how contemporary concepts of neurocomputation . . . can account for the properties of perception as observed in visual consciousness [including] hallucinations" (sect. 2.4, para. 3). Actually, current neural models offer an explicit account of schizophrenic hallucinations (Grossberg 2000) as manifestations of a breakdown in the normal processes of learning, expectation, attention, and consciousness (Grossberg 1999b).

Contrary to Lehar's claims in section 8.7, recent neural models clarify how the brain learns spatial representations of azimuth, elevation, and vergence (see Lehar, Fig. 14) for purposes of, say, eye and arm movement control (Greve et al. 1993; Guenther et al. 1994). Lehar defends "the adaptive value of a neural representation of the external world that could break free of the tissue of the sensory or cortical surface" (sect. 8.8). Instead, *What* stream representations of visual percepts should be distinguished from *Where* stream representations of spatial location, a distinction made manifest by various clinical patients.

Lehar reduces neural models of vision to capacities of computers to include navigation as another area where models cannot penetrate (see sect. 6.1 and sect. 9). Actually, neural models quantitatively simulate the recorded dynamics of MST cortical cells and the psychophysical reports of navigating humans (Grossberg et al. 1999), contradicting Lehar's claim that "the picture of visual processing revealed by the phenomenological approach is radically different from the picture revealed by neurophysiological studies" (sect. 9, para. 1). In fact, a few known properties of cortical neurons, when interacting together, can generate emergent properties of human navigation.

Lehar ends by saying that "curiously, these most obvious properties of perception have been systematically ignored by neural modelers" (sect. 10, penultimate para.). Curiously, Lehar has not kept up with the modeling literature that he incorrectly characterizes and criticizes.

Steven Lehar's Gestalt Bubble model of visual experience: The embodied percipient, emergent holism, and the ultimate question of consciousness

Keith Gunderson

Department of Philosophy, University of Minnesota, College of Liberal Arts, Minneapolis, MN 55455-0310. **gunde002@umn.edu**

Abstract: Aspects of an example of simulated shared subjectivity can be used both to support Steven Lehar's remarks on embodied percipients and to triangulate in a novel way the so-called "hard problem" of consciousness which Lehar wishes to "sidestep," but which, given his other contentions regarding emergent holism, raises questions about whether he has been able or willing to do so.

Steven Lehar's Gestalt Bubble model (GBM) is said to emphasize the often ignored fact "that our percept of the world includes a percept of our own body within that world, . . . and it remains at the center of perceived space even as we move about in the external world" (sect. 6.4). I offer here a friendly, if folksy, example of a *simulation* of shared first-person subjectivity designed to reinforce Lehar's brief but interesting claims concerning the prominence of the embodied percipient in visual perception. This example leads to other questions regarding his analysis. I have labeled the example elsewhere, and with variations, the Cinematic Solution to the Other Minds Problem, and invoked it earlier against B. F. Skinner's view of subjective privacy and scientific inquiry, also objected to by Lehar for his own reasons (Gunderson 1971; 1984).

Suppose a film director wishes to treat us to the subjective perceptual experiences of another person, say Batman, as he gazes on the traffic far below from some window perch. How is this best done? Not, to be sure, by simply showing us the whole scene: the superhero perched on the ledge with the traffic moving by on the street below. This would not be anything like being privy to Batman's subjective perceptual experience. It would only amount to our own visual experience coming to include Batman. Instead, what is characteristically done is that Batman's filmed body (or at least the better part of it) is somehow (gradually or suddenly) subtracted from the screen in such a manner that we become insinuated into roughly whatever space and orientation Batman's body occupies and are thereby made party to the visual field (sense of height, traffic passing below, etc.), which we can assume would be Batman's from that perspective. We cannot, of course, literally occupy (even cinematically) exactly the same space that Batman does – a prerequisite to having his visual experience – but the tricks of the art permit us to enjoy a simulation of such an occupancy. It is the sleight-of-camera with respect to our seemingly ubiquitous embodied presence in visual perception that carries with it tactics for conjuring a sense of the usual "subjectivity barrier" between us and another percipient being breached. And here it occurs in a florid phenomenological manner, obviously different from the "relational information" that can cross that barrier, as described by Lehar (sect. 5.1). Notice too, that a "preset" feature of the whole typical movie experience involves the darkened theater and no focused sense of our own body being either present in the audience or included in the screen action. The effect is that where we are not assuming specifically Batman's perspective, we are assuming one belonging to no one in particular, or rather one "belonging" to anyone in the vicinity, as it were.

