

# What Human-Vision Scientists and Neuroscientists Have to Say

Spring 2013

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- Bela Julesz [1991]: “In real-life situations, bottom-up and top-down processes are interwoven in intricate ways,” and “progress in psychobiology is ... hampered ... by our inability to find the proper levels of complexity for describing mental phenomena”

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- V.S. Ramachandran: [1998]  
“Perceptions emerge as a result of reverberations of signals between different levels of the sensory hierarchy, indeed across different senses”. He then goes on to criticize the view that “sensory processing involves a one-way cascade of information (processing)”

- Richard Gregory [1998]: "Perceptions are predictive hypotheses, based on knowledge stored from the past". The idea goes back to Helmholtz (19<sup>th</sup> century).

## A Neuroscience Sampler

- Research published in *Nature Neuroscience* in November 2008 has found “evidence for explicit neural code for complex three-dimensional object shape” in the brain of monkeys.
- An editorial in the same issue (“*So many pixels, so little time*”) points out that “the primate visual system is composed of 25-40 distinct areas, depending on how they are counted.”

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## Challenges to Machine Vision

- We have to deal with the fact the processing is not unidirectional and also affected by other factors besides input (context both inside and **outside** the image). **Visual illusions** (far more common than auditory illusions) **attest to that fact.**

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