

Psych 259, Winter 2014, Course Code 68885. Prof. George Sperling  
Human Perception and Performance: Visual Attention

#### TWO GENERAL INTRODUCTORY BOOKS

Elizabeth A. Styles (2006).  
The Psychology of Attention, 2nd Ed.  
NY NY 10017: Psychology Press. Pp. 336  
<http://lib.myilibrary.com/Open.aspx?id=62230>

Claus Bundesen & Thomas Habekost (2008).  
Principles of Visual Attention: Linking Mind and Brain  
New York, NY: Oxford University Press. Pp. 360

#### Lecture 1. Jan 6

Definition of a task: stimuli, responses, utility.  $[S], [R], U=f([S] \times [R]) \rightarrow \text{Reals}$ ,  
concurrent and compound attention tasks.  
Overview of attention paradigms  
Classroom example of limited resources

Attending operating characteristics, iso-utility contours, optimization.

Required reading: pp 2-4 to 2-9 in  
Sperling, G., & Doshier, B. A. (1986). Strategy and optimization in human  
information processing. In K. Boff, L. Kaufman, & J. Thomas (Eds.),  
Handbook of perception and human performance: Vol. 1. Sensory processes and  
perception New York: Wiley. Pp. 2-1 - 2-65.

#### Lecture 2. Jan 13

Required background reading: Bundesen (Ch. 2)

Partial report procedures (Sperling, Averbach & Coriell), (NICOLE)

Styles, Ch. 2 (as well as Bundesen) is useful for partial report and for  
historical setting.

Bunden's model for partial report (KIER), (Bunden & Habekost, Chapters. 3,4)  
Iconic Memory (Neisser, 1967)

Auditory synchrony methods to measure visual persistence (Weichselgartner & Sperling, 1985)

Post-stimulus masking to terminate visual persistence (Sperling, 1963)

The temporal and spatial dynamics of an attention movement, spotlight theory (Shih & Sperling)  
Metacontrast masking,

#### References:

Neisser, U. (1967). Cognitive Psychology. New York: Appeltion-Century-Crofts.

Sperling, G. (1963). A model for visual memory tasks. Human Factors, 5, 19-31.

Weichselgartner, E., & Sperling, G. (1985). Continuous measurement of visible  
persistence. J. of Experimental Psychology: Human Perception and Performance,  
11, 711-72

Shih, S., & Sperling, G. (2002). Measuring and modeling the trajectory of  
visual spatial attention. Psychological Review, 109, 260-305.

Averbach, E., & Sperling, G. (1961). Short term storage of information in  
vision. In C. Cherry (Ed.), Information theory. (pp. 196-211).  
Washington, DC: Butterworth & Co.

Lecture 3. Jan 27

Spatio-temporal distribution of attention: other paradigms, feature attention,

McMains, S. A. & Somers, D. C. (2004). Multiple spotlights of attentional selection in human visual cortex. *Neuron*, 42, 677-686. NICOLE

McMains, S. A. & Somers, D. C. (2005) Processing Efficiency of Divided Spatial Attention. *Mechanisms in Human Visual Cortex. Journal of Neuroscience*, 25(41), 9444-9448. NICOLE

Bichot, N. P., Cave, K.R., and Pashler, H. (1999). Visual selection mediated by location: feature-based selection of noncontiguous locations. *Perception and Psychophysics*, 61(3), 403-423. HOWARD

Dubois, J., Hamker, F. H., VanRullen, R. (2009). Attentional selection of noncontiguous locations: The spotlight is only transiently "split." *J. of Vision*, 9(5)3, 1-11. KIER

Lecture 4. Feb 10.

Some temporal and spatial factors in attention

Background reading. Styles Chapter 3 with particular attention to Posner's Paradigm p.53ff

PRESENTATIONS

Shih, S., & Sperling, G. (1996). Is there feature-based attentional selection in visual search? *J. of Experimental Psychology: Human Perception and Performance*, 22, 758-779. PAULINE

Hogben J. H., Di Lollo, V. (1974) Perceptual integration and perceptual segregation of brief visual stimuli. *Vision Research* 14, 1059-1069. KIER

Reeves, A., & Sperling, G. (1986). Attention gating in short-term visual memory. *Psychological Review*, 93, 180-206. NICOLE

Lecture 5 Feb 24

Required review and prep for lecture:

Sperling, G., Reeves, A., Blaser, E., Lu, Z.-L., & Weichselgartner, E. (2001). Two computational models of attention. In J. Braun, C. Koch, & J. L. Davis (Eds.), *Visual attention and cortical circuits* (pp. 177-214 + four color plates). Cambridge, MA: MIT Press.

Shiffrin, R. M., & Gardiner, G. T. (1972). Visual processing capacity and attentional control. *J. Exptl Psychology*, 93 (1), 72-82. HOWARD

Shulman, G. L., Remington, R. W., & McLean, J. P. (1979). Moving attention through visual space. *Journal of Experimental Psychology: Human Perception and Performance*, 5, 522-526. TINKI

Lecture 6. Mar 3

Reynolds, J.H., Pasternak, T., Desimone, R. (2000).  
Attention increases sensitivity of V4 neurons.  
Neuron, 26, 703-714. PAULINE

Reynolds, J. H. and D. J. Heeger (2009). "The normalization model of attention." Neuron 61(2): 168-185. NICOLE'

Lee, J. and J. H. Maunsell (2009). "A normalization model of attentional modulation of single unit responses." PLoS One 4(2): e4651, 1-13. HOWARD

Link, S. W. The relative judgment theory of choice reaction time. Journal of Mathematical Psychology, 1975, 12, 114-135. TINKI (bare model only + example)

+

Ratcliff, R. (1978).  
A theory of memory retrieval.  
Psychological Review, 85, 59-108. TINKI (bare model only + example)

See <http://star.psy.ohio-state.edu/coglab/People/roger/pub2.html> for 100+ follow-up diffus

Dosher, B., & Lu, Z.-L. (2013).  
Mechanisms of visual attention.  
In Frontiers in Human Information Processing,  
Chubb, C., Dosher, B., Lu, Z.-L., & Shiffrin, R. (Eds.).  
Washington, D.C. American Psychological Association. Pp. 149-164. KIER

Lecture 7, 8 Mar 10, 17

General article for discussion to be read by all (4pp)

Posner, M. Attentional networks and consciousness. (2012). NICOLE  
Frontiers in Psychology, 3, Article 64, pp 1-4.

Posner, M. I., & Rothbart, M. K. (2007). Research on attention networks as a model for the integration of psychological science.  
Annual Review of Psychology, 58, 1-23. HOWARD

earlier short version:

Fan, J., McCandliss, B. D., Sommer, T., Raz, M., and Posner, M. I. (2002).  
Testing the efficiency and independence of attentional networks.  
J. Cogn. Neurosci. 3, 340-347.

Duncan, J., Bundesen, C., Olson, A., Humphreys, G., Chavda, S., & Shibuya, H. (1999). Systematic analysis of deficits in visual attention. Journal of Experimental Psychology: General, 128, 450-478. TINKI

Thomas Habekost, Anders Petersen, & Signe Vangkilde. (2014).  
Testing attention: Comparing the ANT with TVA-based assessment.  
Behavior Research Methods, Instruments, & Computers, 46, 81-94. PAULINE