UCI, Spring, 1999. *Special Topics in Human Cognition:* Theories of Attention

UCI Psych 229 (Seminar), Code 66812. Profs. George Sperling & Barbara Dosher
USC Psych 590, Class 68140-D Prof. Zhong-Lin Lu

Friday, 1:00-4:00p, UCI Social Science Plaza B - Room 3249

1. April 9 - Business meeting plus **Lecture. Basic Concepts**:

Basic concepts. Definitions of attention (state dependence, classes of phenomena); attention operating characteristic (AOC), classroom example, relation to decision theory; resource-performance operating characteristic (POC); concurrent and compound tasks. Attention in various classical paradigms: selective listening; search; iconic memory, masking to stop processing; stage models (Sternberg); dual tasks- PRP; the necessity of formal models. How to adapt experiments to animals, to single neurons, to brain imaging (fMRI, eeg, MEG).

Background:

Historical Article

Wundt, W. *An introduction to psychology.* (R. Pintner, translator, from the Second German edition) London: George Allen & Unwin. (Reprinted 1924.) Chapter 1, Pp. 1-42. Consciousness and attention.

Data Survey

Shiffrin, R. M. (1987). Attention. In *Stevens' Handbook of Experimental Psychology, 2nd edition.* Eds.: R. C. Atkinson, R. J. Herrnstein, G. Lindzey, and R. D. Luce. New York: Wiley.

Methodological Survey

Sperling, G. & Dosher, B. Strategy and optimization in human information processing. In Boff, K., Kafuman, L. & Thomas, J. (Eds.), Handbook of Perception and Performance. Vol. 1, NY: Wiley, 1986. Pp. 2-1 to 2-65.

Review Articles

H. Pashler (Ed). (1998). *Attention.* East Sussex, UK: Psychology Press. *(A collection of review essays.)*

2. April 16 - Classical Papers

Treisman, A. (1986). Features and objects in visual processing. *Scientific American, 255,* 114B-125.

Posner, M. I., NIssen, M. J., & Ogden, W. C. (1978). Attended and unattended processing modes: The role of set for spatial location. In H.I. Pick, Jr., & E. Saltzman (Eds.) *Modes of perceiving and processing information.* Hillsdale, N.J.: Erblaum.

Sperling, G., Budiansky, J., Spivak, J. G., & Johnson, M. C. (1971). Extremely rapid visual search: the maximum rate of scanning letters for the presence of a numeral. *Science, 174* 307-311.

Shiffrin, R. M. & Schneider, W. (1977). Controlled and Automatic Human Information Processing: II. Perceptual Learning, Automatic Attending and A General Theory. *Psychological Review, 84,* 127-190. [Selected Pages]

Schneider, W. and Shiffrin, R. M. (1977). Controlled and Automatic Human Information Processing: I. Detection, Search, and Attention. *Psychological Review, 84,* 1-66. [Selected Pages]

Sperling, G., & Melchner, M.J. (1978). The attention operating characteristic: Examples from visual search. *Science, 202,* 315-318.

3. April 23 - Visual Search I. Lecture. Response-Time Procedures (Dosher).

Stage models, random-walk model (RWM), speed-accuracy tradeoffs (SAT), cued-response time, parallel-serial distinction (Sternberg, Vorberg, Townsend), applications to visual search.

Duncan, J., & Humphreys, G.W. (1989). Visual search and stimulus similarity. *Psychological Review, 96,* 433-458.

Carrasco, M., Evert, D. L., Chang, I., Kaatz, S. M. (1995). The eccentricity effect: Target eccentricity affects performance on conjunction searches. *Perception & Psychophysics, 57,* 1241-1261.

Nakayama, K., & Silverman, G. H. (1986). Serial and parallel processing of visual feature combinations. *Nature, 320,* 264-265.

Wolfe, J.M. (1994). Guided search 2.0: A revised model of visual search. *Psychonomic Bulletin & Review, 1,* 202-238.

4. April 30 - Visual Search II

Sagi, D., & Julesz, B. (1985). Fast noninertial shifts of attention. *Spatial Vision, 1,* 141-149.

Shiffrin, R. M. & Gardner, G. T. (1972). Visual processing capacity and attentional control. *Journal of Experimental Psychology, 93,* 72-82.

Palmer, J. (1995). Attention in visual search: Distinguishing four causes of a set-size

effect. *Current Directions in Psychological Science, 4*, 118-123.

