

FUNCTIONAL MRI INVESTIGATION OF MULTIPLE FOCI OF VISUAL SPATIAL ATTENTION: MORE THAN ONE SPOTLIGHT?

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BACKGROUND: Visual spatial attention is commonly viewed as a "spotlight" that enhances processing within a unitary, contiguous spatial window (Posner & Snyder, 1980). Recent fMRI studies revealed a physiological correlate of the "attentional spotlight" as retinotopically-specific visual cortical modulation. What happens when you attend to more than one location? Spotlight theory predicts that attention will modulate the attended locations and intermediate regions. Other evidence suggests more complex spatial windows of attention (e.g. Pylyshyn & Storm, 1988) Here, we investigated visual cortical modulation patterns produced when subjects simultaneously attended to two objects. **METHODS:** Subjects viewed displays consisting of rapid serial visual presentation (RSVP) at five locations (fovea, 4 quadrants). Two diagonally-opposing quadrant streams were simultaneously monitored in the "attend2" condition; a third quadrant in "attend1"; the fourth quadrant and the foveal stream served as distractors. Attend2 task required that subjects perform a same/different comparison on digits that simultaneously appeared in two monitored letter streams. **RESULTS:** Retinotopic cortical representations of the RSVP streams were functionally identified for each subject. Activation was compared in these ROIs for attend1, attend 2, and passive viewing conditions (t-test, random effects model, N=5). Attend1 (vs. attend2) produced significant ($p < 0.01$) modulation only in the representation of the attended quadrant. Attend2 (vs. attend1) produced significant ($p < 0.01$) in the two opposing attended quadrants, but not in the intervening foveal representation. **CONCLUSIONS:** Retinotopically-specific patterns of human visual cortical attentional modulation are consistent with the existence of multiple spatial spotlights and inconsistent with the unitary spotlight hypothesis.

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