Retinae don't see

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Abstract: Sensation should indeed be understood globally: some infant behaviors do not make sense on the model of separate senses; neonates of all species lack time to learn about the world by triangulating among different senses. Considerations of natural selection favor a global understanding; and the global interpretation is not as opposed to traditional work on sensation as might seem.

As Stoffregen & Bardy (S&B) (2001) contend, the theory of "direct" perception does indeed seem to be incompatible with the idea that sensory data should be understood as being gathered independently via several senses. In suggesting that the conflict be resolved by rejecting the latter idea, rather than simply by abandoning the theory of direct perception, they choose the more controversial route. In this brief response I offer a few further reasons to take their suggestion seriously.

In the first place, some infant behaviors simply do not make sense on the assumption that at birth the several senses begin providing independent information which can be brought together only after further experience and comparison. Excellent examples

of such behavioral phenomena are provided in the studies of infant imitation done by Meltzoff and Moore (1977; 1983a; 1983b) in which they found that infants can contort their faces in imitation of another person's facial expressions within minutes of birth. Since these children have no idea how their faces look, visual cues thus seem to be leading to direct and immediate matches with tactile/proprioceptive sensations, with no time and no mechanism available for learning about correlations among distinctly apprehended sensory modalities.

Second, consideration of experiments like these suggests, more generally, that the early lives of neonates of all species must be rich in similar cross-modal sensory integration, given the sophistication of what they are able to do almost immediately. Although there is certainly no reason to argue that the world *never* presents itself to animals via singular sensory modalities, such presentations must be rare. Yet animals need to work with information in their environments almost immediately, and it is often the nuanced information that crosses and combines modalities that is most crucially needed, whether for balance, for reaching, for flight, or whatever. Animals simply do not have time to learn about the world by triangulating among independent contributions of several different senses.

Third, the idea that sensation is primitively multimodular makes considerable evolutionary sense. It seems likely that the several sense organs of each species have evolved as specializations of earlier less-specialized organs, based on the proven value of each specialization in enabling species members to survive and propagate. More general sensation must arrive on the evolutionary scene earliest, and then becomes more specific as a result of the contingencies of the niche. This seems consistent with a treatment of sensation that understands it most primitively as a global sensitivity to the environment, focused by opportunities and dangers available there, organized and differentiated by natural selection over time in terms of various sensory surfaces.

Finally, students of perception have frequently disagreed about how to understand the role of the several sensory modalities. It has seemed plain to anyone who has ever thought about sensation that colors are remarkably different from sounds, and although this has seemed to require a sharp distinction among the contributions of the several senses, there have also been suggestions that this distinction must be moderated in any suitable analysis.

George Berkeley (1709; 1713; 1733; Jessop 1937), for example, tried to distinguish between "immediate and proper" seeing and a more liberal sense of "seeing." The first – the bare immediate and proper "seeing" – is to be understood as uninterpreted, stripped of all learned associations. But Berkeley's own texts show that he was himself very uncomfortable with the traditionally conceived implications of this distinction.

This discomfort emerges quite clearly in Berkeley's examination of whether distance can be seen. His view was that although it cannot be seen "of itself and immediately," it can nevertheless be seen in a less restrictive sense. Indeed, according to Berkeley, there are a great many factors involved in determining our visual perception of distance, one of which is plainly the apparent magnitude of the thing seen. But this did not lead him to conclude that distance is seen indirectly via such cues as size, since that latter perception is often based on how far away we think the object is. Neither cue is less "directly" perceived than the other. Each can help in discerning the other. Another factor involved in determining *both* perception of magnitude and perception of distance is the apparent faintness of what is seen. But that is simply another factor in a very complicated contextual situation.

Berkeley argued, finally, that what one sees with regard to distance and magnitude is determined in part also by the posture of the head and eyes, and perhaps with the help of contributions from other sensory modalities. What is important here, though, is his forceful argument that no "judgment" or inference is involved in such seeing – the distance is suggested immediately. In sum, Berkeley's claim is not really that we do not see depth, for he explicitly says that we do. But he insisted equally that it is *we* who see . . . not our retinae (see Sanders, forthcoming).

This line of thinking shows, in any case, that even Berkeley's thoughts on the subject examined by S&B were not as antithetical to their thesis as might be imagined. There is also support here for the idea that a theory of "direct" perception need not be as counterintuitive as has sometimes been maintained. The line of study urged by S&B would amount to a Gestalt switch of sorts, it is true. And it is important to acknowledge, even in their proposed research program, the importance of studying the separate sensory modalities in order to further understand their contribution to sensation. The upshot would be, though, that sensation would be understood not as taking place at sensory surfaces, in particular, but throughout a larger global sensory system which has those surfaces as parts.