

Comments on Epstein's Neurocognitive Interpretation of William James's Model of Consciousness

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Dr. Epstein has taken on the urgent task of relating phenomenology, cognition, and neurophysiology. He has done substantial theorizing, based on some substantial empirical work, although he modestly warns that it is only a working-paper model. I think it is an important article, for several reasons.

First, it is heartening to find more neuroscientists calling for clarification of phenomenology so that we can see what a physiological model of consciousness must account for.

Second, Epstein gives equal ontological status to all the levels of analysis that he deals with—phenomenology, cognition, and neurophysiology. He is not a naïve reductionist.

Third, and perhaps most important, Epstein is the first to make a serious attempt at neurologizing William James's idea that there are qualitatively different types of information in awareness (James, 1890, chapter 9).

Fourth, Epstein explores the particularly fecund idea that mentally “moving around” in a complex conceptual structure literally makes use of the same neural mechanisms that are used for spatial orientation and navigation. This is a much more neurologically specific development of a general hypothesis previously proposed, but so far only developed at the linguistic, cognitive, and computer-simulation levels (contributors include Lakoff, Johnson, Feldman, Grady, Regier, Bailey, and Narayan: for brief overview and citations, see Lakoff & Johnson 1999, appendix, pp. 569–583). The general theory hypothesizes that the neural systems which subserve physical operations on physical entities also contribute to mental operations on abstract entities (concepts and categories). By this theory, for example, the same neuronal systems that control the hand to transform the position of a berry from on the bush to in the mouth would also play a role in mentally extracting a single element from a narrative and putting it into an appropriate category. They suggest it is more than a figure of speech to say that we “grasp ideas” or “chew on” them. This notion, which I call “The Perceptual-Motor Basis of Abstract Thought,” has many important implications for how we categorize the world (Johnson, 1987). Epstein has taken a bold step toward making it testable.

Beyond these general endorsements, I will highlight a few of the issues Epstein

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raises. But I must first establish a context for examining Epstein's development of James's work.

Caveat

On the occasion of this special issue of *Consciousness and Cognition* on James' model of consciousness, there is a danger to be noted. We need to avoid beatifying James and canonizing his *Principles of Psychology* as holy scripture. In this latest revival of interest in James, there is already much wrangling over just what he said and just what he meant by it (e.g., Baars, 1988; Bailey, 1999; Chafe, 1994; Galin, 1994; Mangan, 1991, 1993; and the authors of the present volume). But except for historical scholars, the chapter-and-verse citations and exegesis should not be our focus, and we should avoid the heat and smoke that the wrangling sometimes generates. Such efforts at textual clarification are important for contemporary theory and research only to the extent that they make James's good ideas more available. In the following sections I myself enter into exegesis concerning James's metaphors. I am not merely indulging in scholarly sport; rather, I believe that many of the interpretive quarrels are caused by taking James's conflicting metaphors too seriously or trying to stretch them beyond the limited domains in which they are apt (e.g., Bailey 1999). This interferes with the larger work.

James's Expository Inconsistency

James's writings, like the Bible, are not revered for their consistency or systematic treatments; rather, they are tumbles of interesting ideas, based on sharp observation, gloriously if not rigorously expressed. In fact, James waffled back and forth on many issues of consciousness, thingness, relations, and metaphysics throughout the writing of the *Principles*, which was stretched over a 12-year period. He continued repositioning to the end of his life, notably in *Essays in Radical Empiricism* (1912) and *Pluralistic Universe* (1910).

We must recognize the limitations of what James had to work with. In his day, scientific psychology was embedded in the Newtonian view that the world is made up of objects (solid and persisting, like bricks) and relations (derivative, evanescent, and transcendental). An influential school considered thoughts to be well-bounded, discrete Newtonian objects which could be assembled into larger structures. Much of James's effort in "The Stream of Thought" was to counter this "atomistic, associationist" view and to place emphasis on thought's flowing continuity and complex interconnectedness. But the 1890s psychology repertoire was quite limited: no non-conscious mind, rudimentary neuroscience, no distributed processing, no top-down vs bottom-up controls. Without these sophisticated advantages, James writhed and struggled to reconcile the apparent discreteness of thought with its apparently seamless flow and dependence on context. Perhaps he would have struggled less if he had late-20th-century concepts to work with, such as fields, networks, radial categories, and schemata (e.g., Rosch & Lloyd, 1978; Norman, 1986; Rumelhart & McClelland, 1986; Lakoff & Johnson, 1999). In the absence of such conceptual tools, he made use of brilliant metaphor. And it is in trying to untangle his weaving of metaphors that we, his contemporary admirers, become enmeshed ourselves.

