

Optical illusions as a tool to understand visual perception in monkeys and fish

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Optical illusions are commonly used in perception studies as they can reveal how visual information is processed in terms of top-down and bottom-up mechanisms. Comparative researchers have also focused their attention on how non-human animals perceive illusory patterns. Indeed, like human perception, the perception of non-human species is likely to be subjective, in which a subject's perception of the external world is not congruent with reality. The comparative study of optical illusions has become a useful tool to investigate whether perceptual systems are similar/dissimilar to those described in humans [1-2].

Here we summarize our recent studies on optical illusions in rhesus monkeys (*Macaca mulatta*) and fish (*Poecilia reticulata* and *Danio rerio*). For instance, in two studies on illusory motion [3-4], subjects were initially trained to discriminate static versus dynamic arrays. Once reaching the learning criterion, they underwent probe trials in which we presented the rotating snakes illusion and a control stimulus identical in overall configuration with the exception that the order of the luminance sequence was changed so that no apparent motion could be perceived by human observers. Results showed that both species spontaneously classified the rotating snakes array as a dynamic pattern, suggesting the perception of illusory motion in rhesus monkeys and guppies. By using similar training procedures, we also investigated subjects' sensitivity to other illusory phenomena, like Zöllner illusion [5] and brightness illusion [6]. On the whole, our results showed that distant-related species have a similar perception of these optical illusions, raising the intriguing possibility that the perceptual systems commonly described in humans are more ancient than previously thought.

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