

## The Structure of Awareness: Contemporary Applications of William James' Forgotten Concept of "The Fringe"

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Modern psychology does not address the great variety of elements constituting subjective experience or the relations among them. This essay examines ideas on the fine structure of awareness and suggests a more precisely characterized set of variables, useful to all psychologists interested in awareness, whether their focus is on computer simulation, neuroscience, or clinical intervention. This view builds on William James' insight into the qualitative differences among the parts of subjective experience, a concept nearly forgotten until recently reinterpreted in contemporary cognitive terms by Mangan. I review, revise, and expand these ideas, and suggest their application to self-monitoring in several domains, including metacognition, action, and emotion. Sharpening and extending the distinctions James drew among key descriptive aspects of awareness gives us a more differentiated vocabulary for research and theory.

Contemporary psychology has not yet developed a taxonomy for the varieties of awareness (our subjective experience), or even a consensus on the constructs or terminology with which to characterize its richness.<sup>1</sup> As a first

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<sup>1</sup>For a discussion of the acute problem of terminology, see Galin, 1992a, 1992b, p. 153. By "awareness" I mean first-person subjective experience, all that James included in the "stream of consciousness." Unless otherwise specified, I am not referring to the underlying mechanisms and control systems which generate it, sustain it, and modify it. I try to use only aware and awareness (or subjective experience) instead of the more common terms conscious and consciousness which are often used in more inclusive senses.

I find it useful to think of awareness as a *medium* in which information is presented. The code and what is encoded are conceptually distinguishable from the medium. This concept may be clarified if we consider more familiar examples of media and information. Paper-and-ink is a medium in which information at the level of alphabetic characters can be presented. Alphabetic characters, in turn, are a medium in which words can be presented. Words are a

step, this paper calls attention to key descriptive aspects of subjective experience which have been rather neglected.

Although awareness has been reclaimed as a major topic of study, most research and theory has focused on the apparatus or processes that support awareness rather than on subjective experience itself (e.g., Edelman, 1989; Johnson-Laird, 1983; Minsky 1986; Posner, 1990; Rumelhart and McClelland, 1986).<sup>2</sup> I believe that a relatively complete theory of awareness will include accounts at the subjective level as well at the neurological and cognitive levels of analysis (cf. Flanagan, 1994; Jackendoff, 1987). I do not mean to belittle important recent progress in cognitive neuroscience, both theoretical and empirical, in such areas as selective attention (e.g., Cohen and Servan-Schreiber, 1992; Posner and Rothbart, 1992), working memory (e.g., Baddeley, 1986; Goldman-Rakic, Funahashi, and Bruce, 1990), the "computational" approach to imagery (e.g., Farah, 1989; Kosslyn and Koenig, 1992), and frontal cortex interactions with thalamus (e.g., Crick, 1984; Crick and Koch, 1990; Yingling and Skinner, 1977). My point is that we must remember that these are attempts to describe the mechanisms underlying awareness rather than awareness itself. These authors are not all naive reductionists, trying to reduce consciousness away or to show that it is "nothing but." Nevertheless, in the rush to account for awareness in terms of information processing or neurophysiology, we may not sufficiently examine just what it is that needs to be explained.

Anyone who examines her subjective experience finds a great variety of properties. In this paper I propose a new characterization of these parts of awareness and suggest categorizing them under a broader framework of self-monitoring processes. My proposals are built in part on the insights of William James who analyzed the structure of awareness a century ago in his revered but now nearly unread *Principles of Psychology* (1890/1950). James' conception that awareness consists of two qualitatively different parts is quite distinct from current models, and it addressed phenomena that still must be

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medium in which concepts can be presented. In this series, each succeeding medium is an emergent property of the information at the previous level, but no rigid dependence is implied; clearly words can be represented in media other than alphabetic characters. A helpful discussion of levels and emergence is given by Wimsatt (1976a).

<sup>2</sup>Awareness as a topic is now explicitly recognized by the institutions of academic psychology and neuroscience, evidenced by a spate of new books with "Consciousness" in the title, a new major journal (*Consciousness and Cognition*, Academic Press), and its appearance as the subject of invited lectures at major meetings (e.g., International Neuropsychology Society's Benton Award 1989, D.S. Schacter). Of course, there are many exceptions who have attended to awareness *per se* for some time, and many new converts: prominent exemplars include Baars (1988), Deikman (1971), Hilgard (1977/1986), Jackendoff, 1987, Kihlstrom, (1987), Libet (1965, 1987), Marcel and Bisiach (1988), Natsoulas (1981), Nelson et al. (1986), Ornstein (1972), Prigatano and Schacter (1991), Sperry (1968, 1976), Velmans (1991)). In contrast to academic psychology, psychiatry never lost its concern with awareness *per se*.

accounted for. His model has nearly been forgotten; it was called to my attention by Mangan (1991), apparently the only contemporary psychologist who recognized the potential of James' idea and built upon it.

Although I begin with James, this paper is not intended as a historical account nor as a contribution to Jamesian scholarship; my chief concern is with contemporary issues concerning awareness. I will outline James' ideas on the two part structure of awareness in order to highlight their differences from the dominant modern concepts, including the "searchlight" metaphor for awareness. I will also review how Mangan has extensively updated James' idea of "fringe" experiences; in particular, the experience of being "on-the-right-track." I will then examine some confusions that have arisen when James and others have classified mental contents as definite or vague, and this will lead to a more precise characterization of the parts of awareness, and to a revision of James' and Mangan's dichotomous models. Finally, I will suggest how James' and Mangan's ideas — as I have revised and extended them — can be useful in understanding self-monitoring in several domains including emotion, action, and metacognition.

### James' Model of Awareness

James railed against the "traditional psychology" of his day, which held that definite images were the sole building blocks of mental life. He considered that exclusive emphasis to be:

*... the great blunder to which all schools [of psychology] are liable . . . . It is the reinstatement of the vague to its proper place in our mental life which I am so anxious to press on your attention . . . . The definite images of our traditional psychology form but the very smallest part of our minds as they actually live . . . . The significance, the value, of the image is all in this halo or penumbra that surrounds and escorts it . . . . (1890/1950, pp. 254–255)*

James made 3 key points:

(1) Awareness has two parts. He called them the definite and the vague, or the nucleus and the fringe. He also used the metaphor of a halo or penumbra spreading out around a distinct image, or water surrounding a rock in the stream.

