

CLASSICAL PERCEPTION  
PSYC8230

Spring 2008  
M 12:20-3:20pm  
Room 513

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Graduate Bulletin Course Description: Discussion of classical problem areas of perception (e.g., contour, movement, illusions) with emphasis on the perceptual process and its relation to other psychological functions.

In 1981, William Uttal published his book, *A Taxonomy of Visual Processes*, offering it to the psychological community as an organizational framework for thinking about visual perception. Considering the information available as he organized his taxonomy (i.e., up to the late 1970's), it is obvious that he would have updated it to incorporate new information gathered since. The notion of parallel processing streams in the visual system is one of the dominant themes to emerge in perception research since the early 1980's. While not a new idea, it has received ever-increasing emphasis in light of accumulating psychophysical and physiological evidence. This emphasis complements Uttal's taxonomy nicely given the stress of his taxonomy on processes not phenomena. Our class will be structured around Uttal's taxonomy while also reflecting the recent emphasis on parallel processing in the visual system. While Uttal's taxonomy has proven a useful heuristic for organizing the course, to at least partially insure against putting on any theoretical blinders I have included some other more general philosophical/theoretical readings by Kaufman, Mace/Gibson, and Rock for us to consider as background.

Text: As might be expected, there is no single book that could adequately cover the material for a course of this nature and scope. We will use a combination of downloadable pdf files and pdf files scanned in from previous readings.

Grading Policy: Your grade will be determined from (1) a 20-30 page (not including title page, figures, or references) APA-style paper on a topic of your choice (35%), (2) a 20-30 minute class presentation based on your paper topic (20%), (3) a take home Final Exam (25%), and (4) class participation and preparation (e.g., discussion leader), and take-home assignments (20%). Take-home assignments will be used as a basis for class discussions. In some cases the take home assignment will be choosing and presenting one of the readings being covered that week. Papers are due by April 21<sup>st</sup> but can be turned in anytime before then.

*The following is tentative & subject to change depending on progress.*

*Those marked with (\*) are related readings that may be of interest and/or useful background.*

**Weeks 1 & 2:** 1/7-1/14

Perception: Philosophy & Theory

Uttal, W. R. (1981). *A Taxonomy of Visual Processes*, Chapter 1 (pp. 3-59), LEA: NY.

Kaufman, L. (1974). *Sight and Mind*, Chapter 1 (pp. 3-24), Oxford University Press: NY.

Mace, W.M. (1977). James J. Gibson's strategy for perceiving: Ask not what's inside your head, but what your head's inside of. In R. Shaw and J Branford (Eds.) *Perceiving, Acting, and Knowing*, Chapt. 2 (pp. 43-65), LEA: NY.

Rock, I. (1983). *The Logic of Perception*, Ch. 1 (pp. 1-42), Bradford Books/M.I.T. Press: Cambridge, MA.

Nakayama, K. (1994). James J. Gibson - An appreciation. *Psychological Review*, 101, 329-335.

**Week 3: 1/21 NO CLASS – MLK Holiday (Do we want to/can we reschedule?)****Week 4: 1/28**

Taxonomic Level Theory (TLT): Overview & Brief Discussion of Levels 0 & 1.

Uttal, W. R. (1981). A Taxonomy of Visual Processes, pp. 239-284,371-377, 472-475.

Level 2: Neural Interaction Processes Affecting Perception

Arend, L.E., Buehler, J.N., and Lockhead, G.R. (1971). Difference information in brightness perception. *Perception & Psychophysics*, 9, 367-370.

Festinger, L., Allyn, M.R., and White, C.W. (1971). The perception of color with achromatic stimulation. *Vision Research*, 11, 591-612.

**Week 5: 2/4**

Level 2: Neural Interaction Processes Affecting Perception, cont.

Barlow, H.B. (1972). Single units and sensation: A neuron doctrine for perceptual psychology. *Perception*, 1, 371-394.

Ratliff, F. (1972). Contour and Contrast. From: *Recent progress in perception: Readings from Scientific American*, (pp. 9-19), 1976.

Werblin, F.S. (1973). The control of sensitivity in the retina. From: *Recent progress in perception: Readings from Scientific American*, (pp. 21-29), 1976.

Ratliff (1985). Band-pass filters versus feature detectors: Contrasting views on information processing in the retina. From: *The Visual System*, pp. 145-166.

**Week 6: 2/11 *Paper topic due.***

Parallel Visual Pathways & Sensitivities

Logothetis, N.K., Schiller, P.H., Charles, E.R., & Hurlbert, A.C. (1990). Perceptual deficits and the activity of the color-opponent and broad-band pathways at isoluminance. *Science*, 247, 214-217.

