The Vision Problem

The *Vision Problem* is that of constructing representations of the *state* of the world from samples of the flux of photons present in the environment.

Issues that need to be addressed:

- What constitutes the "state" of the world?
- What is a good representation of the state?
- What is the relationship between the world state and the flux of photons?
- How is the photon flux sampled, or transduced?

Ecological Optics

(Gibson, J.J., **The Senses Considered as Perceptual Systems**, Greenwood Press, Westport Connecticut, 1966)

Gibson suggested that to determine how the brain constructs a representation of the world, we need to combine *optics* with *ecology*.

Gibson makes a distinction between direct, *radiant*, light and *ambient* light.

Radiant light is that given off by light sources, such as the sun, stars, or light bulbs.

Ambient light is radiant light that is reflected, or transmitted, by structures in the environment.

It is ambient light, therefore, that contains most of the information about the state of the world.

Stages in Ecological Optics

Gibson describes, in 8 "stages", the way in which the state of the world gets enfolded into the photon flux (or as Gibson refers to it, the "ambient array").

- 1. Radiation from a luminous source.
- 2. Scatter-reflection of light from surfaces.
- 3. The set of convergence of points in a medium.
- 4. Ambient light at a stationary convergence point.
- 5. The Effective Array at a stationary convergence point.
- 6. The ambient array at a moving convergence point.
- 7. Figural motion with the ambient array.
- 8. Kinetic optical occlusion and edge information.