

CONCEPT OF VISUAL SENSATION IN A THEORY OF VISUAL ATTENTION: A THEORETICAL NOTE¹

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Summary.—An integrated account of visual sensation, recognition, and attentional selection is sketched in outline.

In "Concept of Visual Sensation" (1), I proposed a sharp distinction between sensory and perceptual processes. In "A Theory of Visual Attention" (2), I suggested a unified account of visual recognition and attentional selection. The purpose of this note is to indicate how both contributions fit in with a fairly broad and conventional conceptualization of visual processing.

Sensory processing.—Visual processing of stimulus objects proceeds through several stages. The first major stage, the *sensory* stage, produces initially an impression of the two-dimensional distribution of light over the retina [a *primal sketch* (4)] and subsequently an impression of the three-dimensional visual world [a *2½-D sketch* (4)]. The visual-world impression "can be uniquely specified by content in terms of moving, colored regions in three-dimensional space" (1, p. 1195).

Unit formation.—The next stage of processing generates a part-whole organization of the visual input by Gestalt grouping operations (3). At this stage, parts of the scene represented in the total visual impression are defined as separate perceptual units by criteria based on proximity, similarity, and continuity. The set of perceptual units is the set of *elements in the visual field*.

Perceptual testing.—For some categories F , a measure of the strength of the sensory evidence that an element x in the visual field belongs to category F is computed by comparing element x (actually, a structured visual impression of element x , formed at the previous stage of processing) against a memory representation of visual characteristics of members of category F . A category F with this property is said to be a *perceptual category*.

Attentional selection.—In the theory of Bundesen (2), visual recognition and attentional selection consist in making perceptual categorizations of the form " x belongs to F_i " where x is an element in the visual field and F is a perceptual category. The computed strength of the sensory evidence that x belongs to F is one of the factors that determine the likelihood that the perceptual categorization, " x belongs to F_i ," is made (selected). Other factors are pertinence values of perceptual categories and perceptual decision-bias parameters. The way in which the factors interact is explained in the theory.

REFERENCES

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