different location condition in **B**.



**Figure S3. A model of interactions between the category and feature stages. Related to Figure 3.** In this model, there are category units at a higher-level stage than feature (orientation) units at a lower-level stage. While one orientation is being trained, the unit of the trained orientation gives bottom-up signal to the category unit which includes the trained orientation. The category unit, in turn, provides top-down signals to all of the orientation units which belong to the category.