

## ***Cognitivist Overview***

Cognitivist Psychology, and the affiliated disciplines that make up 'Cognitive Science': linguistics, computer science, philosophy and neuroscience, owe an intellectual and cultural debt to behaviorism. While many in the cognitivist community see themselves in the tradition of William James, John Dewey and the 'Chicago school,' most cognitivists were trained as behaviorists. They do not differ with behaviorists with respect to the metaphysical thesis that the mind is physical. They differ on the basic object of study of psychology: the cognitivists hold that psychology is the study of the mind, not just behavior.

Theoretically, cognitivism marries information theory of computer science to psychology and neurobiology. It sees mental states and processes as informational states and processes which are realized in the computational 'hardware' of the brain. Thus, a proper explanation of psychology should not only describe the behavior of the organism, it should also explain the informational algorithm that drives that behavior, and the neurobiological states that implement the algorithm.

You are neutral on the issue of the definition of mental illness, but be ready to oppose any definition that is clearly behaviorist or psychoanalytic in nature.

## ***David Marr, Graduate Student***

### **Your Biography**

Young neuroscientist from Cambridge. In 1971, you haven't even finished your dissertation, which proposes a model of the function of the brain with respect to vision. You come to the APA primarily because of your interest in the work of Miller and Chomsky. You think of the brain as essentially an information-processing device, and you know that Miller and Chomsky both got their start working in information theory during WWII.

You were born in Essex, England, and educated at the private, prestigious Rugby School. You went to Trinity College, Cambridge on 1 October 1963, where you studied Mathematics for both a BS and an MS. You became interested neuroscience and started a PhD under the direction of Giles Brindley. You are currently working on your Dissertation in the physiology of vision. You've only published three papers at this point, but they have been influential.

You treat the brain as an information processing system. You put forth (in concert with Tomaso Poggio) the idea that one must understand information processing systems at three distinct, complementary levels of analysis. This idea is known in cognitive science as Marr's Tri-Level Hypothesis:

- computational level: what does the system do (e.g.: what problems does it solve or overcome) and, equally importantly, why does it do these things
- algorithmic/representational level: how does the system do what it does, specifically,

what representations does it use and what processes does it employ to build and manipulate the representations

- implementational level: how is the system physically realized (in the case of biological vision, what neural structures and neuronal activities implement the visual system)

## Game Objectives

Articulate your theory of levels of explanation, and its sympathetic relationship to Chomsky and Miller's metatheoretical positions with respect to explanation in linguistics and psychology respectively. This should be in the form of a paper in 1975.

You are neutral on **the issue of the definition of mental illness**, but be ready to oppose any definition that is clearly behaviorist or psychoanalytic in nature.

**Fission:** Join Miller and Chomsky's Cognitive Science Society

## Must Read

Marr, D. (1969). "A theory of cerebellar cortex." *J. Physiol.*, 202:437-470.

Marr, D. (1970). "A theory for cerebral neocortex." *Proceedings of the Royal Society of London B*, 176:161-234.

Marr, D. (1971). "Simple memory: a theory for archicortex." *Phil. Trans. Royal Soc. London*, 262:23-81.

Marr, D. (1982). *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information* MIT Press (esp. Ch 1)

## Secondary Sources

Edelman, S. & Vaina, L.M. "David Marr" available at <http://kybele.psych.cornell.edu/~edelman/marr/marr.html>