

Dual pathway hypotheses for perception and action: A critical view.

A number of prominent theories assume that the visual system is divided into two parallel subsystems. For example, Milner and Goodale proposed two separate systems for action and perception: The vision-for-action system is assumed to be located in the dorsal cortical stream and to use visual information to guide motor actions. The vision-for-perception system is assumed to be located in the ventral cortical stream and to be used for object recognition and to generate the conscious visual percept. Recently, Glover and Dixon suggested an alternative view by assuming that the ventral stream controls early phases of movements and therefore has an important role in movement execution ("planning"), while only late phases are controlled by the dorsal stream ("control"). A number of studies on the effects of visual illusions on grasping seemed to provide evidence for one or the other of these incompatible theories. Strong evidence in favor of Milner and Goodale's model was the finding that visual illusions affect only perception but not grasping, while evidence in favor of Glover and Dixon's model was the finding that only early phases of grasping are affected by visual illusions but not late phases. However, these findings are controversial and have led to many further studies with seemingly contradictory results. I will argue that these results are not as contradictory as it seems at first sight. Instead, I argue that the data consistently show that grasping is affected by visual illusions in a similar way as perception. This suggests that visual illusions deceive a common representation of object size that is used by perception and action. In consequence, grasping and visual illusions should not be counted as evidence for a subdivision of the visual system.