

## What do Visual Modules do?

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The visual system has a parallel organization, evident at every stage of signal transmission from the retina onwards. The parallel pathways that originate in the retina remain distinct until they reach primary visual cortex, where their separate identities are submerged in a new system of parallel, but interconnected, pathways that contain a hierarchy of modules.

Although the general benefits of parallel and hierarchical organization in the visual system are easily understood, it has not been easy to discern the function of the modules. A widely held view is that in extrastriate cortex the different visual modules analyze different fundamental dimensions of variation in the image (cortical areas V4 and MT being notable examples, associated with the analysis of color and movement, respectively), with the outcomes of these analyses being later brought together to provide a coherent and comprehensive representation of the visual world. This general conception leaves unanswered such questions as why do we need so many visual modules; what is done at each level in the hierarchy; how are the outcomes of the different analyses brought together?

I shall argue that the visual system does not work in the way outlined above. Rather than undertaking multiple relatively independent analyses of the image from which it assembles a unified representation that can be interrogated about the what and where of the world, cortex is organized so that perceptually relevant information can be recovered at every level in the hierarchy, that information used for decisions at one level is not passed on to the next level, and, with one rather special exception, through all stages of analysis all dimensions along which the image is analyzed remain intimately coupled in a retinotopic map.