

# Sensation's Ghost

## The Non-Sensory "Fringe" of Consciousness

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**KEYWORDS:** Consciousness, fringe, inattention, nonsensory experience, implicit cognition, voluntary retrieval, feeling-of-knowing, emotion, qualia.

**ABSTRACT:** Non-sensory experiences represent almost all context information in consciousness. They condition most aspects of conscious cognition including voluntary retrieval, perception, monitoring, problem solving, emotion, evaluation, meaning recognition. Many peculiar aspects of non-sensory qualia (e.g., they resist being 'grasped' by an act of attention) are explained as adaptations shaped by the cognitive functions they serve. The most important nonsensory experience is coherence or "rightness." Rightness represents degrees of context fit among contents in consciousness, and between conscious and non-conscious processes. Rightness (not familiarity) is the feeling-of-knowing in implicit cognition. The experience of rightness suggests that neural mechanisms "compute" signals indicating the global dynamics of network integration.

### 1. Introduction <1>

This paper has three related aims. The first is to establish that non-sensory experiences constitute a basic, if neglected, category of conscious contents. The second is to identify some of the cognitive functions that nonsensory experiences appear to execute in consciousness. The third is to argue that the limited capacity constraint on consciousness has shaped the particular way these functions are instantiated -- if so, we can then to a degree explain *why* non-sensory experiences have the peculiar phenomenological character they do. So I intend to consider non-sensory experiences at three interlocking

levels of analysis: descriptive, functional, explanatory. The explanatory level is by far the most speculative, and while it depends on the first two, they do not depend on it.

Today when people consider the subjective aspect of consciousness, they often talk about "qualia." In principle this term can refer to the qualitative feel of any experience. But in practice it is usually applied to cases in which we attend to strongly felt and easily named *sensations* -- the blare of a trumpet, a twinge of back pain, the saturated red of a ripe tomato. The leading examples of what it is like to be conscious are now usually drawn from vivid sensory experiences of this sort. For better or worse, these are the paradigm cases which tend to guide people's intuitions about the nature of consciousness and its relation to the far more complex cognitive system in which consciousness is embedded.

Paradoxically, it may be easier to understand the interplay of conscious and non-conscious processes, and to begin to explain why qualia feel the way they do, by considering two *less* obtrusive aspects of our phenomenology -- the indistinct peripheral-sensory experiences that surround the focus of attention, and those experiences that have no sensory content at all. Of the two, non-sensory experiences are probably of greater cognitive importance. In any case, I will restrict myself to considering peripheral-sensory experiences only to the degree they throw light (which is considerable) on the phenomenology and function of non-sensory experiences.

These two aspects of experience are closely related, both in their phenomenology and in their cognitive functions. For something like the indistinct, spreading, blurred quality of peripheral-sensory experiences is also found in non-sensory experiences. Many descriptive terms in English naturally apply to both cases. For example, in what is probably the single most useful and evocative treatment of non-sensory experiences (at least given the aims of cognitive research), William James often likened non-sensory experiences to a "penumbra" or "fringe" of "vague" experiences -- even though James himself recognized that non-sensory experiences pervade the entire field of consciousness, and are not just creatures of the periphery. [<2>](#) And non-sensory and peripheral-sensory experiences are involved with the same inclusive cognitive functions: Both represent context information in consciousness; and by virtue of this capacity, both help mediate the voluntary retrieval of new information into consciousness.

But they also differ in basic ways. Non-sensory experiences are just that -- without sensory content. Peripheral-sensory experiences have sensory content, albeit fuzzy or slurred. And non-sensory experiences are, again, not just peripheral, but pervade the entire field of consciousness. So in terms of the standard Gestalt figure/ground distinction, the figure is the region of focal-sensory contents, the ground of peripheral-sensory contents. Non-sensory contents, however, pervade both the figure *and* the ground. Then, too, the scope of the context information sensory and non-sensory contents provide is hugely different. Peripheral-sensory experiences represent information about the immediate environmental surround. Non-sensory experiences represent virtually everything else of cognitive importance in consciousness. Non-sensory experiences constitute, among other things, those aspects of consciousness that turn a naked focal-sensory content into an interpreted, meaningful perception. In the ground, non-sensory

experiences constitute, among many other things, the feeling of immanence -- i.e., the feeling that much more detailed information is available on the periphery for retrieval if needed.

It will take a good deal of exposition to unpack and qualify what I have said so far, and that will be the job of the next few sections. For now, to make things a bit more concrete, let me briefly consider one non-sensory experience from among the virtual infinity that can occupy consciousness -- familiarity.

Everyone knows what it is like to feel that something is familiar, and I doubt anyone would claim that familiarity, in itself, is a sensory experience. The feeling of familiarity is not a color, not an aroma, not a taste, not a sound. It is possible for the feeling of familiarity to merge with, or be absent from, virtually any sensory content found on any sensory dimension. In general this is a striking feature of non-sensory experiences -- they are trans-sensory.

It is difficult to examine the feeling of familiarity introspectively. While we know without question *that* we feel it, just *how* it feels is a good deal more obscure. I will argue that this introspective peculiarity is the result of a combination of factors typical of most non-sensory experiences. One of these factors has to do with the relative resolution capacity of non-sensory as compared to focal-sensory experiences. Non-sensory experiences are less fine grained, less precisely delineated than focal-sensory experiences, which occur in a relatively circumscribed region the entire conscious field. And non-sensory experiences are much more diffuse -- they have a cloud-like quality that usually spreads out over larger portions of our conscious field than that occupied by focal-sensory contents.

It is much easier to give a straightforward characterization of familiarity's cognitive function than its phenomenology. Familiarity represents a particular sort of context information in consciousness. It is the datum which signals that something now in consciousness has been encountered before. This feeling-signal indicates the same cognitive relationship in numberless specific cases. The cognitive work of actually determining that something is familiar is presumably an extremely complex process and is carried out, almost completely, by non-conscious processes.

So far as I can tell, in contemporary discussions of empirical research, familiarity is by far the most commonly named non-sensory experience. This is because studies routinely identify familiarity with the "feeling-of-knowing," and by virtue of this conjunction the experience of familiarity is taken to play a major role in a wide range of findings from implicit cognition to emotion to various kinds to problem solving; some of this work will be reviewed in Section 8.

If we take the phrase "feeling-of-knowing" at face value, it is at the heart of cognition in consciousness. The very word "cognition" derives from the Latin root meaning to acquire knowledge. It is hard to see how anything could be more central to the cognitive study of consciousness than finding out if, or to what degree, a single identifiable experience

constitutes our felt conviction that we know something -- both in order to isolate this feeling and its operation in consciousness as carefully as possible, and to work back from it to the underlying non-conscious processes.

At various points in this paper I will argue that the feeling-of-knowing is a good deal more important for understanding conscious cognition than it is already taken to be. But at the same time I will try to show why the feeling-of-knowing is *not* familiarity. Unfortunately I can find no term in English with a connotation broad enough to adequately cover the non-sensory feeling that I claim *is* the feeling-of-knowing. For want of a better term, I will call it "rightness." I suspect this terminological inadequacy arises in part because rightness is a far more basic and versatile cognitive signal than is familiarity. Rightness is at once the core feeling of positive evaluation, of coherence, of meaningfulness, of knowledge. All these different aspects of cognition in consciousness depend, I claim, on the same non-sensory signal.

My treatment of individual non-sensory experiences will be limited almost entirely to familiarity (as the most widely discussed), to the sense of imminence, and to rightness. In functional terms, it is almost as easy to say what rightness does in consciousness as it is to say what familiarity does. Rightness signals how well the contents of consciousness fit their context. The detailed information which constitutes the full cognitive representation of this context and its evaluative processing are almost completely non-conscious. So in this sense rightness functions in consciousness to signal how well, at any given moment, the conscious and non-conscious domains of human cognition are integrated. Among other things, then, rightness signals how well the contents that flow through consciousness fit with one another, i.e., cohere, over time. Habituation aside (a significant qualification) the intensity with which rightness is felt indicates the degree to which context fit is successfully occurring, just as (with the same qualification) the intensity with which we feel familiarity indicates how often a content now in consciousness has been encountered before.

Confusing familiarity with rightness has ramifications that go far beyond establishing a subtle point of phenomenology. The determination of context fit is something quite different from the determination that a conscious content is familiar. Perhaps this is easiest to see in cases of complex problem solving when the solution is novel, and so the feeling-of-knowing cannot be familiarity. The discovery of a novel solution involves the feeling that it is *right* -- in functional terms, that the solution fits an antecedently created context that specifies what would constitute a solution in a given case. Consciousness is involved far more with novel than familiar information. Familiar information is usually handled more efficiently by non-conscious processes, and via habituation it tends to leave consciousness (Baars, 1988). Qua experience, rightness is completely conscious. But metaphorically speaking, rightness can be thought of as a sort of semi-permeable membrane, mediating the flow of information between conscious and non-conscious domains.

By intersecting phenomenological and functional analysis, we can begin to explain why non-sensory experiences have their distinctive character. As we will see, various

articulation trade-offs in our phenomenology imply that consciousness is constrained by a sort of conservation principle -- by an overall limit in consciousness' ability to articulate experience at any given moment. This means that as some aspects of experience gain detailed articulation at any given moment, others will lose it. To increase the sensory content in one region of the field of consciousness, sensory content in other regions will become more attenuated. Non-sensory experiences place the smallest load on consciousness' limited capacity to produce detailed experience, peripheral-sensory experiences place a greater load on it, and focal-sensory the most. The current equilibrium among these demands is presumably the result of a long cognitive/biological evolution.

To some degree, phenomenology follows function. That is, the cognitive function or functions that an experience serves helps to shape the particular feel or quality of that experience. So, for example, non-sensory experiences involved in the retrieval function are peculiarly elusive, that is, they seem to actively resist attempts to focus attention directly on them. This phenomenological quality is apparently mandated by the retrieval function which they serve. One implication of this is that it is a serious mistake to equate the contents of consciousness only with those contents that can occupy attention. The contents of consciousness are far more extensive than the contents of attention, and we will see that this point can be supported by the convergence of cognitive-functional considerations and slightly indirect phenomenological evidence.

Now, if non-sensory experiences do play a central role in conscious cognition, we would expect that observant human beings would already have noted their existence long ago. And in fact the recognition of the non-sensory aspect of conscious cognition is ancient and persistent -- even though it has often been confounded with metaphysics. Plato, for example, insisted that non-sensory experiences underlie our capacity to unify a multiplicity of changing sensations into a single concept. But Plato also held that non-sensory experience derived from a higher reality (e.g., *Phaedrus*, 247, 249). Interest in non-sensory experience in part led Leibniz and Kant to undertake the first detailed exploration of the relation between what we would now call conscious and non-conscious information processing. In Kant especially, an acute cognitive phenomenology is obscured by a very complex overlay of theory.[<3>](#) During the transition in the 19th century from philosophy to scientific psychology, interest in the cognitive role of non-sensory experience was if anything more prominent, from Herbart to Wundt to the unjustly maligned (see Zangwil, 1987) Wertzburg school.

Behaviorism came to power during the period of vehement cultural reaction that followed the carnage of the First World War. Behaviorism asserted as a founding principle that the study of consciousness is inherently unscientific. It tried to stop all research on consciousness, and it largely succeeded. Behaviorism influenced other disciplines beyond experimental psychology. In philosophy, for example, its marks are evident on some of the more well-known aspects of Wittgenstein, much traditional Analytic philosophy of mind, and contemporary versions of functionalism such as Dennett's. But even Wittgenstein (who could quote James from memory, page number included!) investigated

with sympathy many aspects of non-sensory phenomenology, notably in aesthetic or quasi-aesthetic contexts.<4>

As behaviorism declined, the cognitive revolution flourished. Almost immediately non-sensory experiences began to crop up in empirically based research -- but just in passing. Behaviorism had held power for so long that it had been able to establish an irrational but very deep prejudice against the study of consciousness. The result was a kind of institutional amnesia about the history of previous scientific work on the role of consciousness in human cognition. This amnesia is still largely intact, and I am convinced that even the most dedicated practitioners of consciousness research today remain subject to it in one way or another (Mangan, 1997). In revolutions, habits of mind cultivated by the old regime are sometimes adopted, unrecognized, by the revolutionaries. The cognitive revolution began its rise to power in the 1960s. But it was not until the late 1980's or early 1990's that more than a tiny minority of cognitive researchers took the study of consciousness to be legitimate.

