

THE PHILOSOPHY AND SCIENCE OF PERCEPTION

WHO, WHEN, AND WHERE

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TEXTS

Some of the readings will be made available in a course pack, but a number of them can be found in the following book.

Stephen E. Palmer, *Vision Science* (Cambridge, MA: MIT Press, 1999)

Both the course pack and the book are available in the bookstore.

Additionally, most of the books from which we have assigned a chapter are available on reserve (Sciences Library) and we have set up e-reserves for the journal articles and some chapters. See <http://dl.lib.brown.edu/reserves/> (look under CG0186, password is "think")

REQUIREMENTS

1. An in-class midterm exam, given on October 19.
2. A final exam, given during the examination period in December. (This exam will cover only the material from the second half of the course.)
3. A short term paper, due on the last day of class (December 7). Papers should be 5-6 pages in length.

Review questions for each exam will be distributed a week in advance. The topics for the papers will be announced on November 9. Each exam will count 30%, and the term paper will count 40%.

COURSE DESCRIPTION

There are a number of characteristically philosophical questions about perception, a number of characteristically scientific questions, and a number of questions about perception that are shared by philosophy and science. In this course we will consider questions of all three kinds, but we will focus primarily on questions that are shared. There will be six main topics.

1. Perceptual consciousness. Some perceptual representations are conscious; others are not. What is the difference? There are philosophical dimensions to this question and also scientific dimensions. Thus, it's impossible to answer the question without a preliminary clarification of what we mean by "conscious." Philosophy has some useful things to say about this matter. On the other hand, once we have achieved a preliminary clarification, we are left with factual questions like "To what extent does perceptual consciousness depend causally on attention?" and "To what extent does perceptual consciousness depend causally on working memory?" Contemporary science has a lot to say about these questions. Relevant studies include investigations of change blindness, inattention blindness, binocular rivalry, hemineglect, distributed attention, and gist perception. We will consider work on all of these topics.

2. What is perception? How should perception be defined? That is, what characteristics are common to all forms of perception, and how does perception differ from other modes of cognition? What is the range of variation among the different forms of perception – to what extent do the different forms diverge from one another? We will explore these questions by considering a couple of forms of perception (blindsight and synesthesia) that are radically different from such paradigmatic forms as vision and hearing, by examining the possibility that awareness of pain and emotional awareness are ultimately perceptual in nature, and by considering the relationship between perception and reasoning processes that make use of visual images.

3. Perceptual metaphysics. The macro world of common sense is a realm of three dimensional objects moving along continuous trajectories in space-time. These objects are divided into various categories, some broad and some narrow, such as *living thing*, *animal*, *human being*, *human body*, *face*, and *nose*. This common sense view of the world is not inevitable – we know that human infants have a somewhat different view, and that members of other species have a range of different views. Hence, in a deep sense, the common sense view is a metaphysical "theory" – a proto-scientific, species-relative interpretation of reality.

It is clear that the metaphysics of common sense is shaped in part by our perceptual systems and in part by higher cognitive faculties, but it is not at all obvious, in advance of investigation, *how much* of the shaping is done by the perceptual systems. Consider, for example, the category *animal*. To what extent are the defining properties of this category due to conceptualization, and to what extent are they due to routines in the visual system for discriminating and tracking individual members of the category? More generally, to what extent is the individuation of individual substances and kinds due to information processing routines in perceptual systems? Further, to what extent is our "perceptual metaphysics" the product of experience, and to what extent is it determined by biology?

4. Colors. Since the time of Galileo, philosophers and scientists have debated whether colors are objective, mind-independent properties of physical objects, or they are instead subjective, in the sense that they cannot be defined without taking properties of the human visual system into account. How can there be disagreement about such a fundamental issue? One reason is that science appears to call our experience of color-similarity into question. It seems to us that all red things are similar – that they have something in common. It has been known for some time, however, that there are many quite different physical properties that can give rise to an

experience of red. In an important sense, it is true that there is no *physical* property that all red things have in common. Many philosophers, and also many scientists, have taken considerations of this sort to show that colors are subjective – that “red is in the head.” But if we say this, we have the problem of explaining why red *seems* to us to be on the surfaces of external objects. That is, we have the problem of explaining why red seems to be just as “external” as such objective properties as size and shape. What could possibly account for such a profound and systematic illusion? And why would Mother Nature provide us with a perceptual capacity that is so misleading? It has turned out to be very difficult to answer these questions. We will consider both the views of “color subjectivists” and the views of “color objectivists.”

