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Cognitive Processes: Attention, Perception, Comprehension and Memory

The overall goal of research in the Potter laboratory is to understand the very rapid processes involved in perceiving, comprehending, and remembering meaningful material such as words, sentences, or pictures. In contemporary theories of human information processing, such material passes through several stages of analysis as it is perceived and understood, and it is these stages and their interactions that we investigate.

A key discovery is that understanding the meaning of a pictured scene or written word happens in a fraction of a second, much faster than the time required for stabilizing even a brief memory of that stimulus. The viewer may not even become conscious of the stimulus unless it fits in with the context. For example, the lab has shown that a sentence can be understood and remembered when presented as rapidly as 12 words per second (using RSVP, rapid serial visual presentation). In contrast, a sequence of unrelated words (even if no longer than 4 or 5 words) is much more difficult to process and only two or three are remembered. Similarly, viewers can pick out a target picture from a rapid sequence when given a title such as "a picnic," although they cannot remember most of the pictures they have just seen. In recent work we have found, however, that memory for the pictures persists briefly, consistent with the idea that there is a conceptual short term memory (CSTM) for meaningful material.

We also study competition for attention using words and other visual stimuli. When the viewer is looking for two targets in a stream of nontargets presented at 10/s, detection of the second target is markedly impaired when it arrives 200-500 ms after the first target, an attentional blink. In contrast, when the task is to report all the items on a short list, there is no evidence of an attentional blink. We have supported and extended a computational model of attention (e.g., Wyble, Bowman, & Potter 2009). Current work looks more closely at how reading a rapid sentence and picking out two targets in the sentence tap distinct forms

of processing. The lab's work also encompasses other questions about perception, attention, memory, and language processing, including repetition blindness, the creative misperception of a nonword as influenced by semantic context, cross-modal (visual-auditory) processing of sentences, and the conceptual basis of "verbatim" recall of sentences. These studies contribute to our understanding of how a stimulus such as a word, sentence, or picture generates an interpretation and a fleeting or stable memory.

Potter, M. C., Nieuwenstein, M. R., & Strohminger, N. (2008 May). Whole report versus partial report in RSVP sentences. *Journal of Memory and Language*, 58 (4): 907-915.

Wyble, B., Bowman, H., & Potter, M. C. (2009 Apr). Categorically defined targets trigger spatiotemporal attention. *Journal of Experimental Psychology: Human Perception and Performance*, 3(2): 324-337.

Potter, M. C., & Fox, L. F. (2009 Feb). Detecting and remembering simultaneous pictures in a rapid serial visual presentation. *Journal of Experimental Psychology: Human Perception and Performance*, 35(1): 28-38.

Potter, M. C., Wyble, B., Pandav, R., & Olejarczyk, J. (in press). Picture detection in RSVP: Features or identity? *Journal of Experimental Psychology: Human Perception and Performance*. (in press).

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