Nevertheless, the phenomena are so robust that even the first well known textbook in the new field, Neisser's *Cognitive Psychology* (1967), had already assembled (without recognizing it) enough research findings and theoretical considerations to make it possible to reactivate the scientific study of consciousness, including the study of non-sensory experience. As we will see, Neisser did not put the pieces together, at least in part because of the lingering influence of behaviorism

Evidence for the existence of non-sensory experiences of some sort began to accumulate at many other nodes of cognitive research. From the early days of blindsight and implicit cognition experiments, subjects reported that at times non-sensory feelings mediated their behavior. Weiskrantz (1980) noted that for some cases of blindsight, "...with relatively salient stimuli -- large, contrasting, moving -- he [D.B.] was 'aware' of something, he 'knew something was there,' and roughly where it was, but he did not in any sense 'see' it -- about that he was absolutely firm and denied that even far peripheral normal vision was similar to any experience in the blind field." Marcel (1983) reported that in his experiments on implicit cognition, subjects would sometimes say that they relied on non-sensory "gut feelings." Subjects in Lewicki's (1988) experiments on the recognition of artificial grammars made similar remarks. But in none of these cases was an attempt made to specify precisely what non-sensory experience might be operating.

So far as I can tell, familiarity is the only non-sensory experience mentioned with any frequency in the cognitive literature; many researchers now take it to be an important cognitive datum. But familiarity is still treated on an ad hoc basis, without discernible interest in its non-sensory character, and without the recognition that it is just one non-sensory experience among a multitude with equal or greater cognitive importance. The result of these oversights is that putative applications of the feeling of familiarity are usually too broad, often mistaken, and obscure the existence of rightness.

From here my argument will move from a descriptive phenomenology of non-sensory experience (sections 2-3) to its functional analysis (4-5), and then on to an attempt to

explain non-sensory phenomenology as a consequence of its cognitive functions (6). The final sections (7-10) return to consider some of the relevant cognitive literature

## 2. Preliminary Examples

The reader can now begin to verify directly that non-sensory experiences are a distinct species of conscious content -- even though in almost all cases non-sensory experiences do not occur in isolation, but are merged with sensory contents to some degree. Read the following paragraph through at normal speed. Don't skim or give up half way through.

A newspaper is better than a magazine. A seashore is a better place than the street. At first it is better to run than to walk. You may have to try several times. It takes some skill but it is easy to learn. Even young children can enjoy it. Once successful, complications are minimal. Birds seldom get too close. Rain, however, soaks in very fast. Too many people doing the same thing can also cause problems. One needs lots of room. If there are no complications it can be very peaceful. A rock will serve as an anchor. If things break loose from it, however, you will not get a second chance. (Klein, 1981, p. 83).

At this point the reader will *feel* that something is deeply wrong with the paragraph. As a whole it is meaningless, disjoint, makes no sense -- even though all the words make individual sense, every sentence is well formed and, except for its subject, everything is perfectly straightforward. This unpleasant, raw, clashing feeling of incomprehension is just that, a feeling, and it is without any sensory content. It is easy to show this by slipping in the word kite at this point. Behold: Rightness flashes in consciousness.

The character of the reader's non-sensory conscious field will now have shifted -- radically and instantly. Nevertheless the *sensory* components of the paragraph did not change at all. And yet the overall quality of its phenomenology could not be more different. Now please go back and read the paragraph through again. I say "please" because you may well resist my request. Do you already feel so strongly that each sentence will now make perfect sense that it seems a bit tedious to go through the paragraph sentence by sentence to establish what is *already* obvious? But how do you know before actually doing it what the outcome will be?

There are many ways to describe the experience of cognitive integration that filled the paragraph once the word kite was introduced. We could say that the parts suddenly felt like they all fit together; or that they suddenly became joined into a coherent whole; or that they suddenly made sense, or that they suddenly acquired an overall meaning, or that we felt the YES! AH! RIGHT! of solving a taxing problem (taking the paragraph to be problematic on first reading). There is reason to think that these and many other terms and phrases (e.g., meaning, unification, coherence, integrated whole) are all different ways of referring to the same basic non-sensory experience -- what I call "rightness" and

James among other things called the feeling of "subjective rationality," "right direction to the thought," "dynamic meaning."

Beyond an appeal to our phenomenology, we can establish a plausible preliminary identification of these and similar terms to the degree that they arise from the same basic cognitive situation, and so could be expected to generate the same sort of cognitive signal in consequence. And functionally understood, these kinds of terms *do* often arise in cases where a given content in consciousness is found to fit especially well with its relevant context information, almost all of which is encoded non-consciously.

Now, then, introspect on just what this feeling of rightness, meaningfulness, cognitive integration, etc., felt like. What precisely did you feel when you saw the word kite and felt for the first time, and realized that the paragraph made sense, that it was a meaningful whole? What, precisely, was the phenomenological character of the feeling that delivered this message? At this point two things at least should be evident. First, that the experience was intense for a moment and then faded away; second, that the experience had no sensory content of its own, even when it was most intense.

Here is a striking paradox: In one sense, this feeling was exceptionally clear since it delivered a very clear message -- that the sentences in the paragraph made perfect sense. This was evident instantly; there was no need to read each sentence to feel this. Yet in another sense the experience that delivered this clear message was itself very unclear. It had nothing like the precision of detail we usually have in focal sensory experience. The feeling of rightness was amorphous, fuzzy -- more like a mass of slightly compressed raw cotton-balls pervading a considerable region of consciousness than like the precise focal experience of, say, the experience on your screen of the word "this." The phenomenological texture of rightness (like virtually all other non-sensory experiences) had something of the blurred quality of deep peripheral vision. Or to use an auditory example, like the amorphous background buzz of many overlapping conversations at a theater before the lights go out.

There are a virtual infinity of non-sensory experiences -- rightness and familiarity, with their opposites wrongness and novelty, are only four of them. Once a person "gets" the non-sensory dimension of experience, he or she will immediately see what a huge role they play in consciousness. Free-floating anxiety, the feeling of causal connection, the sense of "mineness" underlying our concept of self, many aspects of emotion -- these are all non-sensory experiences -- as are the realm of intuitions and hunches. Any experience that is not a sensation is non-sensory. The list is endless. All expressive feelings such as the sorrow of the willow or the joy of sunshine are non-sensory experiences. (These so called "physiognomic" experiences were a special interest of Wittgenstein's). It is safe to say that any experience that occurs in more than one sensory mode is non-sensory.

The distinction between the sensory and non-sensory aspects of experience is quite straightforward at the level of common-sense concepts, even though we have the paradox that, at the phenomenological level, non-sensory experience is often impossible to isolate

completely. Normally, the sensory and non-sensory aspects of experience merge so seamlessly with one another that they cannot be separated by an act of selective attention. We will see later that there are various functional reasons why this should be the case, deriving from the limitations of consciousness and the relation of consciousness to non-conscious processing.

Another way to roughly capture the sensory/nonsensory distinction is to think of non-sensory experiences as the contents in consciousness which, when added to and merged with sensations, create perceptions. Or we can put the same point in terms of subtraction: If we begin with a full fledged perception and strip it of its normal non-sensory content, what is left is the experience of (more or less) naked sensations. The missing something is the non-sensory component of the original experience.

Consider an experiment most of us carried out when we were kids. Repeat a word out loud rapidly twenty or thirty times. Actually do this right now, and use the word "grudge".

The sensory component -- that is the sound "grudge" made by your mouth and tongue and larynx -- remained more or less constant during all repetitions. But *something* in the full experience of the word definitely changed. As the repetitions continued, this something grew dim and then faded away altogether. What remained -- the raw sound that is the sensation "grudge" -- became an odd and somewhat ugly mix of vowels and consonants, like a word in an unknown and guttural language. The something that is lost during repetition is the unobtrusive non-sensory content.

When people describe this change, they commonly and naturally say that the word in question has "lost its meaning," that it has become "a mere noise."<sup>5</sup> So people not only distinguish a sensory from a non-sensory component in experience, they also identify the non-sensory component with the word's *meaning* -- as that meaning is directly felt in consciousness. Again, even many ten year olds grasp this point, as you may have yourself when you were young. Perhaps this example is already enough to give the reader a further inkling of the magnitude of the cognitive role non-sensory experiences appear to play in consciousness -- for non-sensory experiences would seem to bear meaning in consciousness. And so it would seem in cases of this sort that what we mean by a perception is the combination of non-sensory experiences and sensations.

So what could be called educated folk psychology has already attributed a basic cognitive function, or perhaps overlapping functions, to non-sensory experiences (e.g., bearing meaning; turning sensations into perceptions). But something is very puzzling about this when we get down to the phenomenological details. The phenomenology of non-sensory experiences is difficult to apprehend directly. In order to show that "grudge" had a non-sensory component, the introspective procedure was *indirect*. We compared our memory of how the word felt normally with the way the word felt after many repetitions, and projected the shortfall back into our sense of the word's feel when it was fresh.

In general we have far more ability to use selective attention to distinguish one aspect of a complex sensory experience than we have for distinguishing the sensory and non-sensory components in the same experience. If we listen to (say) a three part fugue, we can apprehend its musical character as a whole, or we can focus a given voice and follow it in relative isolation. But for some reason our attentive mechanisms resist attempts to isolate the non-sensory aspect of an experience from its sensory aspect. There is something about non-sensory experiences that resist direct introspective access.

This is not to say that direct introspection of non-sensory experience is impossible -- only that non-sensory feelings are peculiarly muffled and difficult to separate from their sensory matrix. It is certainly possible to feel the nonsensory character of a word directly, and as with many things, I presume this capacity can be increased with practice. Every good poet and spin-doctor is alive to these subtle non-sensory overtones enveloping a word. Nevertheless it is typically easier to bring out these non-sensory aspects via a method of comparison of identical sensory material. "Darn" when used as a timid substitute for damn has a different non-sensory feel from the word "darn" when used to refer to mending a hole in a sock. But what we certainly do not find when we try to introspect on our non-sensory feelings is anything corresponding to the articulated detail and clarity that we take for granted in sensory experience. By comparison, non-sensory feelings are in some sense amorphous, fuzzy, diffuse.

On the other hand, many non-sensory experiences enjoy a kind of freedom of manifestation normally denied to sensations. The same non-sensory experience can envelop sensations in more than one sensory mode, and in the case of familiarity, every sensory mode. This freedom also transcends the strict demands of logic; "contradictory" non-sensory experiences can co-exist simultaneously. I would maintain that the *deja vous* experience occurs when the non-sensory feelings of familiarity and novelty become superimposed for some reason. This is a striking case of a general capacity of more than one non-sensory experience to occupy consciousness at the same time, and merge not only with sensory content, but with one another.

At this point, five basic features of non-sensory phenomenology should be reasonably evident: Non-sensory experiences are *translucent*. They have no sensory content of their own. Like clear glass, they let sensations pass through their substance without leaving a sensory trace of their own. Non-sensory experiences are *low resolution*. They have a fuzzy, slurred, cloud-like character in contrast to the fine grained detail and texture of typical focal sensory experience. Non-sensory experiences are *elusive*. They elude direct introspective access, and their existence is easier to verify indirectly, especially through various contrasts in which the sensory aspect of experience is held constant. Non-sensory experiences are relatively *more evident in the periphery* of experience than at the attentive focus of experience. Non-sensory experiences vary in *intensity*. Typically they are less forceful than focal sensory experience; this adds to their unobtrusive quality. But at times (e.g., when the kite paragraph first made sense) a non-sensory experience can have enough force to become an evident content in consciousness, even as it resists direct introspective access.

### 3. James' Phenomenology of Non-Sensory Experience: The Fringe

James' most extensive treatment of non-sensory experience is found in the most well known part of his work -- the "Stream of Thought" chapter of the *Principles of Psychology*. I doubt a day has passed during any conference on consciousness in the English speaking world without at least one passage having been quoted from this celebrated chapter.

Nevertheless, some of the most important things it has to say have yet to register. In part this is because James put the bulk of his treatment of non-sensory experience under a heading that reads "within each personal consciousness, thought is sensibly continuous." As an organizing idea, and as a preliminary way to get at the operation of non-sensory experience in consciousness, this is apt. On James' account this is certainly one of the things that non-sensory experiences do -- give consciousness its sense of continuity.

