

PS1061: Sensation and Perception

<http://www.pc.rhul.ac.uk/staff/J.Zanker/PS1061/PS1061.htm>

Course co-ordinator: Johannes M. Zanker, j.zanker@rhul.ac.uk, (Room W 214)

Lecture 3: Illusions as Key to Reality

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Lecture Topics

- illusions as part of your everyday life, as tool of science
- revision: basic concepts of visual information processing
- perceiving brightness: contrast illusions, filling in
- the added value of colour information
- theories of colour vision
- encoding contrast in space and time >> more illusions

After this lecture you should understand some of the main principles underlying the encoding of visual information:

- illusions often are explained as constructing solutions to puzzles, but many of them are a consequence of **basic information processing strategies**
- visual information is re-organized, **compressed**, and **categorized** by **parallel** and **hierarchical processing** in the visual stream
- opponent encoding by centre-surround **receptive fields** - or **filters** - is a crucial strategy to **increase contrast** and **remove redundancy**, and is common in the processing of brightness, colour, etc.
- **opponency** can account for a number of illusions such as aftereffects and **contrast enhancement**, but additional mechanisms (like **filling-in**) are required to deal with other aspects of perception
- how far does this approach take us to understand a large variety of illusions ?

Reading list (key readings in bold, papers available through virtual resources room):

- **Anstis SM, Rogers B and Henry J, 1978 "Interactions between simultaneous contrast and coloured afterimages" Vision Research 18, 899-911**
- Berlin B and Kay P, 1969 "Basic color terms :their universality and evolution " London :University of California P (131 BER)
- **Campbell F W, Maffei L, 1974 "Contrast and Spatial Frequency" Sci.Am. 231: p.106-114**
- Coren S, Girgus J S, 1978 Seeing is Deceiving: The Psychology of Visual Illusions (Hillsdale: L. Erlbaum Ass.)
- Cornsweet T N, 1970 Visual Perception (Orlando: Academic Press)
- Descartes R, 1664 Traite de l'Homme, as cited in Wade, N.J., A Natural History of Vision. 1998, Cambridge MA: MIT Press.
- Frisby J P, 1979 Seeing. Illusion, Brain, Mind (Oxford: Oxford University Press)

- **Gregory, R.L. (1968) 'Visual illusions' Scientific American 219: p. 66-76**
- Gregory R L, 1998 Eye and Brain (Oxford: Oxford University Press)
- Grossberg S, Pessoa L, 1998 "Texture segregation, surface representation and figure-ground separation" Vision Research 38 2657-2684
- **Jameson D and Hurvich LM, 1964 "Theory of brightness and colour contrast in human vision" Vision Research 4: p. 1-22**
- **Kanizsa G, 1976 "Subjective Contours" Scient.Am. 234: p. 48-52**
- Kitaoka A, "Trick eyes" Tokyo: KANZEN 2002
- McManus IC, 1997 "Note: Half-a-million basic colour words: Berlin and Kay and the usage of colour words in literature and science" Perception 26, 367-370
- Perales, E., F. M. Martínez-Verdú, et al. (2010). "Number of discernible colors for color-deficient observers estimated from the MacAdam limits." J. Opt. Soc. Am. A 27(10): 2106-2114.
- Schrauf M, Lingelbach B, Wist E R, 1997 "The Scintillating Grid Illusion" Vision Res. 37, p. 1033-1038
- Vladusich, T. and J. Broerse, 2002, Color constancy and the functional significance of McCollough effects. Neural Networks, 15: p. 775-809.
- **White M, 1979 "A new effect of pattern on perceived lightness" Perception 8: p. 413-416**
- Wilson, H.R., Pattern discrimination, Visual Filters, and Spatial Sampling Irregularity, in Computational Models of Visual Processing, M.S. Landy and J.A. Movshon, Editors. 1991, MIT Press: Cambridge MA. p. 153-168

Textbooks:

- **Zanker, J. M. (2010) Sensation, Perception, Action – an evolutionary perspective. Palgrave**
- chapters 3 and 7 (ignore the first physiological sections) of Goldstein, E.B. (2007) Sensation and Perception (7th ed.) Wadsworth-Thompson (152.1 GOL)

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