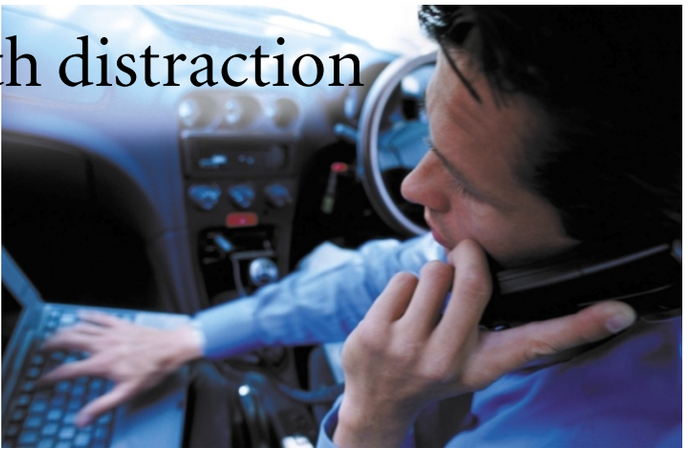
HIGHLIGHTS

ATTENTION

Working with distraction



The interaction between attention (the ability to focus on certain stimuli to the detriment of others) and working memory (the ability to hold and manipulate information in mind) is a complex subject. It has been suggested that working memory might be crucial in selective attention, and this idea received some much needed experimental support from a recent paper from a team led by Nilli Lavie showing a causal role for working memory in the control of selective attention.

Lavie had proposed that because selective attention depends on active maintenance of stimulus priorities in working memory, a high working memory load should result in greater processing of irrelevant (low priority) distractors. J. W. de Fockert and colleagues examined this issue using behavioural and fMRI techniques, in which subjects were required to perform two unrelated tasks. The first task was a test of selective attention that required the subjects to classify famous written names as pop stars or politicians while they ignored simultaneously presented images of faces that acted as potential distractors. The distractor faces were either congruent with the target name (for example, an image of Bill Clinton simultaneously presented with his name), incongruent with the target name (an image of Bill Clinton presented with the name of a pop star) or anonymous faces. Processing of the distractor images was assessed by measuring the interference effects on the time it took to classify the name as a pop star or politician, as well as the neural activity triggered in the visual cortex. As expected, subjects were slower to classify names paired with incongruent faces than those paired with congruent faces, and the presence of distractor faces enhanced activity in areas of visual cortex that selectively respond to faces.

This task was interleaved with a task that taxes working memory for digit order, in which subjects were presented with a four-digit number at the start of each trial. At the end of each trial, after the selective attention task had been completed, they were presented with one of the digits in the memorized sequence and were asked to recall the next digit. Memory load was manipulated on every trial by either presenting a fixed order of digits (low memory load) or a random sequence (high memory load). The reaction time increased with higher memory load, which was also associated with enhanced neural activity in prefrontal cortical areas. The key result, however, was the interaction between memory load and selective attention.

During periods of high working memory demand, the subjects were less able to filter out the distracting faces to focus on the task of classifying the written names. The distractor faces produced greater interference during the naming task and greater neural activity in visual cortex under conditions of high working memory load. Interestingly, previous work has shown that increasing perceptual load can decrease the effect of distractors.

These data provide experimental support for the idea that working memory is required to actively maintain stimulus priorities and that this is crucial for directing attention towards relevant stimuli. This insight into the interaction between working memory and selective attention will surely encourage more experimental work in this developing area.

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References and links

ORIGINAL RESEARCH PAPER de Fockert, J. W. *et al*. The role of working memory in visual selective attention. *Science* **291**, 1803–1806 (2001)
FURTHER READING Desimone, R. & Duncan, J. C. Neural mechanisms of selective visual attention. *Annu. Rev. Neurosci.* **18**, 193–222 (1995)