So the possibility of the cinematic simulation of shared subjectivity seems to presuppose the inclusion of an embodied percipient in our visual perceptions, along lines suggested by Lehar. But the apparent friendliness of the example has a complicated provocative side as well. For if what it takes to create the illusion is the clever collapsing of our perspective (or someone else's) into another's, then the epistemic-ontic primacy of the first-person point of view becomes obvious, and the "hard problem" of consciousness can be rephrased with respect to it this way: There is no analogous thought experiment that would render subjectivity or a point of view (one's own or another's) as being somehow manifest in any set of neurophysiological processes to begin with, such that another consciousness might appear as somehow insinuated into it. But there should be, if consciousness is to be modeled (displayed, illustrated) within any third-person physicalistic conceptualization. This rather flat and crude-sounding point is not, I think, irrelevant or naïvely realistic. In a nutshell, that there can be no cinematic-type simulation of a solution to the mind-body problem parallel to another mind's, can be seen to stem from our inability to cling to our sense of experiencing a point of view while being in some neurophysiological locus (however this is represented).

For Lehar, the salient residual problem(s) is this: Although the contents of all our subjective visual experience for the GBM are subsumed under the subjective, we lack *any* vivid demonstration of how *having* a first-person point of view in itself, which is a prerequisite to there being any such phenomenal contents, lies within that experience. Simply specifying *underlying* neurophysiological conditions for consciousness takes us nowhere we have not already unsatisfactorily been. That there is, and how there is, any locus at all for our perceptions remains unexplained within any micro or macro frame of reference. We think, of course, that the *locus of our locus* of perceptions lies in some way within the embodied. But to be apprised of all this does not thereby help us to see how any subjective perspective occurs in the first place, or why it is uniquely ours! (See Nagel 1965.) The problem of explaining it arises independently of whatever type of metaphysical substance the perceiver is believed to be embodied in, even as part of a *panpsychic* or *panexperientialist* scheme such as Chalmers' (as in sect. 6.5). And it can be reiterated with respect to any type of substance of any kind of complexity, as far we can tell.

Now, Lehar wishes to "sidestep" these latter matters by casting the GBM *wholly within the subjective.* Our perceived worlds –

https://doi.org/10.1017/S0140525X03270096 Published online by Cambridge University Press

our pattern-recognizing activities, including, of course, our total physical natures – will then supposedly lie within the range of what his subjectively rendered model is a model of. But I do not see how this really matters, even when naïve realism such as Skinner's is deleted from the picture for the (laudable) reasons Lehar provides. One might, of course, wish, out of other considerations, simply to set the mind-body problem aside and concentrate on refining taxonomic characterizations within phenomenal experience. (Nagel 1974 is cited as having suggested something like this.)

But more puzzling to me is why Lehar's concluding remarks about Koffka's and Köhler's views on emergence (sect. 7.1), which Lehar finds more satisfying than Davidson's anomalous monism, are not a way of directly addressing "the hard problem." The pivotal demystifying image in the "bottom-up" aspect of Lehar's summary of the mind-body relationship is that of perception characterized along Gestalt lines as being related to neurophysiological processes, in the way that a soap bubble holistically emerges from "a multitude of tiny forces acting together simultaneously" to produce a final perceptual state by way of a process that cannot be reduced to simple laws (sect. 7.1). But whatever other, if any, purposes this no doubt interesting image may serve, the relationship between bubble and tiny forces is not in any discernible way similar to whatever the connection between subjective states of conscious perceptual awareness and neurophysiological states is like. Both bubbles and tiny forces are happily in the world, as it were, whether as macro-bubblistic ones, or micro-force-istic ones, or as something like the pop-out dog example (sect. 7.1). These all involve one set of "out there" aspects being related to other "out there" aspects, whether within the subjectivized purview of the GBM or some other one. The bugbear of consciousness still seems to turn on the point that first-person conscious perspectival states cannot yet be even imagined as either macro or micro anythings to begin with, much less as popping up from micro ones.

Backdrop, flat, and prop: The stage for active perceptual inquiry

Julian Hochberg

Columbia University, 170 West End Avenue, New York, NY 10023.
Hochberg@columbia.edu

Abstract: Lehar's revival of phenomenology and his all-encompassing Gestalt Bubble model are ambitious and stimulating. I offer an illustrated caution about phenomenology, a more fractured alternative to his Bubble model, and two lines of phenomena that may disqualify his isomorphism. I think a perceptual-inquiry model can contend.

