Temporal tuning characteristics of perceptual templates

*Simon Jeon*[1], *Zhong-Lin Lu*[1], *Barbara Anne Dosher*[2]. [1]*Laboratory of Brain Processes (LOBES), Univ. of Southern Calif., Los Angeles, CA 90089;* [2]*Memory, Attention and Perception (MAP) Laboratory, Univ. of Calif., Irvine, CA 92697.*

External noise presented in temporal contiguity with a target impairs perceptual performance, reflecting the temporal tuning of the perceptual template. Deriving the temporal weights of the perceptual template, however, requires an observer model that segregates the impact of non-linearities and intrinsic inefficiencies of the observer in order to account for the impact of external noise in various temporal configurations. We showed that the perceptual template model successfully accounts for temporal masking functions measured with a wide range of temporal configurations of external noise, and estimates the temporal characteristics of the perceptual template. This was first demonstrated in estimating the temporal tuning characteristics of the perceptual template in a foveal Gabor orientation identification task. The same procedure was then used to compare the temporal tuning characteristics of the perceptual template in pre- and simultaneous cuing of spatial attention in a peripheral Gabor orientation identification task. In both experiments, four non-overlapping temporal regions of external noise, each occurring at different temporal intervals from the target display, were combined in 10 different temporal configurations. Psychometric functions were measured in the 10 external noise temporal configurations along with a zero noise condition. The PTM model provides a full account of all the psychometric functions. The estimated full width of the perceptual template at half-height is about 80 ms in experiment 1, 67 ms in the pre-cuing condition and about 90 ms in the simultaneous cuing condition in experiment 2. Manipulations of the temporal configurations of the external noise coupled with the PTM thus provide a method to characterize the temporal tuning properties of perceptual templates with an intrinsically coherent structure.