James's Metaphor Stew

James described the content of awareness from two perspectives. The first is as it changes over time, which he found not continuous but divided into unequal segments of change and no change. He called the experiences of the periods of change "transitive" and the static moments "substantive." The second perspective is as if sampling the static, unchanging substantive moments. He further divided the static moments into two parts, although he insisted it was for analytic purposes only and that the experience of the moment was whole and seamless, not an aggregate or composite. Let me call them "quasi-parts." His most frequent names for these quasi-parts was "the definite" and "the vague" or, equivalently, the "nucleus" and "the fringe." His choice of terms seems to me to be terribly misleading. I have written at length about the confusions that have arisen when James, Baars (1988), Mangan, 1991, 1993), and others have classified mental contents as definite or vague (Galín, 1993, 1994, 2001).¹ To characterize the properties of experience in each of these perspectives he used a variety of metaphors. For the transitive his most frequent metaphor (and apparently the most popular today) was a bird's trajectory with flight alternating

¹ *What is meant by "definite" and "vague":* James's characterization of the nucleus and the fringe as definite vs vague, also emphasized by Mangan, is subject to several confusions. These terms obscure the really important functional and phenomenal characteristics of these types of awareness.

First, the terms have several senses. "Vague" has many synonyms with overlapping but distinguishable meanings: imprecise, undefinable, indistinct, hazy, and ineffable. In common usage we may describe a visual image as vague if it is dim, or if the boundaries are not sharp, or if parts are missing, or if the resolution of the parts is poor, or its class membership is uncertain. But certainly an image in nuclear awareness may be both dim and easily classifiable or both incomplete and sharply resolved. When should we call it vague? Just as the term vague may be used to describe aspects of nuclear awareness, so too fringe experiences could be described as "definite." There need be no uncertainty about detecting their occurrence or distinguishing one from another. For example, the feeling of knowing in the tip-of-the-tongue experience is very intense, not dim, and it is also very specific in that even a closely related word which is suggested will be rejected. Neither is it fleeting. It is misleading to call it vague. Second, sometimes the vagueness is attributed to the objects of awareness and sometimes to the awareness itself. For example, when you see a puff of smoke, or a rippled reflection in a pond, although its boundaries are indistinct and its parts unresolved, you may say truly that you have had a definite experience; it is the object and not the awareness which is vague. Third, although the experience itself was quite definite, the report may be vague due to the reporter's inarticulateness or fleeting memory. On the other hand the report may be more definite than the experience, as with the confabulations of a Korsakoff's syndrome patient or the testimony of an overly eager eyewitness.

Therefore, James's (and others') rather informal characterization of the fringe as vague and the nucleus as definite needs sharpening. All ambiguities resolve, however, when we see that the term vague is relative; its appropriateness depends crucially on the user's purposes. We speak of something (an image, a thought, a report, or, more generally, a representation) as vague if it does not give us all the information we seek from it. For example, sharp boundaries may or may not be important if our purpose is determining general types, but would be critical if we were interested in exact size. And in addition, the resolution needed must only match the scale of our question: if you asked the distance to Paris an answer in miles would not be considered vague, but it would be if you had asked the distance between goalposts. *Whether we consider an experience vague depends on our purposes for the information it presents.* Thus, the difference between fringe and nucleus awareness is not simply that one is intrinsically vague and the other intrinsically definite. Rather, their difference is that the information they carry is suitable for different purposes. It is natural, therefore, that a fringe awareness would be judged vague (uninformative) if it was considered with respect to the purposes of the nucleus, but also, so would the "nucleus" if considered with respect to the purposes of "fringe awareness."

with perchings. However, he also indicated the quality of change by the metaphors of flowing water, river, and stream, which have no alternations. For “fringe” he used halo, penumbra, psychic overtone, suffusion, and water flowing around a rock in a stream. But he also referred to the experience of the transitive as “fringe” and “vague,” which are the terms with which he named one quasi-part of the substantive. And he is quite explicit that the definite includes concepts which elsewhere he calls “fringe.” At times he uses “definite” as synonymous with the substantive instead as only a part of it. This host of metaphors conflicted, as they must (e.g., notice the irreconcilability of “Love is a flower” with “Love is a journey” or “. . . a steady rock”). When he (and the interpreters who followed) tried to combine perspectives, the mixed metaphors became a muddle (or metaphorically, “a stew”). As I read James, he is just circling his topic, pointing to it from various perspectives, using metaphors and gesticulating, urging its importance on us, while trying to hold us back from the premature closure of saying, “I know that already.” It is a mistake to try to find consistency and precision in his poetic expositions.