(2) The nucleus and the fringe present qualitatively different kinds of information. What is presented in fringe experiences are not just dim or preliminary or fleeting or defective versions of nucleus experience.

(3) The experiences of the fringe are critically important in their own right. They represent the context and web of relations that give meaning to the particularized contents in the nucleus. For James, meaning is not intrinsic to a thing but is given by the network of other knowledge and relations in

which it is embedded. This applies to any sort of thing, such as an object, event, word, idea, or bit of knowledge. For example, an object's meaning is given by the *totality* of its aspects such as its name, physical properties, hedonic value, uses, history, etc. (similar to Quillian, 1972). Whereas a few individual features of an object are presented in the nucleus, some indications of its extended connections are presented in awareness in the form of a variety of fringe experiences (James 1890/1950, pp. 254–255; 265; 269).

Note that both parts of James' distinction "fringe vs. nucleus" refer to what is present in awareness. Do not confuse the fringe with the unconscious or the preconscious of Freud, or Polanyi's (1969) tacit knowledge, or Schacter's implicit knowledge (Schacter, 1987), which are not in awareness. Neither do nucleus and fringe correspond to the focus of attention vs. unattended contents of awareness, nor to Neisser's (1967), attended vs. preattended contents which will be discussed below, nor to Gestalt psychology's figure/ground (Koffka, 1935).<sup>3</sup> Although it is common to say that there are two kinds of mind, or consciousness, or modes of thought, James' two parts do not correspond to any of the familiar dichotomies (for lists of such pairs see Bogen, 1969). It is difficult to grasp a new idea if we say too quickly, "Oh, that is just like so-and-so."

James often changed metaphors to evoke complementary aspects of subjective experience. Sometimes he spoke of awareness as a bird's trajectory, alternating flights and perchings, corresponding to the "transitive" (transitory) and "substantive" (stable) aspects (p. 243). This is different from his nucleus vs. fringe distinction. The bird's trajectory metaphor refers to the dynamic aspects of awareness — its duration, direction of change, and rate of change — whereas the nucleus and fringe refer to the form of thought contents at a particular moment. Note also that James spoke of "the stream of thought," flowing seamlessly like a river. He asserted strongly that experience is subjectively unitary and continuous; his division of awareness into functionally and phenomenally distinct parts was only for analytic purposes.

### *Types of Fringe Experience*

James indicated that there are a great many categories of fringe experiences, not just one. However, he did not attempt an exhaustive list, or a sys-

<sup>3</sup>Like James, gestalt psychologists are concerned with the relations between context and a figural core. A central premise is that an experienced form is an emergent unity; analyzing it into components violates its nature. A variety of non-conscious "forces" segregate any mental field into two parts, the figure and ground, so interrelated that each conditions the experienced properties of the other (Koffka, 1935, pp. 177–210). The figure/ground idea had influence beyond perception, at least implicitly, but Koffka, for example, was reluctant to generalize the nature of "ground" beyond visual perception (p. 201). It is hard to map it onto fringe experiences such as the feeling of rightness and the feeling of intention.

tematic analysis of their relations to each other, or to other mental phenomena. He offered a few examples:

1. feelings of familiarity (1890/1950, p. 252). [Note that after struggling to find a single term to denote conscious states (cf. pp. 185–186), James settled on “thought” and “feeling” depending on context, used synonymously with experience and awareness.]

2. feelings of knowing; e.g., as in the “tip-of-the-tongue” experience (p. 251).

3. feelings of relation; these are subjective qualities associated with the relations between objects or ideas, as indicated by words such as “and,” “or,” “if,” and “but.” James says, “We ought to say a feeling of ‘and’. . . quite as readily as we say a feeling of cold . . .” (p. 245).

4. feelings of action tendency; e.g., the intention to say so-and-so, just before it is articulated (p. 253).

5. attitudes of expectancy; the commands, “wait,” “look,” “hark,” elicit distinct feelings of the domain from which a new impression is to come (p. 250).

6. feelings of “rightness” or being “on-the-right-track”: this is a feeling that the content currently in the nucleus of awareness is congruent in some global way with our current goal structure (what James calls the “topic” of our thought). He uses a number of synonyms for rightness such as “harmony,” or “fittingness.”

James considered the fringe presentation of “rightness” or “on-the-right-trackness” to be one of the most important, because he believed that it guides thought:

Relation . . . to our topic of interest is constantly felt in the fringe, and particularly the relation of harmony and discord, of furtherance or hindrance of the topic . . . . [When the sense of furtherance is absent we] cast about us for other thoughts . . . . The most important element of these fringes is . . . the mere feeling of harmony or discord, of a right or wrong direction in the thought. (James, 1890/1950, pp. 259–261)

There is another large group of experiences that seem to belong to the fringe: the subjective component of emotions. But this group is conspicuously missing from James’ examples. I will return to this topic below.

### *The Tip-of-The-Tongue Experience*

Several important features of fringe experience are illustrated in James’ account of trying to recall a forgotten name, the ubiquitous tip-of-the-tongue phenomena (for contemporary treatments see Baars, 1988, p. 225ff; Brown, 1991; Hart, 1965; Mangan, 1991). James says:

This state of our consciousness is peculiar. There is a gap therein; but no mere gap. It is a gap that is intensely active. A sort of wraith of the name is in it, beckoning us in a

given direction, making us at moments tingle with the sense of our closeness, and then letting us sink back without the longed-for term. If wrong names are proposed to us, this *singularly definite* gap acts immediately to negate them . . . . And the gap of one word does not feel like the gap of another, all empty of content as both might seem necessarily to be when described as gaps. (James, 1890/1950, pp. 251–252)

Thus James notes that the metaphor of “gap” is flawed insofar as it implies an absence of awareness or emptiness of content, similar to the unexperienced gap in our visual field where the optic nerve exits the retina, the so-called normal blind spot. Rather, the gap in tip-of-the-tongue experiences is like the scotoma due to a retinal injury where we are keenly aware of the deficit (see Galin, 1992b, p. 154). James declares that the feeling of an absence is different from the absence of a feeling, but he does not analyze the situation further. However, if we apply his model to our own introspection we can clarify more of what is occurring. Three fringe experiences are active simultaneously: the feelings of knowing, meaning, and mismatch. In addition to the intense feeling of knowing that you know, there is an experience in a global way of the web of connections of the missing word, and it is this which gives the “gap” its specificity and “singularly definite” quality. Explicit features from this web may appear in the nucleus, such as the name’s initial sound, or its rhythm (p. 252), but they do not fill enough of the constraints of the web of connections to elicit the complete feeling of “rightness.” James’ use of the term gap expresses the mismatch between the fringe experience of global meaning for which an adequate token is being sought and the nucleus experience of explicit contents being tried out as candidate tokens. The feeling of “gap” or mismatch is the inverse of the feeling of rightness.