5. Perception and knowledge. Philosophers have often expressed doubts about the ability of our perceptual systems to provide us with solid knowledge of an objective world. Thus, skeptics have pointed out that it is in principle possible for a widely divergent range of external causes to produce a series of perceptual experiences. (A brain in a vat of nutrients that was caused to have experiences by electrical pulses from a computer could in principle have the same experiences as you have had.) How then can we be sure that the external causes that actually produce our experiences have the natures that we take them to have? Further, there are strong reasons for thinking that the immediate objects of perceptual awareness are not external physical objects, but rather internal states that are caused by such objects. (One such reason is that the way an object looks to an observer depends as much upon features of the observer – e.g., the acuity of his vision -- as on the objective properties of the object.) But if we are never directly aware of physical objects, then our beliefs about such objects must in some sense rest on inferences from the data provided direct awareness. How can we be sure that such inferences lead to the truth? These traditional philosophical questions have in some ways been sharpened and given new force by contemporary science. (Thus e.g., as noted earlier, it can seem that vision science has undercut the common sense intuition that color experience gives us knowledge of objective, mind-independent properties.) We will consider both the philosophical and the scientific dimensions of the questions.

6. Appearance-based representation. To a very large extent, what we see when we visually explore the world depends on the perspectives or viewpoints we occupy in the course of the exploration. Accordingly, it is natural to see that the primary objects of perceptual awareness are *viewpoint-dependent properties*. What is the nature of these properties? Further, what is the relationship between perception of viewpoint dependent properties and perception of objective physical properties such as size and shape? Are our representations of objective sizes and shapes in some sense built out of representations of viewpoint-dependent properties, as one of the instructors for the present course has maintained? Or do we rather use representations of viewpoint-dependent properties as a platform for constructing independent representations of objective properties – as Irving Biederman has maintained? We will consider these and other questions about viewpoint-dependency, with attention to the implications for such traditional philosophical questions as that of whether we can be said to be *directly* aware of the objective properties of physical objects.

SEMESTER CALENDAR

[★ = MJT out of town]

September 5: Introduction

FIRST SEGMENT: PERCEPTUAL CONSCIOUSNESS

September 7: Forms of Consciousness I

Reading:

- Block, N., “Concepts of Consciousness”

September 12: Forms of Consciousness II

Reading:

- Rosenthal, D., “A Theory of Consciousness”

September 14: Phenomenal Consciousness

Readings:

- Jackson, F., “Epiphenomenal Qualia”
- Kripke, S., “The Identity Thesis”
- Nagel, T. “What Is it Like to be a Bat?”

September 19: Perceptual Consciousness and Attention I (Inattentional Blindness, Change Blindness)

Readings:

- Mack, A. and Rock, I., “An Overview” (*Inattentional Blindness*, Chapter 1)
- Rensink, R. A., O'Regan, J. K., & Clark, J. J. (1997). To see or not to see: The need for attention to perceive changes in scenes. *Psychological Science*, 8(5), 368-373.

September 21: Perceptual Consciousness and Attention II (Hemineglect, Binocular Rivalry, etc.)

Reading:

- Kanwisher, N. (2001). Neural events and perceptual awareness. *Cognition*, 79(1-2), 89-113.

September 26: Perceptual Consciousness and Working Memory

Reading:

- Koch, C., “Memories and Consciousness” (*The Quest for Consciousness*, Chapter 11)

SECOND SEGMENT: FORMS OF PERCEPTION

September 28: Barsalou’s Theory

Reading:

- Barsalou, L. W. (1999). Perceptual symbol systems. *Behavioral and Brain Sciences*, 22(4), 577-660.

October 3: Perceptual Awareness of Pain and Other Bodily Sensations ★

Reading:

- Hill, C. S., “OW! The Paradox of Pain”

October 5: Perceptual Awareness and the Emotions ✨

Reading:

- Damasio, A., “Feelings” (*Looking for Spinoza*, Chapter 3)

October 10: Synesthesia, Images, and Perceptual Reasoning

Readings:

- Two Chapters from Robertson, L. C. & Sagiv, N. (2005). *Synesthesia: Perspectives from Cognitive Neuroscience*. New York, NY: Oxford University Press.
 - Ch 4. *On the Perceptual Reality of Synesthetic Color*, Blake et al., 47-73.
 - Ch 8. *Synesthesia: A Window on the Hard Problem of Consciousness*, Gray, 127-146.
- Rich, A.N.; Bradshaw, J.L.; Mattingley, J.B. (2005). A systematic, large-scale study of synaesthesia: Implications for the role of early experience in lexical-colour associations. *Cognition*, 98(1), 53-84.

THIRD SEGMENT: PERCEPTUAL METAPHYSICS

October 12: Perceptual Foundations of Category Awareness I – Behavior

Readings:

- Mervis, C. B. & Rosch, E. (1981). Categorization of Natural Objects. *Annual Review of Psychology*, Vol. 32: 89-115
- Jolicoeur, P., Gluck, M., & Kosslyn, S. M. (1984). Pictures and names: Making the connection. *Cognitive Psychology*, 16, 243-275.

