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Evidence for gender differences in visual selective attention

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Abstract

Selective attention is considered a central component of cognitive functioning. While a number of studies have demonstrated gender differences in cognitive tasks, there has been little research conducted on gender differences in selective attention. There is limited empirical evidence that indicates males and females may differ in selective attention. To explore this issue we present results from two experiments using a basic Posner cueing paradigm in which females show larger validity effects in endogenously cued tasks, but not with a peripheral cue or exogenous cue. Specifically, we found that while females show costs from an invalid cue relative to a no-cue control condition, males showed a benefit to invalid cues compared to no-cue control conditions. This empirical finding has important implications for future studies using the Posner cueing paradigm. In addition, the possible contribute of gender differences in selective attention to other cognitive gender differences is explored.

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1. Introduction

The notion that selective attention is central to human performance has a well established history in experimental psychology (Posner & Peterson, 1990). In addition, individual differences between males and females have been demonstrated in a number of domains (Halpern, 2000). Traditionally, males are shown to be superior at visual-spatial tasks (Collins & Kimura, 1997), while females have a demonstrated advantage in verbal and episodic memory tasks (Herlitz, Nilsson, & Bäckman, 1997). While females have been shown to suffer in tests of sustained attention (Giambra & Quilter, 1989), the limited empirical research regarding gender differences in selective attention thus far demonstrates this may be an important component of cognitive gender differences (Bayliss, di Pellegrino, & Tipper, 2005; Merritt et al., 2005). If there are gender differences in selective attention, such differences may moderate or contribute to observed gender differences in other tasks. For example, the ability to inhibit information (e.g. Hasher, Zachs, & May, 1999) could play a role in the advantages females show on episodic memory tasks.

The question we address in the current study, is whether males and females differ in the mechanisms of selective attention. Specifically, we focus on a task in which participants attend to one stimulus while ignoring another stimulus. Tasks in which subjects attend differentially to attributes of a single stimulus (e.g. Stroop Tasks) may share mechanisms with more traditional selective attention tasks, but they may also involve more complex mechanisms, so we do not focus on these tasks here.

A primary measure used in studies of visual selective attention is reaction time (RT). In this context, selective attention results are often described in terms of the costs (increased RT) and benefits (decreased RT) associated with selective attention (Jonides & Mack, 1984). Benefits usually accrue to an attended stimulus, while costs can arise when one must respond to a previously ignored stimulus. For example, in spatial orientation tasks benefits are derived from valid cues (i.e. the correct location is cued) but costs are incurred from invalid cues (an incorrect location is cued) (Posner, 1980).

Here we examine whether males and females differ in the benefits or costs associated with selective attention. Males and females might differ in processing of an attended stimulus and therefore show differences in the benefits associated with a target stimulus. On the other hand, males and females may process an attended stimulus similarly but differ in how to-be-ignored information is processed. In the latter case, males and females might differ in the costs associated with selective attention. A limited set of studies have addressed this issue. One study has shown that females show increased costs from an ambiguous cue relative to a valid cue in a spatial orienting task (Robinson & Kertzman, 1990), in a pilot study we observed females to show larger validity effects for symbolic cues (Merritt et al., 2005), and in another study females were shown to exhibit larger validity effects for symbolic cues, but not peripheral cues (Bayliss et al., 2005). In a related study, Jiang, Costello, Fang, Huan, and He (2006) show that both gender and sexual orientation may contribute to selective attention based on the type of information presented. They show that subliminal erotic images can influence the allocation of attention based on type of image, gender and sexual orientation. Finally, one study indicates males and females do not differ in spatial or identity negative priming (Koshino, Boese, & Ferraro, 2000). Together, these results suggest that males and females may differ in allocation of selective attention.

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