The tip-of-the-tongue phenomenon illustrates that several fringe experiences can occur together, that they can be intense and specific, and that they may carry directional or control information. Mangan (1991, 1993) has stressed the control aspects, e.g., that the feeling of knowing has the effect of sustaining memory search when retrieval of an item is temporarily unsuccessful (Hart 1965; Nelson, Gerler, and Narens, 1984; Nelson, Leonesio, Laandwehr, and Narens, 1986). The feeling of being on-the-right-track in some way keeps the search in the neighborhood currently being examined, rather than switching to another region of knowledge.

### Relation of James’ Model to Modern Concepts

I have presented James’ views in some detail because I believe he pointed precisely and gracefully to what is still missing in contemporary approaches to awareness.<sup>4</sup> Modern psychology does not address the plurality of qualita-

<sup>4</sup>It must be noted that James himself never developed the notion of fringe and nucleus systematically, and did not make further use of it in *Principles* in his extensive treatment of attention, his theory of emotion, or his conception of the self, nor in *Varieties of Religious Experience*.

tively different elements constituting subjective experience, and the relations among them. In support of this assertion I will contrast James' model with the ubiquitous "spotlight" metaphor for awareness with which it may be confused. Then I will examine the positions of several disparate modern theorists and contend that they do not adequately deal with the simple introspective data that concerned James in 1890.

### *The Spotlight Metaphor for Awareness*

There is a quality of our subjective experience indicated by polarities such as primary/secondary, most salient/incidental, bright/dim, foreground/ background, or central/peripheral. Metaphoric language often carries unwanted connotations which can be misleading. In this case, the spatial or visual connotations of some of these polarities seem accidental; the non-spatial abstract polarities indicating relative importance or dominance fit this quality of experience just as well. But these accidental visual and spatial connotations combine and permit mischief in a perennial favorite, the searchlight 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' 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' 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 and Koch, 1990; Jung, 1954; Kahneman and 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 (e.g., Mandler, 1975, pp. 236-238). 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 fifty-page chapter on attention in which he did not mention the nucleus or fringe.<sup>5</sup> That which is attended typically includes both nucleus and fringe components. For example, in James' terms, in the experiencing of

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<sup>5</sup>A decade later, in the simplified *Talks to Teachers* (James 1899/1983), he refers to the "field of consciousness" that has a "center or focus" and a "margin" (pp. 17-19). This section clearly concerns attention, and is quite different from the distinctions he made in the "Stream of Thought" chapter (James 1890/1950). The nucleus and fringe model is not mentioned.

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 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' concept of the fringe experience is also quite different from the dim, fuzzy, fringe of the spotlight beam metaphor. James' 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 recentering the beam on it, in James' 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.

The pre-eminence that James accords to the "vague" contrasts with its beggarly treatment by modern theorists. Let us consider four very prominent modern views, each representing a different theoretical and methodological perspective (Baars, 1988; Crick and Koch, 1990; Neisser, 1967; Rumelhart et al., 1986). I sketch their views here, not to support or contend with them, but as examples of how vague awareness is treated in modern psychology, insofar as it is treated at all. Each of them acknowledges indefinite feelings in awareness, but not as carrying a special class of information. Rather, such feelings are said to be vague because they are either preliminary, defective, or fleeting. My discussion of Neisser and Rumelhart abbreviates Mangan's (1991) extensive review. My perspective on Baars' ideas differs from Mangan's, and Mangan has not discussed Crick's model.

### *An Early Cognitivist View*

Neisser, in his influential 1967 book, *Cognitive Psychology*, proposes two sorts of selective constructive cognitive processes: the pre-attentive and the focal attentive. The pre-attentive processes are automatic. They act globally over the input field, segmenting it into "objects" with a primitive unity, which persist briefly in iconic storage; "There is a sense in which we are aware of its contents, but the experience is a fleeting and tenuous one . . .



they have only a marginal claim to being called 'conscious' at all" (p. 301). Neisser asserts that these pre-attentive contents must be elaborated and built upon by focal attention if they are to have much effect on thinking or behavior. If the preattentive contents do enter awareness without such elaborations they are only "fleeting and evanescent objects of consciousness, crudely defined and hard to remember" (pp. 300-301). Although Neisser subsequently revised his ideas extensively, I cite this version because it was (and continues to be) extremely influential.

#### *A Connectionist View*

A similar conclusion is reached by Rumelhart, Smolensky, McClelland, and Hinton (1986, p. 39), albeit by a very different path. They account for the contents of consciousness in terms of states of activity in a system of closely linked units (a parallel distributed processing network). A pattern of activation elicited by an input spreads and shifts through the network until the system reaches a stable configuration where it remains until a new input causes the system to shift again. Conscious contents are related to the *average over time* of this changing configuration. Rumelhart et al. postulate that the stable periods are usually long compared to the duration of shifting, and thus the stable states dominate the average. Thus the contents of consciousness are usually clear, definite experiences. However, "fuzzy" experience or "unclear phenomenal impressions" will occur when the shifting process is especially prolonged, because the average will then consist mostly of changing states.

Thus, like Neisser, Rumelhart et al. consider the "vague" experiences as preliminary. Furthermore, in their view these experiences are defective, not a different class of information with its own valuable special function. The vague is seen as noise in the system, or preliminary results on the way to the useful definite information, only showing prominently in awareness when something is wrong (i.e., when settling to a stable state is too prolonged).