Merigan, W.H. & Maunsell, J.H.R. (1993). How parallel are the primate visual pathways? *Annual Review of Neuroscience*, 16, 369-402.

Croner, L. J., & Kaplan, E. (1995). Receptive fields of P and M ganglion cells across the primate retina. *Vision Research*, 35, 7-24.

Casagrande, V. A. (1999). The mystery of the visual K pathway. *Journal of Physiology*, 517, 630.

Morand, S., Thut, G., de Peralta, R. G., Clarke, S., Khateb, A., Landis, T., & Michel, C. M. (2000) Electrophysiological evidence for fast visual processing through the human koniocellular pathway when stimuli move. *Cerebral Cortex*, 10, 817-825.

**Week 7: 2/18**

Spatio-Temporal Frequency Processing:

Parallel Pathways and their implications for perceptual processing.

Weisstein, N. & Harris, C. (1980). Masking and the unmasking of distributed representations in the visual system. In C. Harris (Ed.), *Visual Coding and Adaptability*, (pp. 317-364), LEA: NY.

Breitmeyer, B.G. (1992). Parallel processing in human vision: History, review, and critique. In J. Brannan (Ed.) *Applications of Parallel Processing in Vision*, (pp. 37-78), Elsevier Sciences Publishers: NY.

Ogmen, H., Breitmeyer, B. G., & Melvin, R. (2003). The what and where in visual masking. *Vision Research*, 43, 1337-1350.

- Breitmeyer, B. G., & Ogmen, H. (2006). *Visual Masking: time slices through conscious and unconscious vision*. NY: Oxford University Press, Inc.
- Moore, C. M., Mordkoff, J. T., & Enns, J. T. (2007). The path of least persistence: Object status mediates visual updating. *Vision Research*, 47(12), 1624-1630.

### Week 8: 2/25

#### A Clinical Sidetrack:

- Edwards, V.T., Hogben, J.H., Clark, C.D., & Pratt, C. (1996). Effects of a red background on magnocellular functioning in average and specifically disabled readers. *Vision Research*, 36, 1037-1046.
- Borsting, E., Ridder, W.H.III, Dudeck, K., Kelly, C., Matsui, L., & Motoyama, J. (1996). The presence of a magnocellular defect depends on the type of dyslexia. *Vision Research*, 36, 1047-1053.
- Keenan, A. G., & Lovegrove, W. J. (2000). Transient deficit hypothesis and dyslexia: examination of whole-parts relationship, retinal sensitivity, and spatial and temporal frequencies. *Vision Research*, 40, 705-715.
- Cadenhead, K. S., Serper, Y., & Braff, D. L. (1998). Transient versus sustained visual channels in the visual backward masking deficits of schizophrenia patients. *Biological Psychiatry*, 43(2), 132-138.
- Butler, P. D., Martinez, A., Foxe, J. J., Kim, D., Zemon, V., Silipo, G., et al. (2007). Subcortical visual dysfunction in schizophrenia drives secondary cortical impairments. *Brain*, 130(2), 417.
- Skottun, B. C., & Skoyles, J. R. (2007). A few remarks on relating reaction time to magnocellular activity. *Journal of Clinical and Experimental Neuropsychology*.
- Skottun, B. C. (2004). On the use of red stimuli to isolate magnocellular responses in psychophysical experiments: A perspective. *Visual Neuroscience*, 21(01), 63-68.

#### Gestalt Laws of Grouping & Texture Segregation

- Uttal, W. R. (1981). *A Taxonomy of Visual Processes*, (pp. 758-790; 797-806).

### Weeks 9 & 10: 3/3-3/10

#### Figure-Ground Organization: Description & Process

- Uttal, W. R. (1981). *A Taxonomy of Visual Processes*, (pp. 791-797).
- Weisstein, N. & Wong, E. (1986). Figure-ground organization and the spatial and temporal responses of the visual system. In *Pattern Recognition by Humans and Machines, Vol II*, Schwab, E. C. & Nusbaum, H. C. (Eds.), LEA: NY.
- Grossberg, S. (1997). Cortical dynamics of three-dimensional figure-ground perception of two-dimensional pictures. *Psychological Review*, 104, 618-658.
- Peterson, M. A. (2003). On figures, grounds, and varieties of surface completion. In R. Kimchi, M. Behrmann, & C. R. Olson (Eds.), *Perceptual organization in vision: Behavioral and neural perspectives*, (pp. 87-116), LEA: NY.
- Von der Heydt, R., Zhou, H., & Friedman, H. S. (2003). Neural coding of border ownership: Implications for the theory of figure-ground perception. In R. Kimchi, M. Behrmann, & C. R. Olson (Eds.), *Perceptual organization in vision: Behavioral and neural perspectives*, (pp. 281-304), LEA: NY.
- Neri, P., & Levi, D. M. (2007). Temporal Dynamics of Figure-Ground Segregation in Human Vision. *Journal of Neurophysiology*, 97(1), 951.

