A Zero Parameter Quantitative Prediction from the V1 Saliency Hypothesis and Its Experimental Test

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It has been proposed that the primary visual cortex creates a bottom-up saliency map (Li 2002), such that the saliency of any location is signaled by the highest V1 neural response to this location in a given scene. This hypothesis has had a few non-trivial qualitative predictions which have been subsequently confirmed experimentally. Here I will present a quantitative prediction which is derived without any free parameters. The prediction is on the probability distribution of the reaction times in a visual search task for a target bar unique in color, orientation, and motion direction among background bars which are identical to each other in color, orientation, and motion direction. According to the V1 Saliency Hypothesis, the distribution of these reaction times for a given observer can be derived from the distributions of reaction times in searching for other targets which are unique only in one or two of these visual features by the same observer. We will show that this prediction agrees quantitatively with experimental observations.