#### *A Neurobiological View*

Crick and Koch (1990) have offered a neurobiological theory of awareness, elaborating on the searchlight model and adding a component from Neisser's iconic storage. In a concise speculative paper they propose a physiological framework to integrate cognitive ideas drawn from many theorists including James, Neisser, and others who have followed, such as Treisman, Posner, Damasio, Johnson-Laird, and Jackendoff. Crick and Koch propose two kinds of awareness, *working awareness* and *fleeting awareness*. A serial attentional mechanism acts ". . . so that a temporary global unity is imposed on the

[selected] neurons in many different parts of the brain" (p. 263). *Working awareness* corresponds to this binding together of several discrete neural representations of properties into a coherent percept (e.g., as the visual properties of color and shape are linked to form an object), and the placing of it in working memory (p. 272).

But Crick and Koch are troubled that *working awareness* alone would only yield a very limited percept. To account for the richness of our awareness they therefore suggest another form, called *fleeting awareness* because it is associated with the very transient iconic memory. Although it has a very large capacity at any one time, it can only embody features which we are genetically endowed to detect or have overlearned, not novel conjunctions, and thus can present only a much more limited variety of features than the *working awareness*. The authors hedge their bet with a major caveat: "Because *fleeting awareness* is so transient it may be especially difficult to study. Whether it really exists remains to be seen" (p. 272). Crick and Koch did not speculate further on the possible functions of their "fleeting awareness," or its relation to "working awareness."

#### *A Recent Cognitivist View*

Baars (1988) distinguishes among many states and processes to which the term consciousness is commonly applied. For methodological clarity he begins with conscious events that are reportable and whose reports could be verified, such as experiences of suprathreshold sensory stimuli. After building a conceptual framework on such cases, he applies it to two classes of awareness usually considered vague and indefinite. The first concerns experiences that are fleeting and presumably therefore hard to remember and to report even seconds later (p. 68). Baars notes the memories and reports of such experiences have a vague quality, but he is agnostic as to whether or not the experience itself was clear, vague, or even not "really" conscious (p. 70).

The second class concerns mental events such as abstract concepts, intentions, and beliefs that do not have sensory qualities. Baars' views here are difficult to paraphrase because he sometimes uses the term "conscious" in ways that exclude subjective experience [see footnote 1, p. 375] (pp. 14; 25-26; 66; 68-70; 284-286). He calls perceptual and imaginal events unambiguously "conscious experience," because they have "clear, consistent qualities" such as color, taste, and texture. In contrast, he says, abstract concepts (e.g., democracy), intentions, and beliefs, that do not have such qualities are conscious *in another sense*: they are "immediately expressible . . . Much ancillary information is immediately available, as if it exists vaguely in some periphery of awareness" (p. 14). In the interest of caution Baars appears to suggest that abstractions do not enter awareness at all: "We will speak of conscious expe-

rience of percepts and images, and conscious *access* to abstract concepts, intentions, beliefs, and the like" (p. 26). This choice of terms separates Baars from James who speaks explicitly of an *awareness of accessibility* of nonconscious information (the experience of knowing) and of an *awareness of global meaning* (the experience of relations: James 1904/1976, pp. 28–29; McDermott 1976, p. xxxv), and *awareness of intentions*. According to Baars, although the abstract concept itself is not experienced, "conscious access" to it will be associated with "conscious experience" of a series of brief percept-like images that are metaphoric, symbolic, or fragmentarily representative of the concept, presumably drawn from the network of relations that constitute its meaning. For example, "democracy" might elicit a series of fleeting images of a flag, a parade, or a meeting. Because each of these metaphors fails to completely capture the concept, it is rapidly replaced by another partially adequate image. Although these metaphors are "ultimately inadequate representations of the more abstract and complex reality," they are useful, Baars says, because "abstract entities may be impossible to experience qualitatively" (pp. 284–286). Thus, (although Baars does not say it explicitly), I infer that these experiences associated with abstract concepts, intentions, etc., would be called vague both because they are inadequate representations, and also because they are fleeting.

In summary, this sample of modern theorists, each of whom I value highly for other reasons, have not heeded James' exhortation that "the reinstatement of the vague to its proper place in our mental life" is paramount for scientific psychology. These exemplars illustrate the ubiquitously low regard given to the rich variety of awarenesses that James urged upon our attention. They were selected because they explicitly include something they call vague awareness in their models. Others do not even consider the vague. Because this aspect of awareness has been categorized as preliminary and/or defective, it has been ignored in most research and theory.<sup>6</sup>

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<sup>6</sup>We must note one more contemporary psychologist, Jackendoff (1987), who has incorporated some features quite similar to James' two-part structure in his theory, although he developed it without being aware of James' ideas (personal communication, 1992). His model is quite thoroughly worked out with respect to aspects of awareness that would correspond to James' nucleus or the contemporary construct focus of attention. But important phenomena were still unaccounted for, and in the penultimate chapter he sketched a second qualitatively different aspect which carried the same sorts of information as the fringe: source information (which distinguishes percept from imagination), feelings of agency, of novelty, of meaningfulness, and a simple emotional liking vs. disliking. Unfortunately he has not developed this part of his extremely interesting and useful theory further, and to my knowledge, it has not been picked up by others. Like James, Jackendoff puts great weight on paying attention to subjective experience as a guide to what any cognitive theory must explain. This is the more noteworthy because he considers himself an epiphenomenalist and holds firmly to his belief that consciousness can have no effects on the computational mind or the brain.

### Mangan's Rehabilitation of Fringe Awareness

Although there are perennial reconsiderations of James' work (Blanchard and Schneider, 1942; Estes, 1990; Johnson and Henley 1990; McLeod, 1969), to my knowledge the only contemporary psychologist who has explicitly responded to James' distinction between the nucleus and the fringe is Mangan (1991, 1993). Mangan's highly original work focuses on the feeling of "rightness" or "on-trackness." He argues that it plays a central role (and therefore can be used as a bridging concept) in three areas of psychology usually seen as completely disparate: cognition (in regard to attention, problem-solving, and awareness), aesthetics, and religious experience. A partial version of his very rich thesis has been published along with useful peer commentary (Mangan, 1993), and I will sketch only a few of his ideas here: that the experience of rightness serves as a summary or condensation of non-conscious knowledge structures, and that it is an instantiation in subjective experience of the connectionist concept of "goodness-of-fit."