James himself pleads, “It is so hard to make one’s self clear . . .” (James, 1890, footnote, p. 258). A particularly egregious example of the muddle can be seen where James introduces his section “Feelings of Tendency” by saying: “So much for the transitive states. But there are other unnamed states or qualities of states just as important . . .” (p. 249). He then goes on to describe these others in exactly the same terms he used for the transitive: “. . . psychic transitions, always on the wing, so to speak, and not to be glimpsed except in flight” (p. 253). He then names them as fringe experiences for the rest of the chapter. Bailey (1999) acknowledged that the transitive and the fringe were described in the same way, but then tries several pages of “possible readings” and settles on the putative difference of duration, which he calls “the least bad of a set of rather unsatisfactory alternatives.” I find it particularly bad, having argued at length that it is the type of information and not the duration or fleetingness which characterizes the “fringe” (Galín, 1994, pp. 382–385). If we focus on the phenomenal experience instead of on the metaphors (for example, in James’s famous tip-of-the-tongue experience), we find that “fringe” awarenesses may be briefer or may persist longer than the definite “nucleus” awarenesses and may be equally or even more intense and specific (Galín, 1994, pp. 379–380).

I think the “bird’s flight” metaphor, with its obligatory either/or alternation of states, was just not a very good metaphor for James’ purpose. In the metaphor of the “water of the stream flowing over and around a series of rocks” the stream and the rocks do not alternate: they are present simultaneously. We certainly do not have to restrict ourselves to one metaphor, but if we did I would prefer “the stream” to “the bird’s flight,” and I think James did too. He named his chapter the “Stream of Thought,” not the “Flight of Thought.”

Keeping out of the Stew

To a great extent, Epstein avoids getting caught in James’s metaphor stew, but at times he struggles as James did with specifying and reconciling “fringe” versus “nucleus,” “stream” (simultaneity, continuity, and indivisibility), versus the “bird’s flight” (change and stability, differing in duration, possibly in contents). He notes

the problem plaintively in footnote 1. The “bird” also leads to trouble later, where it is awkward for Epstein to equate what James called “the goal” or “overall intention of the sequence of thoughts” with a particular perching identified somehow as the final perching (terminal nucleus in a series?). It seems to me that what James means by “the goal” must be a state consisting of both nucleus and fringes. There is nothing in any of Epstein’s cognitivizing or neurologizing requiring alternation or forbidding the “nucleus” and several of the “fringe” experiences from occurring simultaneously or occurring asynchronously in time. In this case, the “nucleus/fringes” metaphor seems apt: It implies some of each in all states.

To avoid the unwanted meanings that come along with James’ metaphors, such as the spatial and status implications of “fringe” and “nucleus,” I proposed alternative terms that are more purely descriptive of function and a typology to sort out the multiplicity of “fringe” experiences (Galín, 1994, better in 2000). Here, for simplicity, I use James’s “fringe” and “nucleus.” I have stressed three points relevant here. First, we should not neglect the phenomenological details of the nucleus. The nucleus experience struck me with its sparseness, its incompleteness. I proposed that “nucleus experience” is the display of only those few features of an encountered object, event, or idea which maximally discriminate among the set of choices relevant to our current goal (e.g., the few features that would best discriminate a shadow in the bush from a tiger). The rest is left to be presented in summary by the multitude of “fringe” awarenesses. Although Epstein’s view is somewhat different than mine, it adds to the growing interest in functional analysis of the “nucleus” part of awareness. I am quite interested in Epstein’s suggestion that it may have more than one function. Second, I emphasized that “fringe” experiences are not just dim or preliminary or fleeting or otherwise defective versions of nucleus awareness. Third, the qualitative distinction between “nucleus” and “fringe” experience must not be confused with the metaphorical “focus and dim halo” of the ubiquitous Spotlight Model of attention.² This is pertinent to Epstein’s frequent references to “attention” processes while putting forth his model.

² *The Spotlight metaphor for awareness:* The unequal importance of the parts of our subjective experience is indicated by polarities such as primary/secondary, salient/incidental, bright/dim, foreground/background, or central/peripheral. The spatial or visual connotations of some of these polarities are misleading, as in the case of a perennial favorite, the spotlight model of awareness. The moving spotlight is a powerful metaphor that guides much of current research and theory in awareness, implicitly or explicitly. Because it has a clear focus and a fuzzy periphery the metaphor of a spotlight is easily confused with James’s model, given his choice of terms with similar spatial connotations (vague fringe, halo, or penumbra contrasted with the clear, definite nucleus). It is important to distinguish the quite fundamental differences between James’s nucleus/fringe model and the spotlight model. In the spotlight metaphor the concept “attention” is used to indicate the adjustments of the beam (e.g., Crick, 1984; Crick & Koch, 1990; Jung, 1954; Kahneman & Treisman, 1984). Attention may denote either the beam’s present locus, its stability, intensity, breadth, degree of focus, or the control mechanisms that change these parameters. Sometimes the term attention is used synonymously with awareness. Some people confuse James’ nucleus with the “focus of attention” (e.g., Mangan, 1993). This is a serious error. James did not equate the nucleus with that which is attended and the fringe with that which is not attended. He wrote a separate 50-page chapter on attention in which he did not mention the nucleus or fringe. That which is attended typically includes *both* nucleus and fringe components. For example, in James’s terms, in the experiencing of a word, whether it is being attended or incidental, the phonological image (nucleus) usually comes along with one or more fringe elements—such as the feeling of its meaning and the

Neurologizing the Motor–Perceptual Theory of Cognition

There are a few minor problems and two major opportunities to mention.

