

# Theoretical approaches to perception processes



Cognitive psychologists differ in their views on the processes involved in perception. Outline two theoretical approaches to perception and provide empirical support for each.

## Introduction

Explanations of perception seek to explain and better understand the process that facilitates the transformation of sensory information from the environment into the experience of objects, sounds, and movement. One of the most established fields of psychological research, studies in perception range from basic recognition of shape, colour, and form, to the more complex relationship between, motion, attention and performance (Eysenck, 2005). In the early 1900's, a group of psychologists sought to show how people organize fields of information during perception, memory, and thought (eg: Duncker, 1945; Koffka, 1935; Kohler, 1940; J. M. Mandler & G. Mandler, 1964; Wertheimer, 1945/ 1982. In Barsalou, 1992). Since then, the distinctions between the work of cognitive and perception psychologists have become less obvious, with cognitive and behavioural approaches increasingly being used in the effort to understand the complex process of visual perception. As experimental approaches have brought about more refined empirical techniques, a greater number of theories have developed in order to help explain the phenomenon. This essay focuses on James Gibson's theory that perception and action are very closely related. Gibson first put forward this theory more than fifty years ago (Eysenck, 2005). The second theory under discussion is the Constructivist approach, which posits that experience formed in memory assist the observer in making informed judgements about the size, shape, form, etc of an object.

Gibson (1979) first brought into discussion the term ‘ direct perception’ – relating to the idea that we pick up enough information from the visual environment to form a conscious version of what we see and that we do not need to use higher levels of cognitive processing in order to understand the visual world (Cardwell et al, 2004).

Part of Gibson’s theory maintained that perception depends upon the existence of a number of cues which inform the brain about the size, shape, and texture of objects, and the distance away from the observer that they lie. Gibson’s work is unique as he based his findings on experiments conducted outside of laboratory conditions – although still very much within a controlled environment with measurable results. Part of Gibson’s work has helped develop new technological features at airports to help pilots develop their depth perception, while the application of his flow patterns idea has been incorporated into the constructions of roundabouts to create the illusion for drivers that they are accelerating on their approach and thus making them slow down (Cardwell et al, 2004). The applicability of these theories to real-life situations increases their relevance and causes them to be an attractive explanation as to how we perceive our visual environment. Gibson (1979) expounded upon what he meant by ‘ direct’:

“ So when I assert that perception of the environment is direct, I mean that it is not mediated by *retinal* pictures, *neural* pictures, or *mental* pictures. *Direct perception* is the activity of getting information from the ambient array of light. I call this a process of *information pickup* that involves the exploratory activity of looking around, getting around, and looking at things.”  
(1979, p. 147)

Gibson posited that it was in the nature of light – as an optic ray – that facilitated our understanding of objects and material reality. Gibson's studies of observation he claimed were founded upon his experiences in World War II. When carrying out aviation experiments, Gibson concluded that the laboratory approach to the study of depth perception could not be suited to improving a pilot's ability to land an airplane, and that it was necessary to study perception outdoors into the natural environment. According to Goldstein (1981, p. 191), in Gibson's 'ground theory' visual space 'is defined not by an object or an array of objects in the air (as occurs for depth cues such as interposition, relative size, etc.) but rather is defined by the ground, a continuous surface or array of adjoining surfaces.' Gibson's texture gradient suggests that there exists a rate of change in texture density. For example, as the gaps in a rail track appear to get closer together the greater the distance over which they are perceived (Eysenck, 2005). Gibson measured his findings in real life situations of perception – where the observer is not stationary in a laboratory and 'observing' – rather, Gibson believed in the importance of the observer being active, constantly moving their eyes, head and body in relation to the environment (Goldstein, 1981).