Mangan begins by noting the general agreement among cognitive psychologists that definite awareness has a very limited capacity: "At any given moment it can only manifest so much clear experience. For something to become clear, something else must become vague" (p. 117). He traces this consensus in part to George Miller's early work that showed that, roughly speaking, at any moment definite awareness is "critically limited to a minuscule allotment of seven psychological units at a time" (Miller, 1962, p. 49; see also Miller, 1956). There are several ways in which we cope with this stringent limit. One is to switch back and forth among topics or channels of interest (e.g., Broadbent, 1958). A second adaptation to the limit is chunking, i.e., the packing of several discrete items into one. For example, the numbers one, four, nine, two, can be repacked as a single date, 1492 (Miller, 1962).

Mangan's important insight was that fringe experiences are an overlooked third major way to finesse the limited capacity of awareness. He proposed that a fringe experience is a radical condensation of a very large web of non-conscious information relevant to the current topic, which would otherwise exceed the limited processing capacity. The fringe experience is a way to present a *summary form* of the contexts or relations that give meaning to the discrete items presented in the nucleus of awareness.

Note that the condensation or summary provided by the fringe experience is not the same as the summary provided by Miller's chunking. A new chunk simply replaces many separate items; the fringe experience does not replace features but rather annotates, amplifies, and explicates them.

Mangan focused primarily on the feeling of "rightness," which he characterized as signaling the fit or compatibility between the small number of articulated features currently in the nucleus of awareness and the *nonconscious*

information structure that makes up the current "topic" or mental context. For example, imagine that while visiting in an unfamiliar home you are seeking the bathroom. You look into a room and see a stove. The mismatch between the stove and the topic (finding the bathroom) is presented in your awareness as a fringe feeling of "wrongness," accompanying the nucleus awareness of "stove." In the next room you see a bathtub. The fit between this item and the topic is presented in your awareness as the feeling of rightness, or on-the-right-trackness. What is presented is "the result of a complex test, but it is neither the test itself, nor that which is tested" (Mangan, 1991, p. 142).<sup>7</sup>

The critical point here is that the fringe awareness of rightness carries a different class of information than the nucleus awareness of the stove or tub. The fringe information in this case has to do with *the relation* of the nucleus items to the topic, the bathroom schema; this could not be given by just another nucleus item. It is providing evaluation or relational information, not just more content information.

Mangan strongly advocates and expands James' position that experiences such as rightness or familiarity have a control function, directing the stream of thought. He links the concept of fringe awareness to important connectionist concepts. He argues (pp. 190 ff.) that the feeling of rightness carries the same sort of information as the formal connectionist metric "goodness-of-fit" or "harmony." This is an abstract mathematical expression which provides a score for how well the pattern of activation over a PDP network as a *whole* has matched its input (Rumelhart, Smolensky et al., 1986; Smolensky, 1986). Because it is a global measure, reflecting information distributed over the whole network, goodness-of-fit could act as a summary or condensation. As far as I know, no connectionist models actually compute and use a value for goodness-of-fit; it is only used by the researcher to describe the global state of the system and to compare states. Mangan suggests that in human minds something like it may actually be computed, and that it shows up in awareness as the feeling of rightness.

Connectionist ideas have been predominantly concerned with "the microstructure of cognition" (Rumelhart et al., 1986). Mangan's hypothesis makes a bridge from the microcognitive to the level of awareness. This is important because, in my view, one of the purposes served by the emergence of awareness as a level of organization beyond the neural and the cognitive levels (Galín, 1992b) is to provide a frame of reference in which to compare and evaluate elements that appear as unwieldy global properties at the microcognitive level.

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<sup>7</sup>For the interested reader unfamiliar with these aspects of cognitive psychology, a full treatment of how rooms and their identifying features are handled in terms of "schemata" and connectionist networks is given in Rumelhart et al., 1986, pp. 22-38.

### Problems with James' Model

#### *What is Meant by "Vague" and "Definite"*

At first James' characterization of the nucleus and the fringe as definite vs. vague seemed adequate. The same distinction is also emphasized by Mangan. However, there are several sources of confusion in the way these terms are used as descriptors of awareness, and they obscure the really important functional and phenomenal characteristics of these experiences.

First, the terms have several senses. Vague has many synonyms with overlapping but distinguishable meanings: imprecise, undefinable, indistinct, hazy, 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 eye-witness.

Thus, James' and Mangan's rather informal characterization of the fringe as vague and the nucleus as definite needs some sharpening. All these 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 not be important if our purpose is determining class membership, 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. Thus, *whether or not we consider an experience vague depends on our purposes for the information it presents.*

This analysis brings us to see that 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 if it was considered with respect to the purposes of the nucleus. There must be some qualities more fundamental than definiteness that make the fringe information unsuitable for the purposes served by the nucleus information, and vice versa. I will suggest some possibilities below.

### *Beyond the Dichotomy*

I find a second problem in James' formulation. The power of his idea was in showing that the fringe and nucleus experiences were qualitatively different, and in calling attention to the overemphasis on the nucleus and the richness of what was left out. But although he gave examples of fringe awarenesses he did not develop a systematic taxonomy of them, leaving the impression that they could all be lumped together. Because Mangan was concerned primarily with the feeling of rightness, he too did not emphasize any further distinctions. Neither James nor Mangan attempted to sort the very heterogeneous array of fringe awarenesses into categories, either phenomenally or functionally. Thus they implicitly gave us the dichotomization of awareness into nuclear vs. everything else.

We must explicitly reject this parsing of awareness. It is important to distinguish more than two basic varieties. Fringe experiences seem to *differ among themselves functionally and phenomenally as much as they each differ from the nucleus.* For example, the feeling of rightness is as subjectively distinct from the feeling of intention as they both are from the experience of seeing.