3/5 Semester Midpoint

**Week 11: 3/7 NO CLASS - Spring Break**

**Week 12: 3/24 Paper outline due.**

Closure, completion, interpolation, and depth.

Uttal, W. R. (1981). A Taxonomy of Visual Processes, (pp. 808-847).

Nakayama, K., Shimojo, S., and Silverman, G. H. (1989). Stereoscopic depth: its relation to image segmentation, grouping, and the recognition of occluded objects. *Perception*, 18, 55-68.

Brown, J.M., and Weisstein, N. (1991). Conflicting figure-ground and depth information reduces moving phantom visibility. *Perception*, 20, 155-165.

Gilliam, B., & Nakayama, K. (2002). Subjective contours at line terminations depend on scene layout analysis, not image processing. *Journal of Experimental Psychology: Human Perception & Performance*, 28, 43-53.

Kellman, P. (2003). Visual perception of objects and boundaries: A four-dimensional approach. In R. Kimchi, M. Behrmann, & C. R. Olson (Eds.), *Perceptual organization in vision: Behavioral and neural perspectives*, (pp. 155-201), LEA: NY.

Komatsu, H. (2006). The neural mechanisms of perceptual filling-in. *Nature Reviews: Neuroscience*, 7, 220-231.

Keane, B. P., Lu, H., & Kellman, P. J. (2007). Classification images reveal spatiotemporal contour interpolation. *Vision Research*, 47, 3460-3475.

Pessoa, L., Thompson, E., & Noë, A. (1998). Finding out about filling-in: A guide to perceptual completion for visual science and the philosophy of perception. *Behavioral and Brain Sciences*, 21(06), 723-748.

**Week 13: 3/31**

Motion Processing and Dynamic Cues to Structure and Depth

Regan, D., Beverly, K., and Cynader, M. (1979). The visual perception of motion in depth. *Scientific American*, 241, 136-151.

Ramachandran, V. S., and Anstis, S. (1986). Figure-ground segregation modulates apparent motion. *Vision Research*, 26, 1969-1975.

Cavanagh, P., & Mather, G. (1990). Motion: The long and short of it. *Spatial Vision*, 4, 103-129.

Papathomas, T. V., Gorea, A., and Julesz, B. (1991). Two carriers for motion perception: Color and luminance. *Vision Research*, 31, 1883-1891.

Kourtzi, Z., & Nakayama, K. (2002). Distinct mechanisms for the representation of moving and static objects. *Visual Cognition*, 9, 248-264.

**Week 14: 4/7**

Lightness & Brightness:

Gilchrist, A., Kossyfidis, C., Bonato, F., Agostini, T., Cataliotti, J., Li, X., Spehar, B., Annan, V., & Economou, E. (1999). An anchoring theory of lightness perception. *Psychological Review*, 106, 795-834.

Constancies: A brief look into various issues

- Epstein, W. (1976). Historical introduction to the constancies, Chapter 1 (pp. 1-22). In W. Epstein (Ed.) *Stability and constancy in visual perception: Mechanics and processes*. Wiley: NY.
- Coren, S. & Girgus, J.S. (1976). Illusions and Constancies, Chapter 8 (pp. 255-283). In W. Epstein (Ed.) *Stability and constancy in visual perception: Mechanics and processes*. Wiley: NY.
- Hamburger, K., Hansen, T., & Gegenfurtner, K. R. (2007). Geometric-optical illusions at isoluminance. *Vision Research*, 47, 3276-3285.

**Week 15 & 16: 4/13-4/21 (Papers Due: 4/21)**

- Shebilske, W. L., & Peters, A. L. (1996). Perceptual constancies: Analysis and synthesis. In W. Prinz & B. Bridgeman (Eds.), *Handbook of perception and Action*, Vol. 1, Perception, (pp. 227-251), Academic Press: NY.
- McKee, S. P., & Smallman, H. S. (1998). Size and speed constancy. In V. Walsh (Ed), *Perceptual constancy: Why things look as they do*, (pp. 373-408), Cambridge University Press: NY.

Parting Viewpoints from Uttal and Epstein

- Uttal, W. R. (1981). A Taxonomy of Visual Processes, pp. 974-1001.
- Epstein, W. (1982). Percept-percept couplings. *Perception*, 11, 75-83.

**Week 17: 4/28**

Class Presentations  
Course Evaluations

**Take Home Final Exam Distributed.**

**Due:** Friday, May 2, by 5:00pm