Steven Lehar's ambitious Bubble metaphor is highly stimulating, assuming a unified phenomenal visual world that explains and predicts our perceptual experience. Herewith are a cautionary reminder about phenomenology as such, an alternative to Lehar's specific enclosing Bubble model, and two lines of phenomena that Lehar ignores but that are difficult to reconcile with the particular isomorphism he espouses.

Phenomenology should indeed guide psychophysics and neurophysiology. But phenomenology is certainly not incontestable. For example, Lehar cites the CIE chromaticity diagram as a description of phenomenological color space. The Helmholtzean dogma – that the experience of yellow consists of red plus green experiences – lurked within mainstream sensory physiology until after World War II (and was often attributed to the CIE). Then, following Hering instead, Hurvich and Jameson's (1957) phenomenologically guided opponency-oriented psychophysics and model explained to neurophysiologists what their microelectrodes later revealed, thereby changing our view of neurophysiology and liberating our relevant phenomenology. (In fact, Jameson & Hurvich showed later [1967] that the CIE is no phenomenological

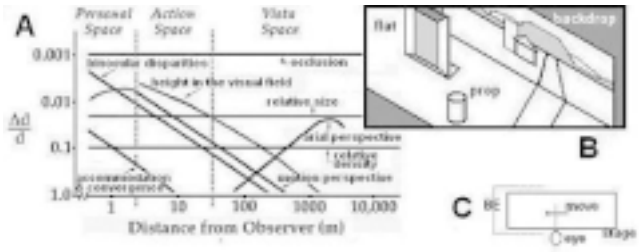

Figure 1 (Hochberg). Onstage and backdrop scenery. **A.** The strength of the major depth cues with egocentric distance, adapted from Cutting and Vishton 1995 (with permission). To the eye as actor, the backdrop usually lies between 10 and 50 feet upstage. **B.** The experienced stage in which visual inquiry proceeds. The viewer's normal actions provide no distance information beyond the plane labeled "backdrop" and they can readily generate and therefore incorporate information about the downstage prop. The curves of Figure 1A account for but are not salient in the experience of B. **C.** Attention extends the stage. When the inquiring eye visits a scene, its boundaries are remembered as further out than they were (see Intraub 1997); this is not merely memory, because such Boundary Extension (BE) is a function of where the viewer plans to look (Intraub et al. 2001).

summary – two very different colors come out at the same point on the graph.) Phenomenology must be both consulted and contested. Accordingly, a different model follows.

Lehar's tackling of encompassing space is an important step, but other phenomenological details might support a different, less holistic model – a *stage* or *set,* not a bubble: Several quite different aspects of our visual ecology afford distance information. Their zones of efficacy, as in Figure 1A (after Cutting & Vishton 1995), are surely important for any account of our encompassing visual world. Assume that the furthest zones form an essentially equidistant region like the *backdrop* on the stage in Figure 1B. Railroad tracks visible in those zones appear to converge. In nearer zones, the depth information effectively specifies the tracks as parallel and holds the backdrop in its place upstage.

This implies discontinuities (e.g., between backdrop and stage) that are not firmly fixed, because where the viewer attends, and with what intentions, affects what information is recovered and used (cf. Fig. 2B, C). Figure 1A can therefore serve only as a conditional account; and as Figure 1C implies, the phenomenal layout itself varies somewhat with the viewer's perceptual intentions. In this model, therefore, distance to the end of the internal world is not a continuous variable nor continuously defined. Why aren't the discontinuities spontaneously evident?

Is there evidence of such overlooked discontinuity? Figure 2A seems to reverse as a whole and has been offered as one example of how a minimum principle (including Lehar's version) leads to perceiving an entire three-dimensional structure (Hochberg & MacAlister 1953; Kopfermann 1930). But Figure 2B shows that, when tested, *perfectly possible* objects display the same dependence on what the viewer attends as was previously shown by the Penrose and Penrose (1958) *impossible* figures. *Perceptual consequences* (Hochberg 1998; in press), such as the effects of rotation described in Figure 2B and the surface-lightness effect in Figure 2C, attest that these are perceptual phenomena. They also share some aspects of Lehar's isomorphism. (And the absence of any salient break between the different spatial zones of the environment in Figures 1A and 1B, and in the apparently-continuous bubble that Lehar describes, merely parallels what happens within objects.)

Such phenomena raise difficulties for any holistic proposed isomorphism powered by the physical relationships as perceived. Gestaltist visions of isomorphism were of course concerned mostly with flat shapes, not three-dimensional structures (see Hochberg 1998). The fact that Peterson and her colleagues (see

https://doi.org/10.1017/S0140525X03270096 Published online by Cambridge University Press