

In earlier work, I analyzed early vision, which I claimed is a pre-attentional visual stage unaffected by top-down conceptual/cognitive modulation. Thus, early vision is a cognitively impenetrable stage of visual processing. I have related the content of the states of early vision with the nonconceptual content (NCC) of perception by arguing that the cognitive impenetrability of some states and contents is a necessary and sufficient condition for these states and contents to be nonconceptual. I also underlined the distinction between early vision and late vision. The latter is cognitively penetrated and involves the modulation of processing by either spatial or object/feature centered attention.

In this paper, I examine the processes that occur in late vision and discuss whether late vision should be construed as a perceptual stage or as a thought-like discursive stage. I argue that late vision, its (partly) conceptual nature notwithstanding, does not consist in pure thoughts, that is, propositional structures that are formed in the cognitive areas of the brain and participate in discursive reasoning and inferences. The content of the output of late vision, that is, an explicit belief concerning the identity of an object (recognitional belief), enters into discursive reasoning. Using Jackendoff's (1989) distinction between visual awareness, which characterizes perception, and visual understanding, which characterizes pure thought, I claim that the contents of late vision belong to visual awareness and not to visual understanding. Although late vision implicates beliefs, either implicit or explicit, these beliefs are hybrid visual/conceptual constructs and not pure thoughts.

In the first section, I sketch early vision.

Then, I discuss late vision with an emphasis on its role in object recognition. The purpose is to examine some of the contents and processes of late vision and their timing. The conceptually modulated stage of visual processing is called late vision. In 50 ms low spatial frequency information (LSF) reaches the IT and in 100 ms high spatial frequency information (HSF) reaches the same area. Within 130 ms post-stimulus, parietal areas in the dorsal system

but also areas in the ventral pathway semantically process the LSF information and determine the gist of the scene based on stored knowledge that generates predictions about the most likely interpretation of the input. This information reenters the extrastriate visual areas and modulates (at about 150 ms) perceptual processing facilitating the analysis of HSF, for example, by specifying certain cues in the image that might facilitate target identification. At about 150 ms, specific hypotheses regarding the identity of the object(s) in the scene are formed using HSF information in the visual brain and information from visual working memory. The hypothesis is tested against the detailed iconic information stored in early visual circuits including V1, a process that requires about 300ms. Thus, in late vision hypotheses concerning object identity are tested and the object is recognized at about 300 ms.

In the third section, I argue that late vision should be considered as a perceptual rather than as a discursive stage involving understanding, that is, a stage of thought processing involving pure thoughts and inferences from propositionally structured premises to the identity of objects. My argument is based on considerations regarding the sorts of contents and processes formed in early and late vision. The reason is twofold.

First, I think that the states of late vision are not inferences from premises that include the contents of early vision states. An inference relates some propositions in the form of premises with some other proposition, the conclusion. However, the objects and properties as they are represented in early vision do not constitute contents in the form of propositions, since they are part of the non-propositional NCC of perception. In late vision, the perceptual content is conceptualized but the conceptualization is not a kind of inference but rather the application of stored concepts to some input that enters the cognitive centers of the brain and activates concepts by matching their content.

One might think that inferences are involved since testing hypotheses is an inferential process even though it is not an inference from perceptual content to a recognitional thought.

It is, rather, an argument of the form if A and B then (conclusion) C, where A and B are background assumptions and the hypothesis regarding the identity of an object respectively, and C is the set of visual features that the object is likely to have. A consists of implicit beliefs about the features of the hypothesized visual object. If C is what obtains in the visual areas, that is, if the predicted visual features match those that are stored in iconic memory then the hypothesis about the identity of the object is likely correct. However, the test basis or evidence against which these hypotheses are tested for a match, that is, the iconic information stored in the sensory visual areas, is not a set of propositions but patterns of neuronal activations whose content is non propositional.

Second, object recognition is not an experience-based belief that is a case of understanding. The constitutive reliance of late vision on the visual circuits suggests that late vision relies on the presence of the object of perception; it cannot cease to function as a perceptual demonstrative that refers to the object of perception, as this has been individuated through the processes of early vision. As such, late vision is constitutively context dependent since the demonstration of the perceptual particular is always context dependent. Thought, on the other hand, by its use of context independent symbols, is free of the particular perceptual context. Even though both recognitional beliefs in late vision and pure perceptual beliefs involve concepts (pure attributive elements (Burge 2010)), the concepts function differently in the two contexts.

The attributive elements guide the contextual reference to particulars since the referent in a demonstrative perceptual reference is fixed through the properties of the referent as these properties are presented in perception. Concepts enter the game in their capacity as pure attributions that make use of the perceptual mode of presentation. In this case, the role of perceptual attributives is ineliminable and, thus, in late vision, unlike in pure beliefs, there

can be no case of pure attribution, that is, of attribution of features in the absence of perceptually relevant particulars since the attributions are used to single out these particulars.

The inextricable link between thought and perception in late vision explains the essentially contextual character of beliefs in late vision. The proposition expressed by the belief cannot be detached from the perceptual context in which it is believed. The reason is that the belief is tied to a idiosyncratic viewpoint by making use of the viewer's physical presence and occupation of a certain location in space and time; the context in which an essentially indexical thought is believed is essential to the information conveyed.