Exploring the Behavioral Differences between Serial Dependence and Prior-Dependent Biases in Human and Monkey Observers

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The perception of visual features such as orientation, numerosity, and color is inherently biased towards inputs that were recently processed. However, perception is not solely dependent on immediate past experiences. Through exposure to environmental statistics over time, the brain builds a prior representation of the probability distribution of stimulus features. This prior knowledge is then used to guide perceptual inference. In this project, our goal is to investigate whether trial-to-trial (i.e., serial dependence), and prior-related biases can be behaviorally distinguished or if they produce analogous perceptual effects. To address this question, we tested twenty human and four monkey observers in a working memory visuospatial delayed-response task, manipulating the probability of appearance of the cue stimulus in different locations. Our results were consistent across both species and showed that serial-dependent biases were predominantly attractive, while prior-dependent biases exhibited a repulsion away from the mean of priors. These findings suggest that prior-related biases may be behaviorally distinguishable and highlight the complex interplay between past experiences and prior knowledge in shaping perceptual inference. Further investigation is needed to fully understand the nature of the prior-dependent repulsion bias.