

Co-opting holograms. This paper usefully dispels some of the aura of inevitability that surrounds much of the enthusiasm for cognitive science today. Even if, as is often said, cognitive science is the only game in town or the only well developed research program in psychology with a prayer of success, it *might*, for the sorts of reasons Haugeland cites, still turn out to have been a perniciously seductive dead end. Haugeland says, correctly, that the best antidote to the "what else could it be?" defense is a sketch of a "conceivably viable alternative." I wish Haugeland had been able to come up with something more conceivably viable than a hologram-inspired nunch. Holograms are marvelous information-storers and (in a restricted sense) information-transformers, and perhaps could be harnessed, as Haugeland suggests, as powerful content-driven associators or address-finders, but so far as we know now, that is the extent of their powers, and what we need are ways of getting information *processed* in a much more dramatic sense: an army with high-fidelity holographic maps of the battlefield does not yet have a battle plan, and what no one (so far as I know) has yet suggested is how to get holograms to turn the afferent-efferent corner and do the work cognitive science supposes done by decision-making systems, for instance. Principles akin to those of holography might indeed provide much needed breakthroughs in what might be called the implementation of systems management, but I do not see how the supposition that structures governed by such principles could supplant *systematic* organization altogether can be anything but a vague wish.

Haugeland's perceptive discussion of the distinction between systematic and morphological explanations in fact seems to provide the ground for an argument against just such a hope. He offers DNA replication as an example of a phenomenon requiring and permitting morphological explanation, though he grants that a finer-grained account of its mechanics might be, in his terms, systematic. Look in the other direction, though, at the *coarser-grained* account of the macroscopic phenomenon to enrich DNA's replicatory prowess contributes. The whole process of sexual reproduction surely requires a systematic explanation, without the rudiments of which DNA replication would be a baffling curiosity. Why should we have such strands in us? What function are they performing? Self-replication and versatile self-maintenance (i.e., successful cognition) are the two most sophisticated processes known to us, I would guess, and now that self-replication is beginning to be understood, after centuries of bewilderment and wild speculation, it turns out to require a systematic explanation. Haugeland does not have much to say about what *sorts* of phenomena are, in principle, amenable to the various sorts of explanation he describes. It is still compelling, in spite of his caveats, to suppose that no phenomenon as sophisticated as cognition could fail to have a systematic explanation. It might well turn out that the mysteries of *subprocesses* of cognition that are currently being attacked via the Rube Goldberg machines of cognitive science can be given nonsystematic, morphological explanations. This seems to be the Gibsonian article of faith (Gibson, 1966). Such breakthroughs would still leave the basic vision of cognitive science intact.

Haugeland's distinction between intentional black boxes (IBBs) and information processing systems (IPs) is very important, for it permits him to raise the often overlooked question: are all IBBs also IPs? In a footnote he criticizes an early paper of mine (1971 *op. cit.*) for "entirely leaving out the

crucial notion of an IPS." This was deliberate, and had I hit upon the term I would have been happy to have called my "intentional systems" "intentional black boxes," for that is what I meant to stress about intentional explanation. The fact that an entity is predictable via an IBB strategy shows us *nothing* directly about its internal structure or processing. My point there was, and still is, to isolate the manifest value of everyday, ordinary-folks-style intentional explanation (e.g., "He threw her the rope because he *thought* she was drowning and *wanted* to save her") from the fortunes, good or bad, of cognitive, subpersonal theorizing (Dennett, 1969, 1977, forthcoming *op. cit.*). This lack of structural or systematic implications is just what makes personal level intentional explanation vacuous as psychology, a point with which, I think, Haugeland concurs.

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