But if we look at James' carefully, continuity turns out to be a *consequence* of the various specific cognitive functions that non-sensory experiences carry out. Continuity itself serves no particular cognitive function; it is in effect a kind of by-product of the non-sensory functions that *are* of evident cognitive importance: The chief of these is to represent more or less abstract context information, or what James called at times "feelings of relation". So my treatment of James will have a different emphasis from the standard accounts. I like to think that James might agree with me on this, since I am not at all sure he wanted to give continuity the pride of place that his expositors now accord it.

But there are two further ways I intend to link up James' analysis of non-sensory experience with the contemporary study of consciousness -- and these, I am at least as sure, James would find distasteful. The first is to link James's treatment of non-sensory experience with notions of non-conscious processing, functionally understood. The great exponent of this way of thinking was Kant, and James, usually gentle to a fault, ridiculed Kant's notion of cognition mercilessly, among other things calling it an "elaborate internal machine shop" (p. 368) [6](#) Yet of all traditional theories of the mind, Kant's comes closest to the current view of nonconscious processing and its relation to consciousness. [7](#)

My own overall concern is to link non-sensory experiences to non-conscious processes that evaluate context information in the modern sense. James' notion of context was relatively narrow. He held what I would call a "horizontal" view of context: The context for a given experience consists of a set of other past or projected future *experiences*. Again, the "feelings of relations, near and remote" we will see James discuss refer primarily to relations *among the sensory contents*. This is consistent with James' rejection of a Kantian approach to nonconscious processing. James did hold a modern "vertical"

sense of context information as including vast amounts of information processing that never enter consciousness themselves, but still condition the contents of consciousness.

The second aspect of my treatment of James that he would resist is this: I have tried to extract a single, coherent theory of non-sensory experience from James. James avoided rigid theorizing, and even his most sympathetic students do not always find him consistent. But I believe I have isolated within the larger field of James' creative variety a set of phenomenological observations and functional attributions that are self-consistent and can rightly be said to constitute a descriptive theory of non-sensory experience.

### **3.1 Terms and Methodology**

So far as I know, James never used the phrase "non-sensory experience." This is convenient, since we then have a pre-theoretical, generic term for the phenomena, and "fringe" can be reserved if necessary to refer more narrowly to James' particular interpretation of non-sensory experience. However, since I believe that James' treatment of non-sensory experience is more or less right (if very sketchy on crucial points), I myself take the "fringe" in James sense and "non-sensory experience" to be synonyms, and the phrase "non-sensory fringe" to be, strictly speaking, redundant. James never used the term "fringe" to refer to the vague and peripheral aspect of *sensory* experience, so far as I know. But at times it convenient for emphasis of clarity to contrast what I will call the "sensory fringe" (i.e., peripheral- sensory experience) with the "non-sensory fringe."

For better or worse, James was never one to stick to a single term if ten evocative synonyms came to his mind. Besides "fringe," he used a number of at least roughly equivalent names and phrases: e.g.,: "the free water of consciousness," "feelings of relation and tendency," the "penumbra or halo" of consciousness, "transitive experience" and "vague experience." James' basic contrasting term for fringe experience is "clear" experience, but he also gives clear experience, too, many synonyms such as "substantive experience," "definite sensorial images," and the "nucleus" of consciousness. "Clear" experience for James means sensory experience on which we can focus attention, vague experience means non-sensory experience on which we cannot focus attention. James often handles fringe experiences as if they only surround the "definite sensorial images" in consciousness (i.e., qualia in its current sense), but various passages in James make it clear that he fully realized that non-sensory experiences also interpenetrate focal sensory experience.

James used many different techniques for distinguishing fringe experiences from the sensory contents in the focus of attention. Probably the most recurrent was to look at cases in which the sensory component or nucleus remained the same over time, but the overall quality of the experience changed. That which changed was the non-sensory or fringe aspect of the full experience in question. We come to recognize the character of fringe feelings after the fact via a contrast carried out in memory, and so introspection in these cases is indirect. This is how we recognize the fringe sense of meaningfulness that

normally envelops the sound of a word by recognizing its absence when we repeat the same word rapidly in my earlier example.

The fringe experience of familiarity also becomes evident by way contrast. As James says: "What is the strange difference between an experience tasted for the first time and the same experience recognized as familiar, as having been enjoyed before, though we cannot name it or say where or when? (p. 252)" As we have already seen, familiarity is certainly a feeling in consciousness, and it has a vary different character from a focal sensory content. The experience is diffuse, enveloping; it eludes our introspective grasp. The experience of familiarity can deliver the same message ("encountered before") about an indefinite number of different sensory contents; this is what allows us to distinguish the feeling of familiarity from the various contents it can envelop over time. And as we have already seen, familiarity is only one of the virtually infinite number of possible fringe experiences, although has received by far the most notice in current cognitive research.

### 3.2 The Stream Metaphor

Few people today grasp the core point James himself was trying to make with the stream of consciousness metaphor -- that consciousness is saturated with non-sensory fringe experiences which constitute cognitive information of many fundamental kinds, above all relational information, and that this information is not given by the sensory aspect of experience. The continuity of consciousness is just one of the implications of this metaphor -- it has many others that are probably of greater importance for cognitive research.

The definite images of traditional psychology form but *the very smallest part* of our minds as they actually live. The traditional psychology talks like one who should say that a river consists of nothing but pailsful, spoonsful, quartpotsful, and other molded forms of water. Even were the pails and the pots all actually standing in the stream, still between them the free water would continue to flow. It is just this free water of consciousness that psychologists resolutely overlook. Every definite image in the mind is steeped and dyed in the free water that flows around it. With it goes *the sense of its relations*, near and remote, the dying echo of whence it came to us, the drawing sense of whither it will lead. *The significance, the value*, of the image is all in this halo or penumbra that surrounds and escorts it, -- or rather that is fused into one with it and has become bone of its bone and flesh of its flesh. (p. 255, my emphasis)

The "free water" metaphor for non-sensory experience brings together, as inspired metaphors do, a number of connected implications, not just continuity. Water is transparent, translucent; the fringe as James treats it is non-sensory. Water flowing in a stream is in one sense ever changing, but a stream as a structural feature of a landscape is

more or less enduring; the mix of particular fringe experiences constantly shift, but the fringe as a structural feature of consciousness is always with us. The static pots and pails are themselves filled with a changing swirl of water over time; the sensory, relatively fixed and static "definite sensorial images" that we can attend to at will are bathed *inside* as well as outside with non-sensory experiences that are in almost constant flux. Water is amorphous, and takes on the shape of the pot that holds it; fringe experiences are shaped and defined by their sensory contents.

The various "molded forms of water" give a kind of form to a category of experience that is, in itself, shapeless and diffuse. Continuity is established via feelings of relation and what James calls (immediately before the above passage) "feelings of tendency, often so vague that we are unable to name them at all. It is, in short, the reinstatement of the vague to our mental life that I am so anxious to press on the attention." (p. 254) We will examine feelings of relation and tendency in more detail below, in particular the experience of rightness or what James at times calls the feeling of "right direction," and its role in what today we would call voluntary retrieval and monitoring.

### **3.3 Feelings of Potential Access or Imminence**

"What a thought is, and what it may be developed into, or explained to stand for, and be equivalent to, are two things, not one" (p. 279). This is the axis on which James' phenomenology of the fringe turns. Miss it, and most of what else James has to say will be lost. Fringe experiences are *not* simply blurred or unfocused versions of more detailed experiences that have just occurred or are just about to occur. A vague experience is simply itself, just as it happens, just as it seems. We will see that both phenomenologically and functionally, the fringe is a completely distinct domain of consciousness with a completely distinct cognitive role, and not just an attenuated form of something else.

The fringe creates a non-sensory feeling of imminence which *implies* the existence of far more than consciousness actually presents at any given moment. Much more detailed information is potentially accessible to consciousness than is in fact actually in consciousness. This is the fundamental trick that lets consciousness finesse its severely limited capacity to represent potentially accessible information by using just a few gossamer wisps of experience.

### **3.4 The Transitive/Substantive Cycle**

When discussing fringe experience in its dynamic role, James often employs yet another set of synonyms: "substantive experience" refers to the core or nucleus of sensory experience, while "transitive experience" refers to the non-sensory aspects of consciousness. These are not steady-state, but oscillate in a kind of recurring cycle. The

non-sensory aspect of experience becomes more pronounced when one sensory nucleus begins to leave consciousness, and before the next sensory nucleus is fully manifest.

If we take a general view of the wonderful stream of our consciousness, what strikes us first is the different pace of its parts. Like a bird's life, it seems to be made of an alternation of flights and perching. The rhythm of language expresses this, where every thought is expressed in a sentence and every sentence closed by a period. The resting places are usually occupied by sensorial imaginations of some sort whose peculiarity is that they can be held by the mind for an indefinite time, and contemplated without changing; the places of flight are filled with thoughts of relation, the matters contemplated in the periods of relative rest. Let us call the resting places the "substantive parts" and the places of flight the "transitive parts" of the stream of thought. (p. 243)

### 3.5 The Elusive Fringe

Even if we indirectly recognize that non-sensory experiences are present in consciousness, it is still very difficult to grasp them as objects of direct attention. The attempt to do so, in at least the great bulk of cases, instantly changes the character of the non-sensory experience, and brings a sensory content squarely into attention.

It is very difficult, introspectively, to see the transitive parts for what they really are. If they are but flights to a conclusion, stopping them to look at them before the conclusion is reached is really annihilating them. *Whilst if we wait till the conclusion be reached, it so exceeds them in vigor and stability that it quite eclipses and swallows them up in its glare.* [my emphasis] Let anyone try to cut a thought across in the middle and get a look at its section, he will see how difficult the introspection of the transitive tract is. The rush of thought is so headlong that it almost always brings us up to the conclusion before we can arrest it. Or if our purpose is nimble enough and we do arrest it, it ceases forthwith to be itself. As a snowflake crystal caught in the warm hand is no longer a crystal but a drop, so, instead of catching the feeling of relation moving to its term, we find we have caught some substantive thing, usually the last word we are pronouncing, statically taken, and with its function, tendency and particular meaning quite evaporated. The attempt at introspective analysis in these cases is in fact like seizing a spinning top to catch its motion, or trying to turn up the gas quickly enough to see how the darkness looks. (p. 243-244)

A number of central points are woven together in this passage, but unfortunately James did not develop them. In part this is because James' own aim here was relatively narrow. In order to show that non-sensory fringe experiences exist in their own right, and that

they are a fundamental aspect of consciousness, James had to explain how they could have been so completely overlooked by classic English Empiricism (e.g., Locke and Hume) which still dominated academic psychology when James wrote. James could hardly claim to have found a vast realm of experience overlooked by this tradition if he did not also explain how the oversight occurred.

James does not attempt to explain why it is so difficult to bring non-sensory experiences into the focus of attention, nor why sensory and non-sensory experience cycle in consciousness. I will argue later that the germ of an explanation is nevertheless present in this account. The *attempt* to grasp a fringe experience seems to obliterate it, with the immediate result is that a new substantive content manifests in consciousness which is amenable to attentive inspection. This points to a mechanism of voluntary retrieval in consciousness, especially given the capacity of non-sensory experience to vaguely suggest the existence of information not itself in consciousness, but accessible to consciousness.

There is also the implication in the above passage that a kind of trade-off between sensory and non-sensory experience operates in consciousness. The *proportions* of sensory to non-sensory experience, their relative "vigor," shifts back and forth systematically. During the transition from one focal substantive content to the next, the non-sensory aspect of consciousness briefly becomes more pronounced, while the sensory aspect of our experience recedes. In conjunction with other considerations to be reviewed later, this points to a general principle informing many aspects of our phenomenology -- the conservation of consciousness.

### **3.6 The Feeling of Right Direction (Rightness)**

James held that the fringe consists primarily of feelings of relation, and that these are "numberless." Feelings of relation include specific logical relations such as "a feeling of *and*, a feeling of *if*, a feeling of *but*, a feeling of *by...*" (p. 245-246, James' emphasis) as well as the most inclusive evaluative feelings. Of all feelings of relation, James insists that the experiences I am calling "rightness" and "wrongness" are the most significant. "The most important feeling in these fringes ... is the mere feeling of harmony or discord, of a *right* or a *wrong* direction in the thought" (p. 261, my emphasis).