Gibson's work has been continuously investigated by other researchers who have been keen to establish its strengths and weaknesses. For example, Greenberg and Donnell (1972) found that the 'weakness of stripes or straight contours does have some touch points in research on infant and adult perception.' (In Pick and Gibson, 1979, p. 71). While very young infants preferred to look at checks over stripes (Greenberg and Donnell, 1972), MacKay and Jeffreys (1973) recorded that adults looking at parallel lines in

contrast with lines that had corners or breaks in them, showed more visually evoked potential for the checked and broken lines, but was relatively small for the parallel lines ( *Ibid* ). Whereas Mayzner and Habinek (1976) found in tachistoscopic experiments that the ' threshold is much lower for detecting contours that change in direction than it is for detecting those that do not' ( Mayzner & Habinek, 1976. In Pick and Gibson, 1979, p. 71). These forms of empirical research have dated well as they highlight basic dichotomies between shapes and forms and how they are perceived by the human eye and thus translated as information by the brain. There is not much scope for disproving Gibson's theories - rather, the challenge of his work lies in whether his explanations of perception are enough to explain the complexity of understanding the material world. Gibson also made an insightful point as to the nature of research and theory of perception - that ' the starting point of perceptual research and theory depends critically on the language used to describe the information available for perception' (Carlson, 1997, p. 76), and that psychologists are thus apt to partially self-define the objectives and results of their own experiments.

In ostensible contrast to Gibson's work, the Constructivist approach places less emphasis on the nature of the visual stimulus itself and focuses on the implications of stored memories (Cardwell et al, 2004). Past experience thus shapes and informs present experience. Gibson's idea that perception is founded upon cues provided by the object itself is reversed in this approach to understanding perception, where perception is effectively constructed by the memory. Gregory expounded upon Gibson's theory by experimenting with the idea that visual stimuli are basic ' starting points' upon which the

observer makes informed guesses about their meaning (Cardwell et al, 2004). Constructivist theory has received much empirical support, beginning in the early 20<sup>th</sup> century with the work of Tichener (1914). Boring (1946) worked with, and altered these experiments, to produce the well-known 1941 Holway and Boring experiment. Here, participants observed the size of a disk, from varied distances. Holway and Boring sought to reduce the number of distance cues available to participants, and found that the more that cues “reduced”, the poorer the size perceptions recorded. Boring concluded that perception needed a core stimulus, and a mediating context informed by cues. Size perception thus relies upon a perceived distance that allows the observer to make informed judgements. In such laboratory experiments there exists the hypothesis that certain illusions persist in our perception of the world - this was a crucial element of the Constructivist theory. Gibson criticised the empirical research for these approaches, highlighting their artificiality and inapplicability to real-life. Furthermore, if perception is analogous to our making judgements and decisions this would not explain how precise perception is - ie: if Constructivist theory is correct then we would make many more mistakes in how we perceive the world.

To conclude, neither approach is meant to be an alternative to the other - rather they are used in conjunction with each other, and the type of processing employed will depend on the type of visual stimulus present in front of the observer. In her discussion about the relevance and scope of cognitive theory, Disessa quotes Marton who has heavily criticised the efforts of cognitive science to explain human experience (Disessa, 1993). Disessa goes on to say that ‘whether for systematic or accidental reasons, cognitive

science has not done particularly well at illuminating the structure of experience.’ (1993, p. 261). If cognitive approaches are to ultimately succeed, then they need to focus more on explaining consciousness itself (Barsalou, 1992), rather than the mechanisms which define consciousness. Other explanations have attempted to identify the behavioural aspects of sensory experience – which indirectly inform the observer as to the nature of their experience. For example, Ludwig (1999) suggests that as well as being able to perceive shapes visually and through touch, we also gain information through other sensory modes. He gives the example of knowing through smelling the scent of a mango that the fruit of the smell’s origin is round; here, shape is not perceived by a visual judgement, but is inferred from ‘ the character of one’s sensory experience and collateral information that an object of a certain shape caused it.’ (Ludwig, 1999, p. 29). There will no doubt continue to be variations and expansions upon the work of Gibson, and of the older constructivist theories – yet the fundamental precepts of each theory remain as integral to the study of perception as they did over fifty years ago. The relationship between the static or stationary observer and the material world will ultimately rely upon the distance, texture, and shape of the perceived object, while the degree to which perception relies upon past experience is yet to be fully understood.

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