Introduction to Cognitive Science - Term Paper 2

Examining evidence against the Action vs Perception Hypothesis proposed by Goodale & Milner (1992), with experiments on visual illusions

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Abstract

Ungerleide (1982) proposed based on lesion studies on monkeys that in primate brains, visual information was processed in two streams – dorsal and ventral. Goodale & Milner (1992) reinterpreted this theory, making a species jump to humans and suggesting that the dorsal stream had the purpose of guiding the manipulation of objects (action) and the ventral stream did the computations necessary for object recognition (perception). I have picked two papers that disagree with this, one via experimentation (Franz et al., 2000), and the other by an analysis of existing work at the time (Franz, 2001). In this term paper, I will be explaining the phenomenon being considered in the first place, the cognitive processes involved, a quick summary of the experiments and arguments, noted gaps in the treatment, potential extensions to the study, and my own suggestions on future experimentation.

What are we looking at?

- Studies with visual illusions have been used to propose evidence for the separate visual processing pathways theory. We're looking at counter-arguments: studies that look at the same illusions with different experimental setups and justify why the original proposal is not so.

The original hypothesis, and responses

- In brief: the theory is that primate visual system is organised into two parallel pathways. Goodale & Milner (1992) suggested extending it to humans too, using an experimental setup around the Ebbinghaus illusion. Hereon this will be referred to as 'the hypothesis'
- Initially received positively, more critical pieces tackling gaps and flaws in the original experiments came up. I'm looking at one such response (Franz et al., 2000) that sets up an experiment contradicting Goodale's (1992) results, and also adds a few more to refute assumptions taken to be true in earlier work. I will also be looking at Franz (2001), that looks at publications on the topic at the time and highlights methodological concerns with all the work agreeing with Goodale's (1992) original work.

The Cognitive Processes involved

- Vision:
  - Perception
  - The hypothesis suggests that this is a complex task involving computations for object recognition and conscious perception, taking up the ventral stream of processing.
- Motor:
  - Estimation

- The hypothesis suggests that this is taken care of by the dorsal stream, where the focus is on quick computation and short-term memory that can locate objects (that might be moving) and start acting towards performing operations on them.

The Experiments and Arguments

Gaps and Future work

References

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Ungerleide, L. G. (1982). Two cortical visual systems. *Analysis of Visual Behavior*, 549–586.