Here again James does little to flesh out his observation, even when he himself insists in this case that it pertains to the two most important non-sensory feelings in consciousness. But what he does say is pregnant, and constitutes one more strand of a larger cognitive system implicit in James, but which unfortunately he never worked out explicitly.

James takes rightness to be the most fundamental phenomenological signal of meaning and knowledge in consciousness.

Relation, then, to our topic or 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 there, we are 'all right;' with the sense of hindrance we are dissatisfied and perplexed, and cast about us for other thoughts. Now *any* thought the quality of whose fringe lets us feel ourselves 'all right' is an acceptable member of our thinking, whatever kind of thought it may otherwise be. Provided we only feel it to have a place in the scheme of our relations in which the interesting topic lies, that is quite sufficient to make of it a relevant and appropriate portion of our thought. (p. 259, James' emphasis)

When the feeling of rightness is present, even gibberish will feel that it makes perfect sense. "The border line between objective sense and nonsense is hard to draw; that between subjective sense and nonsense impossible. Subjectively, any collocation of words may make sense -- even the wildest words in a dream -- if one only does not doubt their belonging together." (p. 26) To say that something makes sense -- that it has what James calls the "subjective feeling of rationality" -- is just another way to say that its elements feel that they hang together, that they form an integrated whole.

So James thinks the feelings of rightness and wrongness are able to indicate the success or failure of what are otherwise distinct cognitive activities. Again James uses a variety of evocative terms to refer to the same basic fact of experience -- the sense of "right direction," the "feeling of rational sequence," of "dynamic meaning." Dynamic meaning, for example, "is usually reduced to the bare fringe we have described of felt stability or unfitness to the context and conclusion" (p. 265). This is the feeling that flooded the kite flying paragraph when it made sense. And "making sense" is, on this account, the same phenomenological entity that constituted the flowing sense of integration when the sentences -- disjoint a moment before, suddenly fit together into a meaningful whole. In this sense, the feeling of "right direction" *is* the feeling of meaning.

### **3.7 Rightness and the Tip-Of-The-Tongue State**

James mentions right/wrong evaluative feelings as he points out how we often experience the non-sensory germ of an intention before its sensory content arrives:

How much of [an intention] consists of definite sensorial images, either of words or of things? Hardly anything! Linger, and the words and the things come into the mind; the anticipatory intention, the deviation is no more. But as the words that replace it arrive, it welcomes them successively and calls them *right* if they agree with it, and calls them *wrong* if they do not. (p. 253, my emphasis)

Here James considers the evaluative phenomenology that obtains between context demands as represented by non-sensory experience, and a sensory content. Sometimes they fit, and sometimes they don't. Or to put the same idea in other terms, the fringe at a

given moment may or may not harmonize with its nucleus. James makes the same point in his brief, celebrated, and misunderstood (Mangan, 2000) discussion of the tip-of-the-tongue (TOT) phenomenon:

Suppose we try to recall a forgotten name. The 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 a wraith of a name is in it, beckoning us in a given direction, making us at moments tingle with the sense of closeness, and then letting us sink back without the longed for term .... If *wrong* names are proposed to us, this singularly gap acts immediately to negate them. (p. 251, my emphasis)

And, as in James example of forming an intention, if the right name is proposed, the non-sensory gap immediately welcomes it by vibrating with the opposite primitive evaluative feeling -- the sensory content will feel right, correct, on the mark. Once we look at James overall treatment of non-sensory experience, it is evident that what is called the feeling-of-knowing in a TOT is the feeling that the *right* word, given the context, is either available to consciousness or present in consciousness. (Of course if a word is in memory, it will usually feel familiar to some degree.) But a moments consideration should make it clear that within wide limits, the familiarity datum is quite orthogonal to the cognitive aim of resolving a TOT. A relatively unfamiliar word can still feel right when it fills this gap, and an extremely familiar word can feel quite wrong.

It seems that in a TOT the usual oscillation between transitive and substantive experience is for some reason partly inhibited. We are stuck at a moment just before the substantive aspect of the expected word would normally arrive in consciousness. If this is so, then the characteristic feelings we have in a TOT point to a much more pervasive, but usually hidden, cognitive process. In TOT phenomenology, we have the sense of a fuzzy, vaguely sketched out region of non-sensory experience that beckons to us, and we respond by attempting to figuratively grasp or squeeze this region -- that is, we try to attend to it. Our frustration that this doesn't produce the right word implies that this act of attention normally *would* bring the right word quickly into focal attention. This is another bit of phenomenological evidence that in many cases the first stage of a voluntary act of retrieval of information into consciousness is to attend to something in the fringe that implies this information.

It is also worth noting than a TOT state is one of the relatively few cases in which we do not need to resort to an indirect method of demonstrating the reality of non-sensory experience. The "gap" that we feel in consciousness is pure non-sensory experience, pure fringe experience -- a kind of structured vacancy that certainly is not void, and which certainly seems to be doing cognitive work. The strength of the non-sensory aspect of a TOT experience is relatively high, and it is not obscured by the "vigor and stability" that would be enjoyed by the right sensory content.

## 4. Relation of Non-Sensory to Sensory Experience

James' treatment of non-sensory experience is remarkably suggestive, though it leaves a number of questions unaddressed or underdeveloped, and I will now begin to clarify and extend it in various ways, first by unpacking James' notion of "vague" experience into two analytically distinct components. At the same time it will be useful to consider phenomenological features that link non-sensory experiences with, or distinguish them from, the other basic phenomenological categories -- peripheral-sensory and focal-sensory experience. At times I will use pixel and computer screen analogies. Sometimes these parallels are very close, as in the distinction between the resolution and the intensity of fringe experience. But sometimes I will resort to more fanciful constructions such as "fat" pixels.

### 4.1 Fringe Experiences are Fully Conscious

Since James wrote, it has become far more common to accept the operation of non-conscious processes in human cognition. In part this derives from Freud's influence, as well as the mass of more recent experimental evidence for extensive non-conscious processing. In any case, people naturally tend to assume that peripheral sensory and non-sensory experiences are somehow "closer" to non-conscious processing than are the sensory contents in the attentive focus. This is understandable, since the overlapping character of non-sensory experience is in a sense a parallel representation, and in many cases the messages non-sensory experiences deliver do probably draw more fully on non-conscious parallel processes. Then, too, the gradual shading off experience toward the periphery suggests that by going further in this direction we would reach a completely non-conscious state.

Nevertheless, non-sensory experiences only represent non-conscious states *in* consciousness. A non-sensory experience, *qua* experience, is still fully and completely conscious, just as a penny is still fully and completely money. As a matter of phenomenology, it is a serious mistake to think that non-sensory experiences are any less conscious than the most vivid sensory experience. Non-sensory experiences are inherently less defined or articulated than are highly defined focal-sensory experiences, and usually they are at relatively low intensities. But, again, a very weak and ill-defined experience is still an experience.

### 4.2 Resolution Capacity is Not Intensity

James' use of terms like "vague" and "indistinct" often confound two analytically distinct aspects of non-sensory experience -- namely low resolution and low intensity. These dimensions tend to co-vary in consciousness, though in some important cases they do not. Here the analogy with a TV or video monitor is direct. Resolution capacity of any

monitor is a function of its pixel density: the more pixels per unit area, the greater the resolution capacity and the sharper an image can be. The brightness of a TV image can vary over a wide range of settings, but except for extreme cases, the resolution capacity of the image is unaffected.

The same applies to non-sensory experiences. Their maximum resolution capacity is fixed over the *entire* conscious field, and since this is low, non-sensory experiences are fuzzy wherever they occur. In contrast, the intensity level that non-sensory experiences can be very high. Intense non-sensory experiences apparently constitute some of the most celebrated phenomenological states human beings can have, such as aesthetic and mystical experience (Mangan, 1991). Even in a relatively mild case such as the kite flying paragraph, the first burst of rightness was strong enough for a moment to rival or surpass the intensity of the sensory content, even though the non-sensory intensity of the experience soon weakened and subsided into the background.

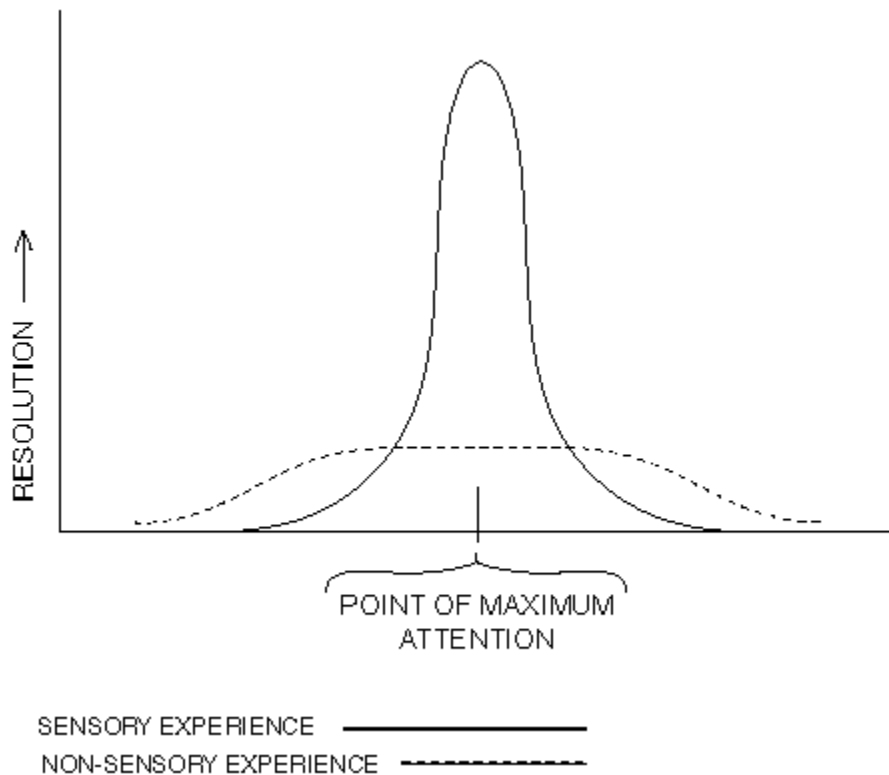


Figure 2.

**Hypothesized differences in maximum resolution capacity between sensory and non-sensory experience over the entire field of consciousness. Note that non-sensory experience extends through the entire field of consciousness. However, on this account, non-sensory experiences would still tend to be more evident in the peripheral region surrounding the attentive focus because there sensory resolution capacity declines rapidly, while non-sensory resolution capacity remains relatively robust.**

Figure 2 is intended to give a graphic representation of these points, and also show how non-sensory experiences could pervade the entire field of consciousness, though be more evident in the periphery.

### 4.3 The Sensory Fringe

I will use "sensory fringe" to mean peripheral sensory experience. James himself did not use the term "sensory fringe;" for him the fringe and its many synonyms referred implicitly to non-sensory experience. The sensory and non-sensory fringe together can be identified with the Gestalt notion of the "ground" in the figure/ground relationship, with one arguable exception. On the account developed in this paper, non-sensory experiences pervade the entire field of consciousness, including the "figure," while in general the Gestalt sense of the "ground" is restricted to the region of experience *surrounding* the figure. Rock's work on inattention (section 7) brings out the non-sensory aspect of the Gestalt ground to the degree that inattentive experience indicates the *availability* of sensory information not actually in consciousness. And in Rock's classic experiment on inattention (Rock & Gutman, 1981), the focal region of the conscious field that manifested attentive sensory content was the same region that also manifested attenuated sensory and non-sensory experience. Until we get to Rock, I will emphasize the peripheral -- *sensory* aspect of the figure/ground relationship, in part to make my examples as uncomplicated as I can, and also to rely on what I presume is the readers recollections of the figure/ground relationship from, perhaps, an old Psychology 1 course.

