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The Cognitive Impenetrability of Cognition

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Abstract: Cognitive impenetrability is really two assertions: 1) Perception and cognition have access to different knowledge bases; and 2) perception does not use cognitive-style processes. The first assertion leads to the unusual corollary that cognition is itself cognitively impenetrable. The second fails when it is seen to be the claim that reasoning is available only in conscious processing.

Pylyshyn argues that some parts of vision are not subject to the operation of reasoning and problem solving -- they are cognitively impenetrable. He notes that perceptual decisions are often made despite the observer's knowledge that the percept must be wrong. This makes perception irrational in Pylyshyn's view, leading to the claim that perception, or specifically, early vision is unlike cognition and cannot use higher order processes such as inference. Complex perceptual processes are not inferential, they are merely compiled, built-in procedures. Not only is vision not cognition, it is not even like it. Cognition is the sole site of reasoning and rational problem solving.

This is serious cognocentrism. Pylyshyn confuses what people know with what cognition knows and what perception really ought to know. This does not demonstrate that perception and cognition use different procedures. If I make a decision despite something only you know, you don't call me irrational, you call me ignorant. And the same holds for perception. It is not irrational, it is just ignorant of the knowledge available to cognition.

You could analyze a picture cognitively, say, deciding whether a dark patch was a shadow, a dark object, or a marking on a lighter object by checking whether there were any possible objects in the scene for which this could be a shadow, whether the region was uniformly darker than its surround all along its border, whether there was a light source consistent with the shadow, or alternatively, whether the dark area itself could be recognized as a known object. If this were done on a numerical representation of the image, to disable any help from the visual system, we would note that this is a possible task for cognition but it would be extremely slow. The visual system performs these very same, highly sophisticated and complex steps at great speed, interrogating knowledge bases, verifying image support and selecting the eventual interpretation of the image from among several alternatives. Two things distinguish this process from cognition. It is extremely fast whereas cognition is slow and its knowledge base is independent of the knowledge base used for cognition.

Clearly, perception and cognition have access to different knowledge bases — things known and reportable consciously have only indirect influence on perceptual outcomes. The details of the knowledge that drives perception cannot be reported verbally. However, this separation of knowledge bases is not limited to cognition and perception, it is often found within cognition itself. As only one example, religious beliefs are, almost by definition, held independently of rational analysis of the physical world — they are cognitively impenetrable. By choice.

Let's look at what Pylyshyn means when he says cognition. Cognition, he says, is present when a system's output "can be altered in a way that bears some logical relation to what the person knows..(p. 5, line 16)" So if a person "knows" that the two lines of the Muller-Lyar illusion are the same length and yet persists in seeing them as different lengths, that percept is cognitively impenetrable. But who is this "person" who "knows" this fact about the two lines? The "person" cannot include his or her own visual system because the visual system believes the lines are different and reports this as the percept. In truth, it can be only the verbally responsive, conscious part of the person that "knows" that the lines are equal. Pylyshyn has linked cognition and cognitive-style processes solely to consciousness, to reportable knowing.

Not that cognition is restricted to conscious events. Clearly, much of the flow of cognition consists of inaccessible, unreportable gaps, memory retrievals, intuitions, rapid routines which return conscious results but whose details cannot be inspected. But the path of cognition is marked by a sequence of conscious states, like Hansel's trail of bread crumbs through the forest. Unless Pylyshyn defines it differently, what he claims we know appears to be only that which we can tell another person.

In this case, Pylyshyn has not shown that vision is cognitively impenetrable, bereft of cognitive-style processes like inference and rationality. He has only shown that vision is impenetrable to consciousness. This fact alone does not constrain the nature of the processes used by vision. It does not rule out inference unless we accept that inference is solely a property of consciousness. There are no grounds for that rather strange assertion.

There are undoubtedly profound differences between vision and cognition but Pylyshyn has not identified differences in process, only differences in access to knowledge. What is needed is a description of the specific procedures which are unavailable to unconscious vision. If none can be named, no differences should be assumed.