5. May 7 - Attention Switching

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

Weichselgartner, E., & Sperling, G. (1986). Dynamics of automatic and controlled visual attention. *Science, 238,* 778-780.

Chun, M.M., & Potter, M.C. (1995). A two-stage model for multiple target detection in rapid serial visual presentation. *Journal of Experimental Psychology: Human Perception & Performance, 21* 109-127. Taylor, T. L., & Klein, R. M. (1998).

On the causes and effects of inhibition of return. *Psychonomic Bulletin & Review, 5*, 625-643.

Posner, M., Rafal, R. D., Choate, L. S., Vaughan, J. (1985). Inhibition of return: Neural basis and function. *Cognitive Neuropsychology, 2,* 211-228.

6. May 14 - ARVO

7. May 21 - Attention to Features and Locations

Prinzmetal, W., Amiri, H., Allen, K., & Edwards, T. (1998). Phenomenology of attention: I. Color, location, orientation, and spatial frequency. *Journal of Experimental Psychology: Human Perception & Performance, 24*, 261-282.

Blaser, E., Sperling, G., & Lu, Z.-L. (1999). Measuring the amplification of attention to color. Manuscript.

Lu, Z.-L., & Dosher, B. (1998). External noise distinguishes attention mechanisms. *Vision Research, 38,* 1183-1198.

Dosher, B., & Lu, Z.-L. (1999). External noise exclusion by attention. Manuscript.

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

Shulman, G. L., & Wilson, J. (1987). Spatial frequency and selective attention to local and global information. *Perception, 16,* 89-101.

8. May 28 - Physiological Correlates I

Moran, J., & Desimone, R. (1985). Selective attention gates visual processing in the extrastriate cortex. Science, 229, 782-784.

Reynolds, J. & Desimone, R. (1999). Manuscript from Catalina Attention Conference.
...neural gain-control mechanisms modulate attention in visual cortex...

Maunsell, J. H. R., & Ferrera, V. P. (1996). Attentional mechanisms in visual cortex. In Gazzaniga, M. S. (Ed.) *The Cognitive Neurosciences,* p. 451-461.

Mangun, G. R., Hillyard, S. A., & Luck, S. J. (1993). Electrocortical substrates of visual selective attention. In D.E. Meyer, S. Kornblum, et al. (Eds.), *Attention and Performance 14: Synergies in Experimental Psychology, Artificial Intelligence, and Cognitive Neuroscience.* Cambridge, MA: MIT Press, p. 219-243

9. June 4 - Physiological Correlates II.

Sereno, M. I., Dale, A. M., Reppas, J. B., Kwong, K. K., et al. (1995). Border of multiple visual areas in human revealed by functional magnetic resonance imaging. *Science, 268 (May 12),* 889-893.

Heeger, Boynton, ...fMRI Heeger/Boynton/...

Watanabe, T., Harner, A. M., Miyauchi, S., Sasaki, Y., et al (1998). Task-dependent influences of attention on the activation of human primary visual cortex. *Proceedings of the National Academy of Science of the United States of America, 95 (Sept. 15),* 11489-11492.

Posner, M. & Peterson, S. (1990). The attention system of the human brain. *Annual Review of Neuroscience, 13,* 25-42.

O'Craven, K. M., Rosen, B. R., Kwong, K. K., Treisman, a., et al. (1997). Voluntary attention modulates fMRI activity in human MT-MST. *Neuron, 18,* 591-598.

10. June 11 - Modeling Attention and Applied Attention

Moszer, M. C., & Sitton, M. (1998). Computational modeling of spatial attention. In H. Pashler (Ed). *Attention.* Erlbaum (Uk): Psychology Press, p. 341-393

Tsotsos, XX. (1999). Computational model of attention. Manuscript from Catalina Attention Conference.

Swanson, G., Castllanos, F. X., Murias, M., LaHoste, G., et al. (1998). Cognitive neuroscience of attention deficit hyperactivity disorder and hyperkinetic disorder. Current Opinion in Neurobiology, 8, 263-271.

Swanson, J. M., Posner, S. G., Bonforte, S., et al. (1991). Activating tasks for the study of visual-spatial attention in ADHD children: A cognitive anatomic approach. *Journal of Child Neurology, 6,* S119-S127.

Taylor, C. J. & MIller, D. C. (1997). Neuropsychological assessment of attention in ADHD adults. *Journal of Attention Disorders, 2*, 77-88.

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