Epstein reviews evidence that awareness of a percept requires information in different brain regions to be bound together and tentatively advances a very strong claim: The “nucleus experience” is to be thought of as the phenomenological correlate of a distributed ensemble formed by the linking of brain regions (presumably neocortical regions). He suggests that the linking takes place by some sort of dynamic interaction such as synchronous neural firing, orchestrated by some sort of quasi-global process, such as a 40-Hz rhythm sweeping over the cortex. It is plausible on current evidence to suppose that the 40-Hz scanning rhythm and associated synchronous firing is at least part of the binding process. Since the 40-Hz rhythm seems to be associated with conscious states, perhaps it does do the binding for the “nucleus” as claimed. But this proposal seems too strong to me for several reasons. First, while conscious perception requires some sort of binding, so does nonconscious perception. So its binding function would not uniquely link the 40-Hz rhythm with consciousness. Second, there must be some mechanism to provide the required binding for whatever nonconscious perceptions occur concurrently with the conscious “nucleus” perceptions, and present evidence does not preclude that binding also being done by the 40-Hz rhythm. Third, many of the “fringe” experiences must also require binding of distributed structures (e.g., the feeling of rightness or the feelings of specific conceptual meanings). We cannot at this point rule out the possibility that the 40-Hz mechanism is also doing the necessary binding for the “fringe” awarenesses occurring concurrently with the nucleus perceptions. Therefore, it seems unwarranted at this time to link the 40-Hz binding rhythm to consciousness or even more exclusively to “nucleus” consciousness.

Epstein makes an interesting attempt to assign brain localizations to correspond to the logician’s distinction of token and type (token is more particularized and type is more generalized or abstracted). But clearly these are relative terms. For example, “mammal” is type in relation to “dog” as token, but “dog” is type in relation to “poodle” as token. It remains to be shown that dog-as-token and dog-as-type are separately represented in parietal and in temporal cortex, as Epstein suggests.

Epstein’s initial emphasis has been on the hippocampal and neocortical structures

feeling of its degree of rightness for the present context. The relative dominance or foreground quality of the nucleus and fringe components varies; in the tip-of-the-tongue experience the fringe elements of the meaning of the desired word and the feeling of gap are more prominent and more persistent than the nucleus images of candidate words or word fragments that rapidly succeed one another.

James’s concept of the fringe experience is also quite different from the dim, fuzzy, fringe of the spotlight beam metaphor. James’s fringe presents a *separate class* of information than the nucleus, not just the same kind of information at a lower resolution. Therefore, whereas dim information at the edge of the spotlight can be brightened (brought into awareness) by reentering the beam on it, in James’s model the contents of the fringe *as such* cannot be brought into the nucleus. They are “attended” in their form as fringe experiences, not converted to the form of nucleus experiences [Jackendoff has presented compelling arguments on the importance of form (chapter 4, 1987)]. This is one of the critical points for modern theorists and experimentalists to consider. The unfortunate spatial connotations of the term “fringe” contribute to possible confusion by implying that what is in the periphery could be brought into the center without changing its form.

because of the hippocampus' strong involvement with both locating items in memory and with locating positions in space. He has not yet extended his theorizing to other motor-action systems such as the basal ganglia and the cerebellum. This seems like a necessary and very fruitful direction for future research and theorizing.

Another important set of opportunities which remain to be developed are the implications for Epstein's model of cerebral duality: We have two cerebral hemispheres, each with all the required parts, and they have multiple paths connecting them to each other. Bogen has written extensively on the duality of the brain and its relations to the duality of consciousness (e.g., Bogen, 1990, 1997; see also Galin, 1974, 1977; and Hilgard, 1977). Epstein's only mention of laterality in his review of the neuropsychology literature was the curious diagonal relation of left frontal cortex and right cerebellum, and he did not comment on it.

Coda

Epstein has set sail with his own metaphor—navigation. He has made powerful use of the correspondences between orienting and locating in physical space and navigation in the figurative spaces of memory and conceptual structure. The metaphor was suggested by the well-known dual involvement of the hippocampus in memory and in orienting in relation to place. This has enabled him to sketch out possible neurological mechanisms that might underly William James's seminal model of "The Stream of Thought." Epstein's frontal-hippocampal theory maps out a very large territory, previously explored in only in a spotty fashion. Like all early maps, it has many blank spots still to be charted and must be expected to be wrong in many details. But a map, even a sketchy one, encourages further voyages of discovery.

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