This difficulty is compounded further because Mangan has not clarified James' concept of nucleus awareness. What sort of information does the nucleus present? Mangan has accepted by default a loose equation of the nucleus with the concept of focus of attention as it is used in the long-lived "searchlight" model of consciousness discussed above.

But because the kinds of awareness are so numerous, some sort of subgrouping, however provisional, would be useful.<sup>8</sup> In the following sections I suggest an abstract framework and some new nomenclature that will allow us to

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<sup>8</sup>In a very thoughtful essay, Shallice (1988) also commented on the great variety of types of awareness, and noted that there is nothing like an exhaustive account in the cognitive literature. He offered what he called a rough-and-ready list, but did not make use of anything like James' distinctions.

reformulate what James was pointing at in terms more congenial to cognitive psychology. This is plainly speculative; I propose it merely as heuristic, as mathematicians or physicists propose a conjecture to focus and stimulate thinking before rigorous theorems or experimental data can be produced.

### Varieties of Awareness

#### *Reconceptualization of James' Nucleus as "Feature Awareness"*

The sum of our conscious and non-conscious knowledge of objects can be thought of as a very large set of properties: size, shape, color, history, uses, cost, hedonic value, etc. (this applies to events and ideas as well as objects). Consider these general properties as dimensions defining an abstract multidimensional "space." Particular properties (e.g., redness, or price, or pleasantness) can be thought of as specific values arrayed along these dimensions (e.g., red is a particular value along the color dimension). A value may be specified with more precision (e.g., a particular shade of red), or with less precision (e.g., any red between orange and violet). Such values are what we commonly call "features." Our non-conscious knowledge of a particular object (or an event or idea) can be described by the whole set of values on the dimensions of its property space. In general, all of our non-conscious knowledge can be thought of as a set of representations in such spaces, which might be separate, or linked, or overlapped, or nested. Many authors have proposed detailed architectures of concept spaces and levels of representation (e.g., Jackendoff, 1987; Rosch and Lloyd, 1978), but this oversimplified sketch will do for the present purpose.

When we become aware of objects, events, or ideas, they are typically experienced in the context of a topic or set of goals. Some dimensions of the object or event are more relevant to the current goal than others; they maximally discriminate among items or choices. For example, when shopping we may be guided sometimes by the dimension of color, and on another occasion by cost. Only the small subset of the object's dimensions most relevant to the current topic need be selected.<sup>9</sup> I propose that when we become aware of an object, event, or idea, the values on these selected dimensions are presented as one part of our awareness. This part corresponds to James' nucleus. I call it "feature awareness," in order to be descriptive of function, to get away from

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<sup>9</sup>What governs the selection, and how "relevance to topic" is defined are complex issues, deliberately glossed over here. More or less detailed models are proposed by Norman and Shallice (1986), Jackendoff (1987), Baars (1988). In my view there are always several topics, some competing and some nested within each other, related to longer or shorter time frames, and more general or more specific goals. Sudden intense stimuli can presumably always gain access to feature awareness; the current topic is then shifted to "what is it?"



the spatial and status connotations of "nucleus," and to distinguish it from the contemporary "focus of attention" which can include nucleus, fringe, or both.

*Other Varieties of Awareness: Reconceptualizing James' Fringe*

But there is much more in awareness than just the most topic-relevant features. This is what James was trying to tell us with his concept of the fringe. I have already stressed that many types of awareness have been conflated under this label. What is different about the information they carry?

One type provides evaluation or relational information, explicating the items in feature-awareness. This type was illustrated above in Mangan's analysis of the feeling of rightness and my example of looking for the bathroom. I emphasized that the information carried by the feeling of rightness concerned the relation of the items in feature-awareness (stove, or tub) to the topic, the non-conscious bathroom schema. Such information could not be given by just adding more features. Other examples of this type are the feelings of source which tell us vividly whether current feature-awareness is derived from current perception or from memory, or the feelings of agency which tell us whether a proprioceptive image of movement was self-initiated, autonomous, or passive.

Another category of fringe experience presents information about dimensions of the current input not selected for feature-awareness. For example, our experience of an object's global meaning can be thought of as a condensation or summary over a relatively large part of its multidimensional property space, in contrast to the few most topic-relevant ones. It is this, *in addition* to the feature-awareness, that fleshes out our experience of an object as more than an assemblage of parts. It is this which is missing in patients with associative agnosia following brain injuries (Damasio, 1990; Rubens, 1985; Sacks, 1985). Such patients may be able to see an object, describe it, draw it, but not recognize what it is or how it is used. Hence the title story of Sacks' popular book, *The Man who Mistook his Wife for a Hat* (1985).

The reader who is not sure of what meaning feels like in awareness may be helped by the contrasting experience of loss of meaning. If you repeat a word aloud twenty times (try "fascination"), your original awareness of its meaning will fade and disappear. What remains of it (or perhaps, what replaces it), is the representation of a few phonemes in feature-awareness, with fringe representation of only a few fragments of its usual extensive connections, or new meanings related to new segmentations of the phoneme string. The experience of the fading of word meaning with repetition is the opposite of the tip-of-the-tongue experience, in which the condensation of the word's meaning is vividly present in the absence of feature-awareness of its key phonemic fea-

tures. This awareness of a condensed specific meaning is distinct from the awareness of generic meaningfulness (rightness, relevance, significance) that Mangan has emphasized.

A third very important type of fringe information is not related to current input, current feature-awareness, or the immediate topic. Rather, it concerns non-conscious knowledge related to other topics or goals further in the background of goal hierarchies (e.g., Baars' nonconscious "contexts," 1988). One example is the feeling of having left something undone, with no awareness of what it is (e.g., call home, or file taxes, or spouse's birthday). Another example is a persistent blue or angry mood relating to a previous or anticipated social encounter, or so-called free-floating anxiety which may actually relate to something like a pending exam or surgery.

To summarize thus far, I have proposed that (1) one part of awareness (feature-awareness, *né* James' nucleus) presents the few most discriminating features of a knowledge structure related to our most immediate topic, and (2) other parts of awareness (James' fringe) present evaluational or relational information that explicates the bare features, or present condensations or global indices of other non-conscious knowledge, both declarative and procedural. The term "fringe" should be replaced. These awarenesses are too varied to be captured by a one-word descriptor, and fringe has a misleading connotation of relative unimportance. Therefore, until we find a less awkward nomenclature, I will use specific labels like "relational awareness" and "summary awareness," and use "non-feature awareness" for the collective.