It is important for purposes of analysis to distinguish the sensory from the non-sensory fringe. They have many features in common, but when we get down to the details, there are significant differences. As we have seen, the phenomenology of the sensory and non-sensory fringe is low-resolution and (typically) low intensity. But the distribution of maximum resolution capacity over the entire field of consciousness is different in the two cases. Furthermore, non-sensory phenomenology is by definition diaphanous, and peripheral sensory experience has by definition sensory content -- albeit, like the non-sensory fringe, at low intensity and low resolution. Functionally, both the sensory and non-sensory fringe help to mediate retrieval, but non-sensory experience contributes far more to this process, both because it provides the feeling that something more is accessible, and also because non-sensory experiences are able to represent relationships of almost infinitely greater scope, both in terms of abstraction and of spatio-temporal relationships, than the sensory fringe can.

Beyond the relatively vivid experiences that give an object its sensory content, we also experience, at the same time, a vague peripheral field of more or less slightly indicated objects, textures, colors, etc., out of which a clear figure stands. In general, when we attempt to direct our attention to this peripheral field of vague sensory experience, a new focal experience almost instantly manifests in attention, surrounded by its own vague field of sensation. If you attempt to consider a peripheral aspect of your current sensory field at this moment, say the outside edge of your computer screen, you will find yourself

looking at clear sensory contents which make up the focal experience of the edge, and a line of text that a moment before had been focal and clear, will be a vague aspect of peripheral experience. In this shift, the formerly clear object that was in the attentive focus is now represented by a vague and sketchy blur of peripheral sensory experience. So over time, the relative proportion of clear to vague sensory experience in consciousness is more or less constant. It is only with a bit of effort and practice that we can to a degree inspect the background aspect of sensory experience.

The figure/ground sensory relationship gives us an intuitive sense of the phenomenological distinction between clear and vague sensory experience, and it shows us that there is a systemic interaction between fringe experience and the articulating power of attention in bringing information into consciousness. For the immediate act that brings a new sensory content into consciousness is the *attempt* to focus attention on a vague, peripheral aspect of the field.

#### **4.4 The Conservation of Consciousness**

The conservation principle I want to explore is such a ubiquitous feature of our conscious life that its operation and implications are easy to miss. Many lines of phenomenological evidence suggest that consciousness can resolve experience only to a certain level of detail at any given moment -- though within this constraint a virtual infinity of trade-offs, non-sensory and sensory, are possible.

The most straightforward example is our strong natural tendency to attend to only one complex thing or situation at a time. If we shift attention to something else and bring *it* into the attentive focus, the previous focal content automatically moves into the fringe and there loses both sensory resolution and non-sensory cognitive content. Consider, for example, a classic Gestalt reversible figure stimulus -- say the vase that can also look like two identical faces in profile. (If possible, the interested reader should actually try to find a textbook example of this. The video medium is too crude to produce the effect I'm after.) Attending to the vase immediately obscures the experience of the faces. Attending to the profiles immediately obscures the experience of the vase. But here I want to go a step beyond a simple figure/ground shift.

Try to make both the faces and the vase objects of attention *simultaneously*. Attempts at this sort of divided attention are unstable, and quickly fall into one interpretation or another. But for a moment the reader should be able to get them both at once. For what it is worth I have tried this experiment informally with literally hundreds of undergraduates, and most (but not all) report that for a moment they can get both the vase and the face interpretation in consciousness, and that in this case *neither* the face experience or the vase experience is as vivid as either is by itself. In other words, the simultaneous resolution level of the faces and the vase, while lower than for either object of attention taken by itself, is greater than the resolution level of either when serving as the ground. I believe the reader can also briefly verify this kind of conservation trade-off by trying to

attend to two conversations simultaneously. And, as I pointed out above, James' account of the transitive/ substantive oscillation implies a conservation trade-off *between* sensory and non-sensory experience (see Figure 1).

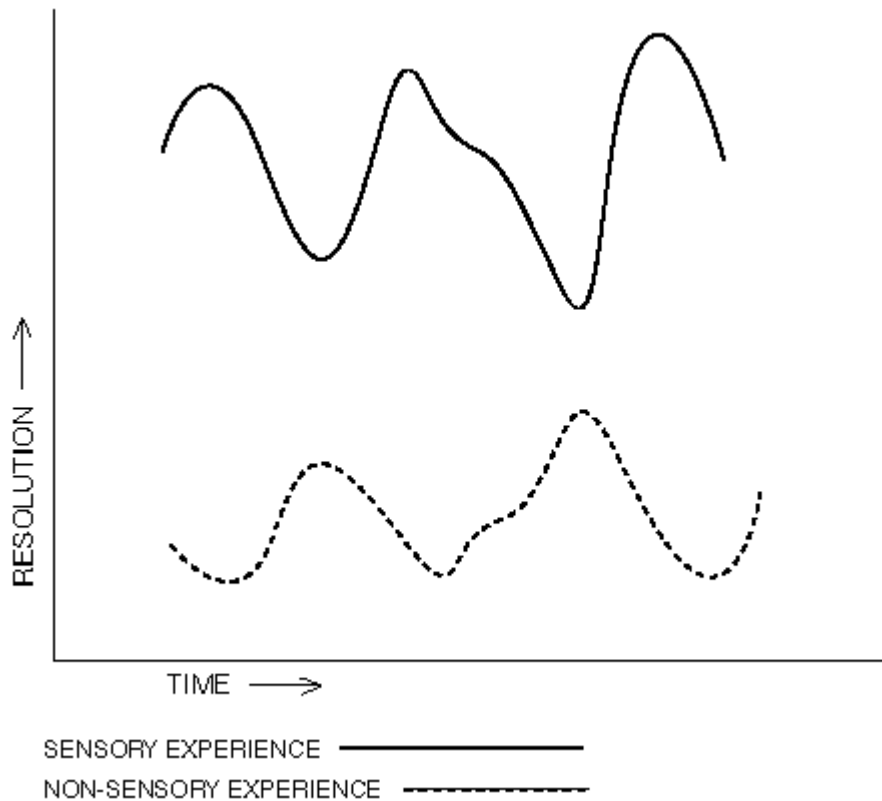


Figure 1.

**Hypothesized conservation of resolution capacity between sensory and non-sensory experience.** As resolution of sensory experience increases, resolution of non-sensory decreases, and as sensory resolution decreases, non-sensory capacity increases. This cyclic rise and fall is intended to correspond to James' account of transitive/substantive oscillation, though James did not consider either the notion of trade-off relationships in consciousness or explicitly, or resolution. Note: resolution trade-offs also occur within sensory experience, e.g., the normal focal/peripheral structure of sensory experience; cases where an object's normal level of sensory resolution is reduced in a divided attention task. The many trade-off relationships in consciousness suggest an underlying principle -- the conservation of consciousness.

To cast some of this into pixel analogies. The structure of the *sensory* conscious field is something like a TV screen with a very odd distribution of pixels. At the center of the screen is a region of very small pixels, which in optimum conditions can produce a very high resolution image. The pixels that occupy regions increasingly further from the center get increasingly larger until at the periphery they are quite fat. But in cases when the attentive region represents two objects simultaneously, the resolution of each object is reduced -- almost as if the number of pixels allocated to each image were reduced by half, but each set is able to, as it were, expand in compensation. I believe James is right about a trade-off between non-sensory and sensory experience, but I cannot decide

introspectively if this is an intensity (energy) trade-off, or an articulation trade-off, or some combination of the two.

So while we have reason to suspect that a conservation principle is basic to consciousness (i.e., to sensory experience, non-sensory experience and their interaction) its precise character and scope is unclear. In any case, the non-sensory fringe does seem to fill the entire field of consciousness, is nevertheless more evident on the periphery, and has a far more uniform pixel size than sensory experience. And in some figurative sense, we can say that consciousness contains two "planes" of pixels, sensory and non-sensory, superimposed on one another.

## 5. From Function to Phenomenology

If consciousness is an active part of our biology, then to some degree phenomenology, like Bauhaus architecture, follows function. That is, we should be able to show that features of our phenomenology are *adaptations* shaped in part by the functions which the phenomenology in question now serves. This simply applies a standard method of biological explanation to consciousness, and if it works, we have further reason to hold that consciousness is a biological phenomenon, however murky its precise physical basis may be. I cannot say too strongly or too often that my attempt to explain aspects of our phenomenology in functional terms is opposed to functionalism in its current philosophical sense. (See Mangan, 1998.)

We can now try to move a step further toward explaining the five descriptive characteristics of non-sensory phenomenology summarized at the end of section 3, and which aim to specify James' much more general notion of "vague" experience. In virtually all cases, non-sensory experiences are (1) diaphanous and (2) low-resolution. In the vast majority of cases they are (3) elusive and (4) relatively more evident in the periphery of consciousness than in the attentive focus of consciousness. And typically, non-sensory experiences are (5) less intense than vivid sensory experiences -- but here there are striking exceptions, for non-sensory experiences can at times be extremely intense (e.g., in manic episodes, aesthetic experience, the problem solving "Ah Ha!")

Briefly, phenomenological features (1), (2) and (3) are to be explained as consequences of the context representation function non-sensory experiences serve, and features (4) and (5) are consequences of the retrieval function, which also in part conditions (3). The exceptional cases in (5) occur because degrees of salience are represented in consciousness as degrees of felt intensity.

In addition to these cognitive functions (e.g., context representation and retrieval) our phenomenology, especially the diaphanous quality of non-sensory experiences, is also conditioned by what I will call a "hardware" function. By hardware function I mean a function which aims to accommodate something about the particular character of a given information processing system. A hardware function is to be distinguished from the more

abstract cognitive functions. The later can presumably be instantiated in virtually any information processing system, the former only make sense in relation to a particular type of information processing entity. Consciousness appears to be a scarce biological resource, and various phenomenological devices have evolved to maximize its very limited capacity to represent information. The hardware function of the fringe is to *finesse* the limited capacity of consciousness by representing information in extremely attenuated form.

## 5.1 Why Is There a Fringe, and Why Does it Resist Introspective Access?

Now to return to the pixel analogy and its implications, here as a computer screen displaying a word processing program. First of all, there are of course only so many pixels on the screen. A virtual infinity of different images can occupy a computer screen over time. But at any given moment, there is only so much resolution capacity available in the pixel/computer screen medium of representation. The size and number of pixels, and therefore the minimum grain size and maximum resolution capacity are established at the factory.

This is obviously a fundamental constraint with innumerable specific consequences for the design of a word processing program. The number of functions alone that a word processing program computer system can apply to documents are beyond the capacity of the screen to indicated at any given moment, let alone a full disk of documents on which the functions can be applied.

The solution, though hardly perfect, are devices like menu bars and status bars. Some of the limited space of the screen is reserved for these peripheral indicators that in a sense *finesse* the limitations of the screen. These peripherals represent the existence of massive amounts of information not actually displayed on the screen, and in many (but not all) cases represent the *potential* availability of the specific information if the task at hand actually requires it.

Menu bars and status bars come at a cost, and are the result of a trade-off. The pixels devoted to the display of peripheral information cannot at the same time articulate the immediate task at hand that occupies most of the screen. But while peripheral displays reduce the maximum resolution capacity available for the main display, they allow, in compensation, for the representation of relevant "context" information, albeit in radically summarized form. For a standard word processing program, these include simple formatting information, the document page number, the "help," and "view" boxes, and so on.

In one respect, this is directly analogous to the trade-off that appears to have produced the fringe/focus structure of consciousness. The fringe (non-sensory and sensory) performs the same functions in consciousness, and for the same overall design reasons as these peripheral user interface devices do. The fringe is a form of condensed information in this

sense: it *implies* (through the phenomenology of imminence) the existence of a huge amounts of information without impinging "too much" on the capacity of the active workspace, the attentive focus or nucleus. There is an inherent dynamic tension here; "too much" is a pragmatic notion, constrained on one side by the overall need to represent peripheral information, and on the other to leave room for the immediate job at hand. This, in a nutshell, is one way to explain why consciousness has a fringe/focus structure.

The same framework also suggests a partial answer to this question: Why do we have diminished introspective access to fringe phenomenology? In particular, why is it that when we normally try to focus on fringe experience, a very different experience actually manifests itself in the nucleus of attentive focus?

Part of the answer would lie in a further question: What is the standard command we use to call detailed information to the screen, information that is otherwise only represented implicitly by a menu bar? We simply move the cursor to the relevant box, and click the mouse. This move and click procedure is a crucial link in the process that converts potential off-screen information into an actual on-screen representation. The direct analogy to consciousness is, of course, that when we attempt to attend to a vague experience in the fringe, the normal outcome is the presence of articulated information in the focus of attention. Why does the fringe refuse to itself come into the focus? For the same reason, by analogy, that menu bars don't themselves occupy the center of the screen when we click them. The retrieval function of the icon would thereby immediately cease.

