MULTIPLE SPOTLIGHTS OF ATTENTIONAL SELECTION IN HUMAN VISUAL CORTEX

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BACKGROUND: Selective attention enhances sensory processing, however the mechanisms of selection are not well understood. The Spotlight Theory proposes that spatial attention facilitates performance in a single contiguous region of space (Posner & Snyder, 1980). But what happens when we attend to multiple objects? Competing theories propose that attention 1) rapidly switches between objects; 2) expands to encompass the objects and intervening space; or 3) splits into multiple, distinct spotlights. **METHODS:** Human subjects covertly monitored either 1 or 2 of 5 simultaneously presented Rapid Serial Visual Presentation (RSVP) letter/digit streams. The Attend 2 condition required simultaneous attention to two distinct locations separated by a distractor stream. Psychophysical performance and functional MRI activation (at 3 Tesla) were compared for the Attend 1 and Attend 2 tasks. **RESULTS:** Psychophysical performance differences between Attend 1 and Attend 2 were independent of RSVP stream speed; thus performance was incompatible with the moving spotlight hypothesis. To distinguish between the single and multiple spotlight hypotheses, two sets of functional MRI experiments were performed using full-field and hemifield target layouts. Both experiments revealed multiple, distinct regions of increased activation in the visual cortical retinotopic representations of the two attended locations; intervening regions were largely spared. **CONCLUSIONS:** Our results indicate that attentional selection is not strictly a serial process and that multiple, distinct spatial regions may be selected simultaneously.

Citation:
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