Obviously there are a great many categories beyond the few examples I have offered. It would be useful if we could formulate a broader frame of reference within which to order them. I will present one such frame here: the concept of self-monitoring, which has been attracting attention recently in widely different areas of psychology (e.g., Frith, 1987; Johnson and Hirst, 1992; Prigatano and Schacter, 1991; Zaidel, 1987)

### Categories of Awareness Related to Self-monitoring

#### *The Self-monitor*<sup>10</sup>

Many complex self-regulating systems that adapt to their environment use a regularly up-dated map of their own state and the adaptations made. The processes that keep track of the current state of the self in its environment

<sup>10</sup>In considering the role of non-feature awarenesses in self-monitoring, it is useful to first clarify the stem concept "self" and separate self-monitoring from the other hyphenated derivatives with which it is often confused: self-concept and self-awareness. Self is rarely explicitly defined even in technical psychology and philosophy and can carry with it a great deal of unacknowledged conceptual baggage. In a recent paper I proposed a new definition: the term

are likely to be hierarchically organized and distributed, but for simplicity I use the term self-monitor in the singular to refer to all of them collectively. There are some empirical data available to constrain hypotheses on the details of self-monitoring although it has not often been considered as a separate process or general capacity apart from the specific performance being studied, and no general theory of monitoring has been offered (Johnson, 1991; Kihlstrom and Tobias, 1991; Landis, Graves, and Goodglass, 1981; Prigatano and Schacter, 1991; Zaidel 1987). Recently I discussed self and self-monitoring in the context of unawareness of deficits following certain brain injuries (Galín, 1992b).

We infer the existence of a self-monitor because we know a lot about our present "mode" of organization, including such things as the level and quality of our awareness and our cognition, and our status as agent. For example, we know how aroused we are (drowsy or alert or drunk); we can distinguish imagining from remembering, we can even sometimes realize that we are dreaming and not awake. We have information about our goals and actions; when the doctor taps our knee and elicits a reflex knee-jerk, we can say "I didn't do that." I believe it is more than a figure of speech when a person says "I don't feel like myself today." It is certainly more than that in pathological conditions, e.g., when patients with multiple personality disorder experience a radical shift between discrete selves, or when a "split brain" patient watches his left hand (right hemisphere) make a response and says, "I know it wasn't me that did that!" (Galín, 1974).

It is important to distinguish self-monitoring from self-awareness. Self-awareness logically means simply awareness of information about the self (Galín, 1992b). Numerous experiments have demonstrated that even very complex information processing can go on without our being aware of it (Kihlstrom, 1987; Velmans, 1991). Therefore it should not be surprising that much or all of what a self-monitor does could be done without awareness. I propose that *when self-monitoring information does enter awareness, it is largely in the form of a wide variety of evaluative, relational and explicating experiences, with key details as usual in the form of feature awareness*. The non-feature awarenesses can be thought of as condensed summaries of the state of certain aspects of our overall system. A summary is needed because the whole map is too big for the limited representational capacity of awareness.

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self should denote the overall organization that makes a person an entity (Galín, 1992b). A person is made up of component subsystems which can be more or less tightly integrated or autonomous. If we define self as *the organization*, not just another subsystem, we will have a clear referent for common phrases such as "a more integrated self," or "a development of the self," or "a loss of self." The concept of self as *organization*, varying dynamically in degree and quality, works at the neurological level of description as well as at the psychological level, and across levels. However, this definition is not necessary for the arguments in the rest of the paper.

The self-concept is another hyphenated term that needs to be considered because it is often conflated with what I have called self-monitoring and self-awareness. In my set of definitions, the self-concept is a knowledge structure (a body of information) consisting of knowledge, beliefs, attitudes, etc. *about* "who one is" as an object in the world. It is similar in form to our concepts of any other objects, e.g., our next-door neighbor or the Washington Monument. Like any other concept we have, it can be incomplete and in some respects incorrect. Some of this knowledge may be inference from earlier reports from the self-monitor, but much of it comes from other sources, such as the opinions of our relatives. It is clearly distinguishable from self-monitoring as defined above. I hypothesize that when information from the self-concept is brought into awareness, it is represented in the same fashion as other concepts.

#### *Taxonomy for Experiences Related to Self-monitoring*

Awarenesses derived from self-monitoring can be provisionally sorted according to the domains to be monitored. I suggest three to start: knowledge, action, and goals. I do not mean this to be an exhaustive list.

The group of awarenesses related to monitoring the domain of *knowledge* includes metacognitive experiences, such as feelings of knowing, familiarity, and source identification (e.g., distinguishing memory from perception or imagination; see Johnson, 1991). The feeling of knowing determines how long a person persists in memory search; when it is inaccurate one may stop too soon or obsess too long (discussed by Mangan, 1991, citing: Gruneberg and Sykes, 1978; Hart, 1965; Nelson et al., 1984).

The second group, related to the monitoring of *action*, includes experiences such as intentions, sense of effort, and sense of agency. Feelings of intention can be thought of as summary representations of action plans currently readied. This view is complementary with the theoretical framework for the role of attention and will in the control of action proposed by Norman and Shallice (1986). These authors give particular emphasis to the different ways in which an action is subjectively experienced, and this guides the development of their theory. Libet and his colleagues, in studies of cerebral processes related to awarenesses in the action domain, have also emphasized the importance of fine subjective distinctions, e.g., between the feeling of preparation (intending to move "soon") and the feeling of intending (wishing) to move now. These have distinct electrophysiological correlates (Libet, 1985.)

*Emotion and the domain of goals.* The experiences related to monitoring the domain of goals includes a major group conspicuously missing from James' examples; the subjective component of emotions. James treated emotional awareness in a separate theory (1884), with no regard to his categories of

fringe and nuclear awareness. In fact, it seems that in his emphasis on the core role of somatic sensations in emotional awareness he was making the error he warned of, i.e., emphasizing the nucleus and ignoring the fringe (for a modern treatment clarifying misstatements and misunderstandings of James' theory of emotion, see Papanicolaou, 1989).