So far as I know, James did not extrapolate from the atypical case of a tip-of-the-tongue experience to typical cases of voluntary retrieval into consciousness. But as we saw above, James' account certainly implies that a TOT is just an instance of normal retrieval that has become stuck in mid cycle, and that the fringe is an important link in the process that normally "calls" new information into consciousness. The command that actually triggers this call being the *attempt* to focus attention on the non-sensory fringe, or, more precisely, to focus on that aspect of it that implies the detailed information to be retrieved. The vague fringe feeling that something is imminent or potentially accessible for focal inspection is a very different experience from the subsequent representation of that something in the focus of attention. This is our implicit assumption, since our frustration in such cases presupposes that normally mental grasping of this sort *will* yield the right word quickly and effortlessly

Again, we can explain the elusive, ungraspable character of fringe experience as *a consequence of its call function*. This is one of the "design" reasons fringe experiences thwart attempts at direct (i.e., focal) introspection. The cognitive purpose of focusing on a vague experience in the fringe is not to make *that* experience a stable entity in attention, but to bring a far more articulated (informative) experience into focal inspection implied by the experience. It is primarily the call function of the fringe that creates the impression that fringe experiences are "nothing but" fleeting, preliminary forms of clear experiences that misled cognitive research, as we will see in sections 7 & 8. If the attempt to attend to fringe experiences themselves simply brought them unchanged into the focus of attention, the ability of the fringe to execute its retrieval function would be severely undercut.

Looked at over time, this also helps explain transitive/substantive cycling between vague and clear experience; it is the macro consequence of a series of individual acts of retrieval. In each case of voluntary retrieval, the attempt to focus attention on the fringe produces a brief pulse of transitive "flight" before the retrieved articulated content constitutes a point of "rest" in attention. In other words, transitive states are (in part) the result of a series of acts of retrieval, substantive states are the relatively stable experiences that result from this retrieval. This is not to say that the transitive/substantive is necessarily part of the flow of consciousness, only that it is its typical state. How far voluntary control and practice is able to shift a process of this sort is, so far as I am concerned, impossible to say at present. Though it may be that training in certain forms of meditation reduce our tendency to constantly "grasp" at non-sensory experience and so, paradoxically, have it become a larger part of the conscious field.

## **5.2 The Hardware Constraint**

At any given moment consciousness is extremely limited or "narrow". This has been a recurring theme since the dawn of the cognitive revolution. Again, the standard examples include our inability to attend to more than a single source of novel input such as a conversation at any given moment, and our inability to apprehend more than a few perceptual objects simultaneously.

So we have a paradox. On one hand, consciousness is extremely limited in its representational capacity. On the other hand, consciousness interfaces with extremely complex bodies of non-conscious information that transcend consciousness' capacity for direct representation by many orders of magnitude. Consciousness cannot possibly represent in detail anything distantly approaching the totality of information which bears on its cognitive activity. The non-sensory fringe is able to finesse the limited capacity of consciousness by using just a few wisps of vague experience to represent summary facts about states of non-conscious information that are otherwise far too complex for direct conscious representation.

The fringe works, in effect, to radically condense information in consciousness. By representing information indistinctly, the fringe frees up more of consciousness' resources to articulate the contents in the focus of attention. It is inefficient to burden consciousness with detailed information if simply informing it of a summary conclusion will do. So the fringe/focus structure of consciousness appears to be the result of a trade-off strategy between the need to articulate information in detail, and the need to represent the larger context in which that information is imbedded. To maximize the efficiency of conscious cognition, a fringe experience need only be distinct enough to deliver its message, and thereby minimally impinge on consciousness' articulation capacity.

The current equilibrium between the allocation of articulation capacity in the focus and the fringe is presumably the result of a long bio-cognitive evolution. It is suggestive that an echo of this strategy evolved in the human eye. There the fundamental limitation is

that the space within the eyeball is limited, and the functional desiderata then must pull in different directions: e.g., to have highly acute vision in bright light works against the capacity to see anything when illumination is low, and visa versa. The structure of the receptive fields in the eye are one result, in which they get fatter and fatter the further they are from the fovea. So in aspects of the design of the eye, the peripheral bars on a word processing program, and the fringe of consciousness all implement versions of a similar trade-off strategy, mandated by an underlying hardware limitation.

## **6. Context Representation and the Feeling of Rightness**

The chief role of both the sensory and non-sensory fringe in consciousness is to represent context information and the single most important piece of context information, either for passive monitoring or active problem solving, is the experience of rightness. Although rightness functions in tandem with its twin wrongness, and this polarity is the natural evaluative unit, I have ignored wrongness as much as possible in order to reduce verbiage and innumerable side issues. In the case of Capgras syndrome, however, wrongness and not rightness is the crucial element.

The fringe experiences of rightness and wrongness are the most inclusive of all evaluative signals in consciousness. They are, again, the linchpin of context representation in consciousness. In functional terms, they signal the degree to which the other contents of consciousness (in both the fringe and focus) are or are not compatible with a vast amount of relevant nonconscious context information.

Rightness and wrongness operate in virtually all cognitive domains. In monitoring, when the overall flow of contents or trajectory of consciousness is going well, we feel rightness; when the flow or trajectory is going ill, we feel wrongness. These feelings vary in intensity, and thereby signal innumerable degrees of cognitive success or failure in consciousness. These fringe feelings are able to represent as imminent the future success or failure of a trajectory. In trying to solve, say, a demanding math problem, rightness/wrongness gives us the sense of more or less promising directions long before we have the actual solution in hand. But many ongoing life activities are underpinned and directed by our overall sense that the direction is going well or ill.

Rightness considered in its monitoring function (i.e., as representing the positive evaluation of the overall direction or trajectory of experience occurring over at least a few substantive/ transitive cycles) envelops the string of individual nuclei as they move through consciousness with the feeling of smooth, integrated flow. This functions as our basal "all is well" signal, indicating that our potential capacity to handle the material in question is strong. Wrongness, of course, represents the opposite message in consciousness, that potential cognitive capacity is weak.

On reading the kite flying paragraph for the first time, the feeling of wrongness indicated that if we were called on to handle this material (say answer questions about the subject

of the paragraph, i.e. a behavioral measure of understanding), we would have serious cognitive problems. On the other hand, the sense of smooth, coherent movement from sentence to sentence signals consciousness that we do have the capacity to deal with the paragraph. The entire genre of nonsense literature (e.g., Lewis Carroll's *Jabberwocky*) rests on the fact that our general signal of cognitive coherence, the feeling of rightness in its monitoring function, can be tricked in various ways to envelop verbal material that, when analyzed substantively, makes no literal sense.

Rightness/wrongness monitoring is ubiquitous, providing a generalized and subtly shifting evaluative ground over which virtually all specific cognitive activity in consciousness plays -- in guiding the trajectory of complex problem solving, for example, or giving us a sense of how well a conversation is conforming to, or violating, its many tacit constraints (social, grammatical, syntactical, etc.). The sense of a smooth transition from content to content in the flow of consciousness derives from rightness in its monitoring function. In aesthetic experience, maximizing the feeling of rightness is an end in itself. (Mangan, 1991)

We have already seen that in cases ranging from feeling-of-knowing experiments and in some instances of blindsight to aesthetic experience, people are often unable to identify the precise phenomenological basis for their judgments, even though they can make these judgments with consistency and, often, with conviction. To explain this capacity, people talk about "gut feelings," "just knowing," hunches, intuitions. By identifying the fringe and its component experience of rightness, we may be able to demystify the notion of intuition. From the standpoint of consciousness, intuition is simply a conspicuous, if heretofore puzzling, example of fringe feelings doing cognitive work in the absence of a sensory content. We can link intuition to an inclusive cognitive system, one that operates in virtually all cases of complex conscious cognition. And it signals the likely direction in which a solution might lie.

In general, if we consider the operation of consciousness over time, rightness works as a feedback device, guiding the local and specific activity of focal attention toward increasing conformity with antecedent and unconsciously encoded context demands. This process leads to a reciprocal interaction between conscious and unconscious processing: the process of detailed conscious analysis will usually change the context, and this in turn will change the evaluative signal that rightness manifests, and so on.

## **7. Related Proposals**

The above analysis is to my knowledge the most extensive attempt so far to understand the cognitive functions of the fringe (sensory and non-sensory) and to unpack its "vague" phenomenology. But there are other proposals in the literature which in some cases parallel aspects of my own argument -- and in at least as many cases contradict it. I would maintain that the chief problem in the research to be reviewed below is its remarkably thin phenomenology. Phenomenological analysis is still treated as a kind of

embellishment, not as an active research tool. This is almost certainly the lingering influence of behaviorism.

Be that as it may, we will see a recurring error undercut many attempts to explain the vague nature of fringe experience; I call it the "fleetingness fallacy." It massively over-extends an otherwise valid point about how we experience the world: In visual experience, when (say) a object moves very rapidly, its phenomenological character is fuzzy or blurry. We will see this observation used to explain why fringe experience has its low resolution phenomenology -- it is presumed that they are fleeting, and this is often true. But even a little care in thinking about this explanation is that some fringe experiences (e.g., familiarity) can last for relatively long periods, and yet they do not become high-resolution experiences if they remain in consciousness for longer than 500 milliseconds.

The extreme "narrowness" or the limited capacity of consciousness is of course one of the earliest findings of the cognitive revolution. It remains a fundamental orchestrating fact for the empirical study of consciousness, as Baars (1988) has shown in some detail. The cognitive revolution virtually began with the dichotic listening experiments of Broadbent (1954), who showed that consciousness can usually handle only one complex stream of novel information at a time -- the so-called Cocktail Party Effect. And within a single stream, consciousness labors under the further restriction of its chunking limits, first set out in the contemporary literature by Miller (1956).

To handle these findings, researchers also appeal, abstractly considered, to the same explanatory principle I have invoked -- the efficient allocation of a scarce cognitive resource. Broadbent (1958) argued that the single source limitation could be explained as an efficient way to husband limited processing capacity. Miller (1956, 1962) explained the operations of packing and unpacking as a cognitive strategy that worked, over time, to circumvent the chunking limit. Neisser (1967) had a similar view: the distinction between preattentive processes and focal attention was the result of a trade-off of limited cognitive resources, with the narrowness and selectivity of focal attention "simply an allotment of analyzing mechanisms to a limited region of the field" (p. 89).

Neisser's early work on preattentive processes probably came the closest to re-discovering the non-sensory fringe experimentally. According to Neisser (who tried to avoid the term "consciousness;" see Mandler, 1975) the pre-attentive realm contains "shadowy and impalpable experiences" (p. 303). In phenomenological terms, they are "fleeting and evanescent objects of consciousness, crudely defined and hard to remember ... such effects as they do have reflect only crude and global properties of the objects involved" (p. 301). In functional terms, preattentive experience provides a context in which attentive acts take place: "Attentive acts are carried out in the context of the more global properties already carried out at the preattentive level" (p. 90)

But there are significant differences between the fringe and Neisser's notion of preattention. He uses "preattention" to refer to both conscious and unconscious elements. The term refers indiscriminately to vague, inarticulate and peripheral experiences on the

one hand, and to completely unconscious, extremely complex and parallel processes, on the other. And his main interest in preattention is on preliminary figural segmentation, and not on the representation of context information in consciousness; nor does he consider the role of "preattentive" experience in voluntary acts of retrieval. Nor does Neisser take the elusive aspect of pre-attentive experience to be a positive structural characteristic in its own right, but rather explains it as the result of its supposedly fleeting and preliminary character.

Another experimental approach to the fringe (if taken as James' sense of directly felt significance or meaning) is to recognize it by contrast when it is relatively absent. After "semantic satiation" a rapidly repeated word will lose its cognitive savor; we naturally say a word in this case has "lost its meaning." The effect is familiar to most children. It is quite amenable to experiment, and it has been called since Severance and Washburn (1907) a "lapse of meaning." This sort of meaning lapse is a completely introspective phenomenon, but its experimental manipulation yields consistent results. So, for example, Wertheimer and Gillis (1958) reported that image related words retain their feeling of meaning longer than abstract words.