October 17: Perceptual Foundations of Category Awareness II – Neural Systems

Readings:

- Tarr, M. J., & Gauthier, I. (2000). FFA: A Flexible Fusiform Area for subordinate-level visual processing automatized by expertise. *Nature Neuroscience*, 3(8), 764-769.
- Kanwisher, N. (2000). Domain specificity in face perception. *Nature Neuroscience*, 3(8), 759-763.

October 19: Midterm Exam ✨

October 24: Guest Lecture on Perceptual Tracking (Brian Scholl)

Readings:

- Flombaum et al. (2004). Dynamic object individuation in rhesus macaques, *Psychological Science* 15(12), 795-800.
- Mitroff et al. (2004). Divide and Conquer: How object files adapt when a persisting object splits into two. *Psychological Science* 15(6), 420-425.

October 26: Guest Lecture on Perceptual Tracking (John Campbell) ✨

Readings:

- Campbell, J., “Sortals” (*Reference and Consciousness*, Chapter 4)

FOURTH SEGMENT: COLOR VISION

October 31: The Perception of Color

Reading:

- Palmer, S., *Vision Science*, Chapter 3
- Brown, R. O. Backgrounds and illuminants: the yin and yang of colour constancy. In *Colour Perception: Mind and the Physical World*, R. Mausfeld and D. Heyer (eds.), Oxford University Press. (Chp. 8)

November 2: The Functional and Neural Bases of Color

Reading (make sure you read commentaries):

- Hatfield, G. Objectivity and subjectivity revisited: colour as a psychobiological property. In *Colour Perception: Mind and the Physical World*, R. Mausfeld and D. Heyer (eds.), Oxford University Press. (Chp. 6)
- Gilchrist, A. The importance of errors in perception. In *Colour Perception: Mind and the Physical World*, R. Mausfeld and D. Heyer (eds.), Oxford University Press. (Chp. 14)

November 7: Guest Lecture on the Philosophy of Color (Alex Byrne)

Reading:

- Byrne, A. and Hilbert, D. (2003). Color realism and color science. *Behavioral and Brain Sciences*, 26, 3-21.

November 9: Guest Lecture on the Philosophy of Color (Brian McLaughlin)

Reading:

- McLaughlin, B., "Color, Consciousness, and Color Consciousness," sections 1-14

FIFTH SEGMENT: PERCEPTION AND KNOWLEDGE

November 14: Cartesian Skepticism and the Argument from Illusion

Readings:

- Descartes, R., *First Meditation*
- Smith, A.D., "The Argument from Illusion" (*The Problem of Perception*, pp. 21-35)

November 16: The Argument from Hallucination and the Argument from Perceptual Relativity

Readings:

- Smith, A.D., "The Argument from Hallucination" (*The Problem of Perception*, pp. 191-208)
- Russell, B., "Appearance and Reality"

November 21: Perceptual Representation and Misrepresentation

Reading:

- Dretske, F., "Misrepresentation"

November 28: Appearance Properties and Perception of Objective Reality

Readings

- Palmer, S., *Vision Science*, 7.1.1, 7.1.2

- Noë, A., *Action in Perception*, Sections 3.3, 3.4, 3.5, 5.2, 3.2

SECOND SEGMENT CONTINUED: FORMS OF PERCEPTION

November 30: Guest Lecture on Blindsight (Melvyn Goodale)

Reading:

- Goodale, M. A. (2000). Perception and Action in the Human Visual System. In *The New Cognitive Neurosciences (2nd ed.)*, Gazzaniga, M. S. (Ed.); pp. 365-378, Cambridge, MA: The MIT Press.
- Goodale, M. A. (2004). Perceiving the world and grasping it: Dissociations between conscious and unconscious visual processing. In *The Cognitive Neurosciences (3rd ed.)*, Gazzaniga, M. S. (Ed.); pp. 1159-1172, Cambridge, MA: The MIT Press.

SIXTH SEGMENT: APPEARANCE BASED PERCEPTION

December 5: Recognition by Components

Readings:

- Biederman, I. (1987). Recognition-by-components: A theory of human image understanding. *Psychological Review*, 94, 115-147.

December 7: Recognition by Viewpoint Dependent Properties

Reading:

- Tarr, M. J., & Bülthoff, H. H. (1995). Is human object recognition better described by geon-structural-descriptions or by multiple-views? *Journal of Experimental Psychology: Human Perception and Performance*, 21(6), 1494-1505.
- Tarr, M. J. (2005). How experience shapes vision. *APA Science Briefs* (July).

Term papers are due