Emotions are complex events, including subjective, physiologic, behavioral, and cognitive components. I am calling attention here only to the subjective component. These components are organized in coherent patterns (Tomkins, 1962). Emotional responses (as distinct from moods) can be conceptualized as brief reactions to events that have significance for our personal goals (Ekman, 1977; Lazarus, 1991). For example, if progress to the goal is externally blocked we may feel angry; if the event renders the goal irretrievably lost we may feel sad; if the event signals movement closer to the goal we feel happy. I propose that *the subjective component of emotion is a summary representation of where we stand with respect to our current personal goals*. In addition, a few key details of the event, of the goal, or of our physical state may or may not be present in feature awareness. In this formulation the subjective component of emotion is seen as part of a family of self-monitoring events, and not of a wholly different nature from other events in awareness involved in metacognition, evaluation, and control. This is consistent with a number of modern theories of emotion which take an information processing approach (Carver and Scheier, 1990; Oatley and Johnson-Laird, 1987; Ortony, Clore, and Collins, 1988;).

These are just initial steps toward a taxonomy of non-feature awarenesses, organized in relation to self-monitoring. The few categories suggested do not capture numerous other awarenesses, vivid to most people, that also seem related to self-monitoring. One omitted domain includes the feelings of health, energy, and vitality, as contrasted with feelings of illness or fatigue. Another group concerns sense of social distance and quality, such as the feelings of being isolated or connected, "at home," loving or indifferent. However, the scheme I have sketched indicates a direction for further development.

### Applications

The test of any new descriptive framework is whether it helps us to group together things whose connections we had not noticed, or to focus our attention on discriminative aspects that we had previously ignored. Although there has been a fair amount of empirical work on some kinds of evaluative, summary, or explicating experiences, in general such research has not been identified as awareness research, and therefore more effort has been spent on assessing performance or mechanism than on phenomenal details and how they vary. Attending explicitly to subjective experience and distinguishing

among the varieties of awareness that I have suggested might be helpful with current problems. One example is the study of the feeling of knowing. This is usually classed as memory research, and focuses on correlations of a simple estimate of the feelings' intensity with subsequent memory performance. Few studies have examined how feelings of knowing are related to feelings of familiarity and to feelings of global meaning, and what aspects of the underlying knowledge structure the feeling of knowing represents or omits (see Schacter 1989, 1991, and Brown's 1991 review for exceptions). The details of questions or instructions to subjects are particularly critical because, as Schacter has observed concerning tests of implicit memory, how you test and what instructions you give determines what you find (1991, pp. 140-141).

A related example concerns the phenomenon of blindsight. Patients with occipital cortical lesions are blind in the corresponding visual field; they report seeing nothing, having no visual experience. Yet some have so-called blindsight: when forced to guess about stimuli shown to the blind field they can localize by pointing, they can detect and discriminate movement, orientation, and color, and when asked to reach for the "unseen" object they can adjust their hand position to match its size and shape (Cowey and Stoerig, 1992; Weiskrantz, 1986). The point for us in the present context is that unless forced to "guess" the patients make no attempt to use "visual" information from their blind field. Even though they have obviously processed the information at some level, they have no subjective experience indicating that it is available. There is no associated feeling of knowing. Studies of this phenomena have focused most on the presence or absence of feature awareness, but to my knowledge, the presence or absence of other varieties of awareness have not been thoroughly explored.

Modern psychology has made some notable progress toward identifying and characterizing the cognitive and brain subsystems related to a long list of mental processes. Now, many psychologists are looking for a bridging conceptual framework which will account for how these bits and pieces are integrated into behaviorally relevant systems in the whole brain and the whole person. This effort will be helped by an increased emphasis on awareness and by attention to the distinctions I have suggested among the varieties of awareness. For example, at least some non-feature awarenesses play an important integrative role in self-monitoring, yet they have been either overlooked, or dismissed as vague, fleeting, preliminary, or defective.

A complete theory of awareness will have to include accounts of phenomena at the subjective level as well as at the neurological, cognitive, and behavioral levels (Flanagan, 1994; Jackendoff, 1987). For instance, most work on associative agnosia has only matched up what is missing at the neurological level (e.g., lesions of occipital-parietal cortex) with what is missing at the cognitive-behavioral level (e.g., inability to identify an object, its use, or its

class membership — [Rubens, 1985]). In this paper I have identified a specific component that is missing in these patients at the phenomenal level, the feeling of meaning, and I have hypothesized that its relation to the cognitive level is that of a condensation or global summary of the knowledge structure which makes up that object's property space. This is not an explanation; it is a better specification of what needs to be explained.

Although contemporary psychologists hold various convictions on the causal potency of awareness (cf. Edelman, 1989; Jackendoff, 1987; Norman, 1986; Sperry, 1976; Velmans, 1991), all can benefit from James' exhortations to attend to subjective experience; even if these distinct types of awareness do not serve control functions in their own right, they must be indicators of important underlying structures. Consider Libet's three decades of experiments on brain mechanisms related to subjective experience and volition; phenomenology has been his starting point more often than neurophysiology (Libet, 1965, 1985, 1987).

### General Conclusions

An important part of scientific psychology is to describe phenomena and explicate their functions. This is distinct from reductive mapping onto other levels of organization, and complements it. Theory-building is an interactive process in which description precedes attempts at reduction and, in turn, is modified by them (cf. Wimsatt, 1976a, 1976b). In this paper I have called attention to key descriptive aspects of awareness and extended the distinctions James drew between nucleus and fringe; not as a dichotomy of two types, but as a much larger set. I have emphasized that the important differences among them are not their degrees of vagueness, but rather the types of information they convey. This descriptive analysis was set in the functional framework of self-monitoring, which is relevant to many subdisciplines in psychology. The categories I have suggested, feature awareness and the variety of evaluative, summary, and explicating awarenesses, give us a more differentiated vocabulary and a more precisely characterized set of variables with which to work. This should be useful for psychologists interested in awareness whether their focus is in computer simulations, neuroscience, or clinical interventions.

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