Baars (1989) considers non-sensory experiences in a sense, but insists that they are without *any* experiential qualities. He also holds the "fleetingness" hypothesis, taking them to come and go so rapidly in consciousness that there is no time for a clear impression. He also proposes that in certain cases, they may be the momentary intrusion of a "goal context" into consciousness.

Crick and Koch (1990), coming from a very different theoretical direction, develop a notion of "working awareness" which they feel corresponds roughly to a "spotlight of attention" model. But they suspect that, by itself, a clearly defined content may not be sufficient to capture the reality of conscious experience: "Can a spotlight of attention, moving over the visual field from one 'salient' location to the next, explain the perceptual richness of our [conscious] environment? Would such a mechanism not lead to a sort of tunnel vision? .... We suggest very tentatively that this richness may be mediated by another form of awareness that is very transient.... " (p. 272). Again we find research groping toward fringe phenomena, but restricted by the presumption that the phenomenological character of these experiences is simply a consequence of the rapidity of its occurrence.

The connectionists have also tried to explain vague experiences. For Rumelhart, et. al. (1986), a stable content in consciousness as a fully settled or "relaxed" parallel network. However, if "the relaxation process is especially slow, consciousness will be the time average over a dynamically changing set of patterns and thus would be expected to lead to 'fuzzy' or unclear impressions." (p.39) Here again vague experiences are presumed to have no cognitive function. They are explained as artifacts produced by many overlapping patterns, each one of which could also occupy consciousness in clear form.

A far more sophisticated account of (in effect) fringe mechanisms is offered by Rock and Gutman (1981). They give us what I believe is the single best experimentally based

account that, in effect, distinguishes the fringe's ability to (1) signal the availability of detailed conscious information and (2) mediate the retrieval of that information into consciousness. These are two related but very different cognitive functions, availability being signaled far more often than the occurrence of actual retrieval. Rock and Gutman point out that what they call "inattentive" experience (this term, by the way, avoids the conscious/nonconscious confound in "preattentive") provides functional information in consciousness that is not a specific, identifiable form or object. The experimental situation is arranged so that subjects viewing stimuli of two superimposed figures (say a tree and a house) will only attend to one of them. Nevertheless, subjects are still able to report some general information about the unattended figure, for instance, that it was red and had curvy lines.

From findings of this sort, Rock and Gutman derive a fundamental conclusion: "In daily life ... [when] we are not attending to a pattern at which we are looking, there is the distinct impression nevertheless that something is there and has certain phenomenal characteristics .... By virtue of the iconic representation, we as observers recognize that the *potential* to transmute this impression is there" (their emphasis). Information experienced "inattentively" is still conscious, though it lacks the overall specifiable organization we find in an object in the focus of attention. Inattentive experience serves two crucial functions -- it implies that detailed information is available *if* attention were to be directed toward it, and provides a target toward which attention can be focused in order to actually bring the detailed information into consciousness.

## 8. Rightness vs. Familiarity

Under various guises, some recognition of the feeling of rightness can also be found in the cognitive literature. But for the most part, these remain veiled. Perhaps because Neisser did recognize a kind of proto-fringe, he was also able to move closer than most to recognizing monitoring and control experiences. Neisser thought he had isolated a preattentive feeling of "familiarity," and for the moment we will use this term to explain his findings as he did. But we will see that in fact Neisser found experimental evidence of rightness and not familiarity.

Familiarity is treated as a preattentive experience (p. 97), and Neisser asserts that the feeling of familiarity *by itself* can be a datum in target search experiments. No experience of a specific content is necessary. Neisser reports that, on occasion, subjects will be able to recognize that one of a possible set of pre-specified targets is present in an array of other letters (e.g., either the letter "D" or "W") without being able to say *which* target was present (p. 99). This finding can be interpreted as a sort of dissociation of the feeling of "familiarity" from a specific content. The feeling is taken to be a sufficient datum for subjects to perform the target search task, even when the specific "familiar" content is not experienced. If we look closely at Neisser's experiment, it seems that it was rightness, and not familiarity, which allowed subject's to know that a target letter was present, without knowing what specific target it was. For Neisser's target search experiments did not

manipulate familiarity levels. Subjects were to respond as quickly as possible when the designated target was present, i.e. to the "right" target.

Rightness and familiarity are at least as functionally distinct as they are phenomenologically distinct. This point is crucial, but rarely made. One of the few to note the difference between the two is Walter Kintch (1970): "Obviously, [in some recognition tasks] 'appropriateness within a given context' as well as 'perceived oldness' may serve as the basic datum for a subject's decision" (p. 276). We can feel strongly that something is right, even if it is unfamiliar -- for example, when we recognize the solution to a math problem for the first time. Or when Archimedes discovered the principle of specific gravity, his "Eureka" hailed the recognition of the *right*, but absolutely *unfamiliar*, solution. And who knows how many far more familiar facts Archimedes considered and judged to be wrong before he hit on his discovery.

In the study of cognition, rightness is far more important than familiarity, even though rightness receives far less consideration. Survival depends on finding the right response, which may or may not be the familiar response. Especially for the study of consciousness, rightness and not familiarity is the crucial datum. For consciousness generally deals with novel information, familiar information tending to leave consciousness via habituation (Baars, 1988).

To feel we have the right solution is to feel we know the solution -- these are simply two ways of naming the same phenomenological state. There is now a growing literature on the feeling of knowing, but apparently lingering behaviorist prejudices are still at work. For even when the phenomenon is given the name "feeling of knowing" (FOK), virtually no attempt is made to work out the precise phenomenological character of the feeling. This is especially ironic, since FOK research grows directly from the experimental investigation of the tip-of-the-tongue phenomenon (TOT); the original paper by Hart (1965) makes explicit reference to James' discussion of TOT. And as we saw, the heart of a TOT for James is the sense that the *right* answer is imminent. The phenomenological datum in a FOK is, I would maintain, rightness.

Operationally, the feeling-of-knowing is the capacity of subjects to correctly report that they "know" something about a definite sensory content (e.g., that a word on the tip of their tongue can in fact be retrieved and will fit correctly into the gap the word was to fill) even though the content is not itself in the subjects' consciousness. The term "feeling-of-knowing," and the experimental paradigm that used it, were first proposed by Hart (1965). In this paper he discussed at some length his debt to James' treatment of the tip-of-the tongue (TOT) experience. James did not examine this humble but complex bit of phenomenology because he had a deep interest in TOTs for their own sake. TOTs just happened to illustrate some of the striking features of non-sensory experience. One of these was the capacity to indicate the existence of information *potentially* accessible to consciousness, but not itself present in conscious as an explicit content. So James' investigation of non-sensory experience, via Hart, led directly to the experimental investigation of this cognitive capacity.

Typically a feeling of knowing experiment elicits TOTs by asking questions like "What is the capital of Vermont?" or "Name the Union general who was in command at the battle of Gettysburg." When a TOT occurs, subjects estimate the likelihood that they know the right answer, which produces a FOK measure. Typically subjects respond well above chance, and among the most interesting TOT/FOK findings is that the strength of the feeling of knowing judgment is positively correlated with the amount of time a subject spends searching for an inaccessible memory (Nelson, Gerler & Narens, 1984). The finding that the feeling of knowing influences search time is of some importance, since it is evidence that the design and operation of consciousness itself presupposes its functional efficacy, as does the fringe structure generally. Nelson, et al. further note that for Korsakoff's syndrome amnesiacs, search times are very short, implying that the disruption in the FOK system may also contribute to retrieval failure in this type of amnesia. Janowsky et al. (1989) also found low feeling of knowing for Korsakoff's amnesiacs, but not for non-Korsakoff amnesiacs, suggesting FOK deficit is associated with pathology of the frontal lobe.

To the degree the FOK and TOT literature is concerned with the *feeling* of knowing, we again encounter another version of the fleetingness hypothesis. In this case, the presumption that the specific word is somehow coming into and then out of consciousness too quickly to be recognized directly. The possibility of a generalized control experience of rightness -- a signal of (potential or actual) context-fit, in other words, a recurring experiential component in common to TOT and FOK -- is overlooked. So, for example, Baars (1989) in discussing TOT phenomenology in the context of Brown and McNeill's (1966) classic paper, gives an excellent summary of the fleetingness hypothesis:

We know from the Sperling phenomenon ... that people can have fleeting access to many details in visual memory that they cannot retrieve a fraction of a second later... There are other sources of support for the idea of fleeting conscious events. In the tip-of-the-tongue phenomenon people often report a fleeting conscious image of the missing word "going by too quickly to grasp." Often we are sure that the momentary image *was* the missing word, and indeed if people in such a state are presented with the correct word, *they can recognize it very quickly and distinguish it from incorrect words*, suggesting that the fleeting conscious "flash" was indeed accurate. (Baars, 1989, p. 68; my emphasis)

The most straightforward problem with this type of explanation is that it implies that none of the vague feelings we experience in a TOT can ever *last* for any length of time -- for if they could, they would have to become clear. At the same time the fleetingness hypothesis does not address the crucial evaluative *experience* on which the resolution of a TOT depends, even though the evaluative *function* of distinguishing the right word from wrong alternatives is recognized. Certainly the general evaluation of right-fit must be made at some cognitive level, and this evaluation is something over and above the specific word taken by itself, be it represented inside or outside consciousness. The heart of a TOT is the *recognition of rightness*, and that recognition is antecedently specified by

the particular context, which is of course largely unconscious at any given moment. We all know that occasionally a TOT can last for quite a few, sometimes agonized, seconds, plenty of time to introspectively recognize the specific content -- if that were really the heart of the process. *All fleeting experiences may be vague, but not all vague experiences are fleeting.* Since a TOT can be relatively long-lasting, it is difficult to see how its vague phenomenological character could be caused by fleetingness alone.

More recently Daniel Schacter (1996) has called for students of implicit learning and memory to take the subjective aspect of implicit memory and related phenomena seriously. But the virtual tradition that is now in place which identifies the experience of the "feeling-of-knowing" is so pervasive that even Schacter takes the phenomenological bottom line here to be the experience of familiarity (e.g., see Schacter, 1996, especially his Introduction and first chapter).

Finally, on some key points, my proposals closely approach those of Whittlesea and his associates (e.g., Whittlesea and Williams, 2000; Whittlesea and Price, 2001) -- but on other points we diverge considerably. This springs in part from Whittlesea's willingness to follow the current presumption that familiarity is the locus of cognitive evaluation in consciousness.

Whittlesea and Williams (2000) hold, as I do, that the feeling of familiarity is only one outgrowth of a much wider non-conscious cognitive process. "[T]he feeling of familiarity is a by-product of the perception and the comprehension of stimulus events. As people integrate various aspects of a stimulus (e.g., orthographic, semantic, and contextual properties) into a unitary construct, they also evaluate the coherence of that processing." These coherence-evaluations fall into one of three categories: "(a) that ... processing is coherent; (b) that ... processing contains incongruous, contradictory elements; or (c) that some aspects of ... processing are in some surprising way discrepant with others." One might then think that when our cognitive apparatus finds that (a) is the case, we would enjoy an *experience* of coherence. But this is not Whittlesea and Williams' view. They hold that when processing is completely coherent, there is no corresponding experience of any particular kind in consciousness. On their account the cognitive phenomenology that springs from the non-conscious coherence-determining process is the feeling of familiarity -- and this feeling only occurs when coherence processing is slightly *less* than perfect, that is, during (c), when the context is somewhat unexpected, novel, or otherwise awry.

