The primacy of ecological realism

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Abstract: Whether or not the correspondence of dorsal stream functions to Gibsonian ecological psychology and the ventral stream functions to "constructivism" hold up, the overall goal of capturing a pragmatic realism should not be forgotten.

The fundamental perceptual question for ecological psychology, as some of us understand the field, is "How does an animal perceive its environment?" (Shaw et al. 1982). In proximal-distal language (which Gibson rejected as incoherent), the question would be, "Why does an animal *ever* experience the distal?" We have argued that the primary emphasis needs to be on the word "environment," and that the priority to be emphasized is the problem of reference in perception. Thus, the question of how an animal perceives its environment is to contrast "the environment"[1] with other possible objects of perception. "How is it that the animal perceives its environment, and not something else?" This is the question of realism, and it is a question that can guide empirical research.

The realist emphasis is one that does not come through in Norman's description of ecological psychology in the target article. He understands correctly that Gibson argued for a far richer view of optical structure than most other researchers, and that the concept of an invariant is important, but does not mention that the point of richer notions is to converge on "the environment," to make specificity possible. I do not think Norman objects to the realist position, but his focus is elsewhere. The persistent problem of reference (Shaw 2001) is rarely acknowledged by psychologists and neuroscientists, including adherents of Gibson, yet we've always taken it to be where Gibson's insights have contributed the most. In brief, Gibson's answer to why it is the external world that an animal perceives and not something else, is that the information (optical structure, for vision) specific to the environment is *different from* the information specific to anything else. Gibson's enterprise of ecological optics, and the consequences of its alternative descriptions, is devoted to finding formulations that are more and more adequate to this scientific goal of principled, specific description of environmental information. We take it that questions of processing and questions of directness and indirectness are *subordinate to* the question of whether or not the environment is indeed what is perceived. We have maintained that indirect perception of the environment will necessarily be parasitic on direct perception and would be impossible without direct perception.

Gibson's position is that information (optical for vision) is indefinitely rich in its specificity. A real world is distinct from a surrogate world by virtue of its nested structure at all scales. When one looks closely at the skin of a person, one ultimately gets to cells. When one gets closer to a painting of the same face, one gets to the paint and grain of canvas, not cells of skin tissue. For a digitized photo of the painting, one gets to pixels, not paint and canvas. The scrutiny of the world at a variety of levels, which exist simultaneously, is critical for clarifying what one is perceiving. The convergence of perception on the "real world" in light of indefinitely rich, specific information, is crucial to how Gibson thought about perceiving and its foundations. In pattern recognition, there is an unknown pattern and the task is to make it explicit, to come up with an answer to the question of what it is (Marr 1982). In Gibsonian perceiving, there are no right or wrong answers, but degrees of clarity and sufficiency for the tasks at hand. Perceiving is pragmatic. There is always more to be perceived in any real situation, and obtaining additional information is a criterion of reality. The specific cases of texture gradients, horizon ratios, optic flow, and tau, stimulated by ecological research, need to be thought of as way stations toward increasing understanding of optical information (for vision), and not as ultimate destinations. They represent progress over what came before, and they illustrate what Gibson meant by "higher order invariant," but they are far from sufficient to specify fully the concrete world that animals (of any kind) live in. They do not, in themselves, capture the nesting type of organization crucial to Gibson. If we were to stop with the inventory we have, we would have "higher order invariants," but we would still be far short of specificity. Our scientific characterizations have to get richer and deeper, just as Gibson said that perceiving over time does (learning). Scientists need some kind of vision to act as a guide for future work. What I've sketched is what I take to be a guiding Gibsonian vision.

Regardless of whether one calls what either the dorsal or the ventral system does "perceiving" or "information pickup," the question I want to highlight is whether the object of the system, for Norman, is the environment. If recognition and identification are carried out primarily by the ventral system, using long-term memory, what is it that is recognized and identified? If I see someone from a distance, without my glasses, and finally "recognize" the person as my acquaintance, John, what did the ventral system do besides come up with a name? It is one thing to try to identify some relevant brain events, but it is quite another to explain how they refer back to John, the unique person in the world.

Without an account of reference, I do not see how an indirect theory can succeed, and I can't see that associating the constructivist approach with the ventral system helps. The problems that constructivist approaches fail to address are still not addressed when one associates them with the ventral system.

What is to be said about the data reviewed by Norman? How are we to understand the two streams? There is much to be understood and he is persuasive that the labor is worthwhile. The development of Gibson's ideas toward more traditional "cognitive" topics was started by Gibson himself (see Mace 1986) and is being pursued seriously by Robert Shaw (Shaw 2001) by careful examination of intentionality and choice. As these efforts mature, I'm guessing that alternative interpretations of the functions of the ventral system will emerge and that we can fruitfully discuss and debate these alternatives with Norman.

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NOTE

1. The word "environment" is used broadly here to include the self, in accord with Gibson's stipulation that "to perceive is to be aware of the surfaces of the environment and of oneself in it . . . . These are existing surfaces; they are specified at some points of observation . . . The full awareness of surfaces includes their layout, their substances, their events and their affordances" (Gibson 1979/1986, p. 255).

The dual route hypothesis in visual cognition: Why a developmental approach is necessary

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Abstract: Norman presents intriguing arguments in support of a mapping between ecological and constructivist visual cognition, on the one hand, onto the dorsal ventral dual route processing hypothesis, on the other hand. Unfortunately, his account is incompatible with developmental data on the functional emergence of the dorsal and ventral routes. We argue that it is essential for theories of adult visual cognition to take constraints from development seriously.