In a blink of the mind’s eye: What you see is not what you get?


The study of cognitive processing over the last century has revealed severe capacity limits associated with attention, which constrain our ability to perform multiple tasks concurrently. A key to understanding these limitations lies in an as yet unanswered question: How do we distribute our attention to the stimuli over time? Temporal constraints arise naturally in the Attentional Blink (AB) paradigm, where stimuli appear at fixation in rapid serial visual presentation (RSVP). When subjects make independent judgements on two successive targets, performance on the second target suffers especially at short intervals. The temporal dynamics of attention also figure prominently in visual search. In this volume Kimron Shapiro has solicited articles by 21 leading international researchers who address aspects of the time course of attention in AB and its relation to other multi-task phenomena. They also address temporal aspects of attention in visual search, using both behavioural and neuropsychological evidence. This collection is of particular relevance to readers of Applied Cognitive Psychology with interests in the nature of human attention limitations in complex, dynamic environments.

The core of the book is devoted to an exploration of the sources of processing limitations in the AB. In the initial chapter, Shapiro reviews AB findings from traditional experimental approaches and recent neuropsychological data. He concludes that AB magnitude is a function of the number of competitors from the same category and he also identifies the inferior parietal lobe in the ventral stream area as mediating the function of object identification in RSVP.

In addition to the perceptual locus suggested by object recognition under masked conditions, the AB may reflect contributions from other processing loci. Chun and Potter (Ch. 2) propose a two-stage human information processing architecture that posits limitations in visual processing capacity and a separate modality-independent central bottleneck. They argue that the locus of the task-switching effect is in the central processing stage, whereas the locus of AB can be at either stage. Enns, Visser, Hawahara, and Di Lollo (Ch. 4) also propose a two-stage model to explain why the AB effect depends critically on masking of the first task, and why Lag 1 sparing occurs only when no attention switching is required. Allport and Hsieh (Ch. 3) show that recovery of performance from experimenter-cued shifts of task set is a function of the number of successive task-relevant stimuli, not the time-lapse since the shift cue. This finding is further evidence that the locus of task-switching effects differs from that of the AB effect. This collection of chapters represents significant progress towards disentangling separate influences on the temporal allocation of attention.

The next four chapters continue the attempt to identify the loci of AB effects by investigating the relationship between AB and central interference. Jolicoeur, Dell’Acqua, and Crebolder (Ch. 5) present evidence suggesting a common bottleneck for the AB and the psychology refractory period (PRP) effect. Arnell (Ch. 8) reaches a similar conclusion from studies of cross-modal AB effects. Ruthruff and Pashler (Ch. 6) also find evidence of a common locus for AB and PRP effects, but find larger AB effects in within-modal conditions than in cross-modality conditions. Consistent with the task-switching chapters, they propose that RSVP tasks also interfere at an earlier perceptual stage. However, Luck and Vogel (Ch. 7) cite neurological evidence suggesting that AB and PRP effects reflect unrelated, independent forms of dual-task interference. Although the chapters on task switching and PRP fail to agree upon a common theory, the issues raised will form the basis for much future research.

Chapters by Moore and Wolfe (Ch. 9) and Ward (Ch. 10) address the temporal allocation of attention in visual search. Moore and Wolfe propose a hybrid model of human visual search, in which
stimuli are processed in serial but analysed, interpreted, and transformed partially in parallel. In further support of the parallel search model, Ward (Ch. 10) provides behavioural and electrophysiological evidence that shifts of visual attention take 200 ms or more. This hypothesized temporal constraint greatly limits the space of possible attention models and the nature of capacity allocation.

The final two chapters deal with the relationship between AB and perception and attention. Raymond (Ch. 11) finds that the perceptual constraints in AB reflect limitations in processes that construct new object representations, not those that update features of an old but changed object. Husain (Ch. 12) reviews the neuropsychology of attention and concludes that the temporal dynamics of visual processing do not mean that the key deficit of visual attention is ‘temporal’.

In general, the collection of chapters in this book represents a significant synthesis of cutting-edge work on temporal processing limitations. Though the chapters do not directly address workplace issues or applications to daily life, there is a clear message that what is being revealed with AB is a fundamental limit on human performance that must be considered in deriving estimates of workload or throughput. The applied community has emphasized formal methods to assist in predicting potential design problems with devices in complex task domains. The success of formal methods depends on an understanding of how the various fundamental limitations interact to constrain performance. The integration of AB with other known limitations in task switching, PRP, and visual processing presented in these chapters is an essential step towards that understanding. Moreover, this book adds to our knowledge about the interaction between early- and late-processing mechanisms, as well as whether attentional limitations arise from modality-specific mechanisms or from a single supramodal attentional mechanism. As some chapters point out, in dynamic worlds, people will adapt their performance to take advantage of potential parallelism afforded by modality-specific attentional resources.

To summarize, this major work is an impressive and extremely useful volume. The ideas presented here, as well as the lively debate on the outline of a comprehensive theory, will appeal to researchers in attention. At the same time, the volume is accessible and contains useful clues to real-world behaviour that will appeal to applied cognitive scientists.

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The philosophy and practice of psychology as a science


This is mostly not a book about the various artificial intelligence/‘can machines think?’ debates that comprise what is usually called cognitive science. Whilst traditional cognitive science/philosophy of mind issues are covered in the text, it is more a book about the philosophy of psychology as a science. As such, these issues are addressed in terms of the way in which they relate to the practice of a scientific psychology.

The author points out in his preface that the book does present some points of view on controversial matters, though he assures us that this is not intended as a treatise or monograph. The book is intended as a course text to help students on psychology degree courses to critically explore the presuppositions, ontologies, methodologies, and epistemological issues that surround psychology. However, Harré’s book is attempting to produce a unified way of thinking and talking about psychology, where none can be currently said to exist. One of his concerns is ‘to integrate the seemingly diverse directions of cutting edge research into a unified though hybrid discipline’ (p. xx). The scope of this integration includes discursive approaches, neuroscience, biology, and experimental cognitive psychology. Given this scope, certain points of view on controversial matters would appear to be essential.

Being set out as teaching tool, each chapter is punctuated by ‘learning points’ that usefully summarize the issues raised in the foregoing text. Each of the four parts of the book ends with a set of self-test study questions and a few recommended readings.