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# Now You See It, Now You Don't: Can People Mentally Impose Spatial Category Boundaries?

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## Introduction

Several accounts of spatial memory biases propose that people "mentally impose" spatial category boundaries (e.g., Huttenlocher, Hedges, & Duncan, 1991). However, in most tasks that have reported categorical biases, adults have used boundaries aligned with either visible lines or axes of symmetry. This raises a fundamental question: can people mentally impose a category boundary in the absence of perceptual structure supporting such a division? In our previous research, we have demonstrated that category boundaries can be created and destroyed in a spatial memory task by changing the perceptual cues available in the task space (Simmering & Spencer, 2004). Thus, in the present study, we added or deleted perceptual structure to see if people could maintain a categorical division in the absence of relevant perceptual information.

## Method & Results

One behavioral signature of using a category boundary in spatial recall is drift away from the boundary over delay (e.g., Spencer & Hund, 2002). In the current experiments, we used direction of drift as an indication of whether participants were using the category boundary. In Experiment 1, the presence of perceptual support for the boundary alternated across blocks. Participants' responses showed drift away from the category boundary only when the perceptual support was provided. Figure 1 shows the switch in drift direction based on the presence of perceptual structure (negative values indicate drift away from the boundary). In both conditions (solid and dashed lines), performance depended on the available perceptual structure. This suggests that people need perceptual support to impose a category boundary.

In Experiment 2, the presence of perceptual support varied randomly across trials. Although imposing the category boundary should have been simpler in the experiment, participants were still unable to impose the reference without perceptual support (see dotted line in Figure 1). This provides further evidence that people need perceptual support to impose a category boundary.

Further analysis of the effects in Experiment 2 suggested that the order of trials may influence participants' ability to mentally impose the spatial category boundary. That is, whether support for the boundary was present on the just-previous trial seemed to influence performance, but the number of trials available for this analysis was too small to determine the reliability of this effect. Experiment 3 was

designed to test this more directly by providing the most supportive conditions for mentally imposing the category boundary. In this experiment, we designed mini-blocks of trials in which a trial with no perceptual support followed sets of 1 or 3 trials with perceptual support. In the mini-blocks with 3 trials, the memory for the category should be strongest, and therefore easiest to impose on the following trial. Data collection for this experiment is in progress.

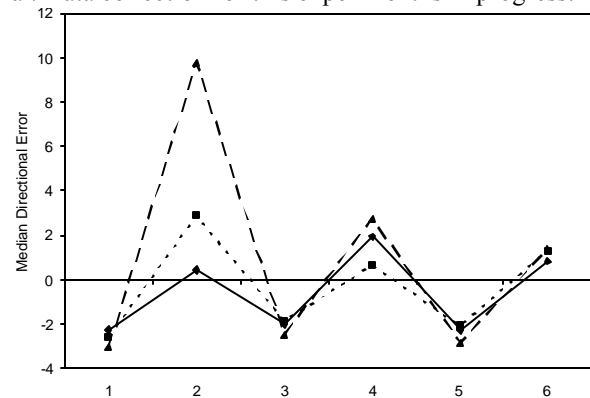


Figure 1: Directional error across blocks for Experiments 1 (solid and dashed lines) and 2 (dotted line).

## Conclusion

This series of experiments suggests that adults are unable to mentally impose a category boundary without perceptual support. Even when a category boundary has been used on previous trials, when perceptual support is removed, adults' performance indicates a failure to impose the boundary.

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