We believe the factor that separates the feeling of familiarity (and other subjective states) from just knowing and just remembering is the coherence of processing. When the various components of a processing experience are perceived to fit together coherently, no particular subjective state occurs: People simply continue with their activity. However when a discrepancy is perceived between parts of an experience, people switch over to an introspective, reflective state, attempting to reconcile the discrepancy and attribute to it some causal factor. In doing so, they experience a phenomenological reaction. (p. 562)

To illustrate this position, they ask us to consider a case where someone is telling his life's history. As it unrolls, "each element in the story proceeds smoothly... each thought is concordant with the others. While this coherent flow persists, the teller may experience sadness, or joy, or nostalgia, but not a feeling that the subject matter is familiar." Then Whittlesea and Williams posit a break in the flow. The storyteller can't immediately remember whether an old girlfriend moved to Boston or Baltimore. But after a moment he inclines toward Baltimore. "At this point" Whittlesea and Williams say, "whether right or wrong, the person feels Baltimore to be familiar. Again you can ask, 'are you sure? Does it feel familiar?' This time the response is "Yeah, pretty sure, that *feels right*. [my emphasis] "

In the interests of space I will consider only a few points raised by Whittlesea's position. First of all, it should be evident to anyone who reads the kite flying paragraph for a second time (after finding out that it refers to a kite) that an actual feeling of coherent flow joins one sentence to the next. James' called this the sense of "right direction in the thought," and this feeling is as much a content of direct experience as is familiarity or sadness. Note that Whittlesea and Williams themselves in effect distinguish familiarity from rightness. For while they ask their imaginary storyteller if Baltimore feels familiar, his answer is that it feels *right*. Even in cases where familiarity is an important component of our phenomenology, it will in most cases also feel right or wrong. In a *deja vu* experience we encounter a strong sense of familiarity. But for some people it will feel deeply right (if they have, say, occult leanings) and for others it will feel as deeply wrong (an hallucination to be rejected). It is simply a mistake to equate the feeling of positive evaluation with the feeling of familiarity.

## 9. Dissociations and Emotion

If sensory and non-sensory experiences are distinct, we would expect to find cases in which they are dissociated -- teased apart by experimental manipulations, or disrupted by a neurological or psychopathological malfunction. We have already considered various experimental studies that in effect dissociate what is normally the tightly integrated sensory/non-sensory relationship in consciousness. Now we will consider a few examples pathological malfunction.

Capgras and Reboul-Lachaux (1923) reported a now well know case of a Frenchwoman who was convinced that various people in her life had been replaced by identical impostors. In his review of the subject, Berson (1983) emphasizes that the affliction is "not a problem of memory or disorientation" nor is the problem "in misrecognition, but in a delusional denial of the authenticity of the identity of the clearly recognized person." And Berson notes the observation going back to Capras himself that "feelings of strangeness" are predominant in many such patients.

From the standpoint of my analysis, the most evident fact about Capgras' syndrome is the dissociation it exhibits between the sensory and non-sensory levels of experience.

Someone suffering from Capgras' does not feel that anything has changed in what we might call the sensory information, but nevertheless believes that an absolutely fundamental change has occurred overall.

In cognitive terms, this change is in the felt relationship *between* the sensations and their appropriate context; in this case the context is whatever constitutes the patient's sense of an other person's global identity. With the onset of pathology, the sensory nucleus continues to feel familiar, that is, feels unchanged from previous encounters. What *does* change with the onset of pathology is the non-sensory feeling that indicates the *relationship between* the sensory nucleus and its context. Normally when we look at someone we know, our sense of familiarity is merged with the evaluative feeling that the occasioned feeling of familiarity is indeed right, to be trusted and accepted without hesitation as a cognitive datum.

In Capgras' the normal overlay of rightness would appear to have reversed its polarity. The context relationship between personhood and the person perceived as a sensory object now feels wrong, false, dubious. If so, then the sense of "authenticity" that Berson reports is lost in Capgras' Syndrome can be identified with rightness. And the phenomenology that replaces it, Berson's "feelings of strangeness," can be identified with the overlay of (1) a continuing feeling of familiarity as it relates to the sensory fact of a person and (2) a pathological overlay of the feeling of wrongness, delivering the apparent message that the sensory contents, and their appropriate context, do not fit.

Obsessive-compulsive disorder (OCD) is another example of what I suspect is a sensory/non-sensory dissociation, and one also notable for a rightness deficit. Woody and Szechtman (2000) note, in a larger discussion, some of the obscurities touching on the current use of the term feeling-of-knowing. As an illustration, they look at a typical case of OCD. They ask us to consider the "example of obsessive-compulsive disorder OCD as a condition in which normal feelings of knowing are lacking. An OCD patient who is checking, such as turning the doorknob over and over again to see if it is locked, is not suffering from a memory problem (that is, the person is not immediately and repeatedly forgetting what he or she just did). Instead, such a person is repeatedly failing to generate the subjective conviction about reality that he or she knows logically ought to be there. By [this] ... we mean a property of immediate conscious experience..." In order to emphasize the phenomenological nature of the deficit in this kind of case, Woody and Szechman are driven to offer a new term "yedasentience, from the Hebrew 'yeda' meaning to know, and the Latin 'sentire,' meaning to feel..." to characterize the feeling of "subjective conviction."

Someone suffering from OCD "knows" abstractly that the door is locked, since they remember having just checked it a moment before. But they don't really *feel* secure in the conviction. What is missing in OCD phenomenology, according to Woody and Szechman, is the ability to have or keep the subjective conviction that the door really is locked. The question is what is "subjective conviction," and my answer would of course be the feeling of rightness, while we could perhaps take "yadasentience" to refer to the same experience.

I would point out that the phenomenology of OCD can be at war with itself. There can be subjective convictions that involve two different and incompatible feelings. The non-sensory fringe is a complex overlay of many analytically distinguishable experiences, and in some cases these feelings can be logically contradictory. At war with the obsessive, compelling character of the OCD obsessive thought "check that lock" is that in many cases the sufferer more or less simultaneously feels "do not check that lock". In *deja vous*, on my account, people feel familiarity and novelty simultaneously in the fringe. Here the thought "check that lock" is felt to be a deeply "right" action and at the same time a "wrong" action, that it doesn't fit the demands of the objective situation.

We can look at many of the most important and basic aspects of human experience in this light, including many kinds of psychopathology and normal emotional experience. Rightness/wrongness signals in the fringe are absolutely fundamental, signaling evaluations of *other* fringe experiences, including emotional experiences as well as the relation between the fringe and sensory experience. There are a huge number of dissociations that are naturally described with the fringe experience, focal experience distinction.

In free floating anxiety, for example, the person often recognizes that they have a feeling that is independent of any given sensory experience, and (often) that the feeling is mistaken -- they know that some dark force is not in fact going to get them, but nevertheless have the phenomenology appropriate to a threat (worried, vigilant) without believing that there is an actual threat. On the other hand, say in advanced cases of paranoia, whatever occupies the sensory focus is taken to be wrong or threatening, even an ashtray or the license number of the car ahead of them at a stop sign. In this case there is no dissociation in the phenomenology, the fringe is pathologically signaling wrong, and the focal object is taken to conform (over time, with intervening compensatory phenomenology, I'd think) to the fringe evaluation.

The fringe/focus and rightness/wrongness distinctions have a very wide application. In virtually all real-world emotional states, for example, there is an *evaluative* component built into phenomenology. People do not generally experience emotions *simpliciter*, but in the context of a fundamental evaluation, a feeling of rightness or wrongness so mingled with the emotional tone of the fringe as to be phenomenological indistinguishable. Rightness is such an intimate part of emotional experience that it passes unrecognized. More noticeable are cases where the phenomenological field of emotion is tinged with wrongness. The same emotional feeling, say hatred, will have totally different psychological consequences, and a very different phenomenology, depending on the overlay of rightness or of wrongness in the fringe. "I hate my father" can be felt as *wrong*, as a horrible intrusion into consciousness, and so produce a string of further psychological consequences, perhaps guilt and horror. On the other hand, the "same" emotion of hatred enveloping the focal content of the father can feel *right*, and the hatred can live in consciousness as the basis of a delicious fantasy. The full reality of the phenomenology of emotion is inherently evaluative.

## 10. Neural Implications of Rightness

Even if consciousness is an epiphenomenon and does *not* perform the functions it would seem to execute, it is evident that consciousness contains the experience I have called rightness. This experience indicates the degree to which a content in consciousness is compatible with vast amounts of context information not in consciousness, and how well aspects of experience fit with one another. We can therefore assume that a non-conscious and presumably neural process of some sort is "boiling down" or radically condensing a mass of parallel information into a single index of integration. This index may or may not have any special relationship to consciousness, but it is certainly found in consciousness, and we thereby also know that it is recomputed almost constantly. In consciousness, this index of global integration is represented by a non-sensory experience, and it seems to underlie the entire spectrum of human activity -- from odd experimental findings in blindsight and tacit perception, to pathological dissociations and emotions, to fundamental integrative aspects of perception, meaning recognition and problem solving.

So the question now is this: how do neurons do it? To find out, we can use the method most brilliantly employed by Hering in the case of color. A careful look at the relevant phenomenology can both suggest neural hypothesis, and serve as one constraint on the evaluation of later research.

To show that neural activity does seem to point to the possibility of an index of global integration, one starting point can be Hopfield's (1982) discovery of goodness-of-fit (see Rumelhart et al., 1986, for a technical discussion of goodness-of-fit) shows that in many cases it is possible to condense into a single metric or index the level of global coherence resulting from an immense number of mutually interacting, neuron-like nodes. And if the connectionist model of nonconscious processing is roughly correct, we can simulate it, to a degree, on a computer, using goodness-of-fit as the interacting link between parallel (nonconscious) and serial (focal attentive) aspects.

Rightness, in consciousness, does seem to behave like a goodness-of-fit metric: that is, it does seem to signal the degree to which a given conscious content is compatible with its parallel and distributed nonconscious context. I believe I have shown that many lines of evidence and theory indicate that the feeling of rightness exists, that it is a distinct entity, and that it is not to be confused with any focal content in consciousness. Rightness signals a coherence relation between *whatever* content may occupy consciousness, and whatever non-conscious context the content is embedded in. Ignoring habituation, as the content in consciousness becomes more integrated with its (presumably) parallel and distributed non-conscious context, the rightness "metric" should increase in intensity.

We would expect this process, for example, to be evident in early stages of problem solving. Equating rightness with a goodness-of-fit metric, then, gives us a coherent picture of how "hunches" and "intuitions" work at both the conscious and nonconscious level. Rightness is able to guide conscious activity before any clear content has appeared as an explicit evaluative criterion. The findings of Bowers et al. (1990) illustrate just such a process: In the context of discovery, "tacit perception of coherence guided Ss gradually

to an explicit representation ... in the form of a hunch or hypotheses. Clues to coherence may automatically activate the problem solvers relevant mnemonic and semantic networks, and eventually the level of patterned activation is sufficient to cross a threshold of consciousness. At this point it represents a hunch or hypothesis." See McGovern (1993) for an extended discussion.

From the standpoint of current connectionist theory, however, there is a serious problem with my analysis to this point. In their present form, networks do not themselves "compute" goodness-of-fit in order to settle into a stable, maximum goodness interpretation. An actual goodness-of-fit computation is carried out for secondary, descriptive purposes, and uses a standard sequential summation. The computation of the goodness-of-fit of a network is *not*, at the moment, itself carried out by a network.

But since I believe I have shown that there is strong reason to hold that rightness exists, we must begin with the assumption that rightness must be produced somehow by our cognitive system, and the job of neural research is to find out how this very basic cognitive signal is generated. The complexity of determining context fit mandates an unconscious process, and our best current understanding of unconscious processing at the moment is that it be network-like. Therefore, this line of thought predicts that some as yet unrecognized "secondary" network architecture must be able to determine the goodness-of-fit of the "primary" network which settles into coherent state as a direct consequence of the immediate content of consciousness. Some secondary process must tell us how coherent the primary network configuration is. We have seen that FOK may have its locus in the frontal lobes (Janowsky et al., 1989), and so perhaps the secondary network system is much more in evidence there.

To search for secondary, goodness-of-fit determining networks, of course, neuroscience needs to have some idea what network architectures are able to do the job (a rough and ready version is more than good enough for now). So a search for secondary networks in the brain would do well to enlist connectionist computer scientists to work out what likely versions of secondary networks would look like. But let me emphasize that the appeal here to connectionism is for purposes of illustration. I presume there are many ways to begin conceptualizing how rightness could be "computed" by a neural process. Connectionism is only one possibility.

A final, general point: Functional analysis of the fringe suggests a new argument against epiphenomenalism and similar ideas. For beyond the almost universally recognized feeling that we do somehow exercise volition, we can now see that the overall structure of consciousness also appears to be designed to allow the exercise of willful activity. The feeling that we have the power to shift attention fits precisely -- like a key in its lock -- with a complex control mechanism hidden in the background of conscious experience.

## Notes

<1>. See Mangan (1991) for a more extensive treatment of the theoretical ideas presented in this paper, and for many additional lines of supporting evidence. Some of this material was also presented in Mangan (1993b,c) and Mangan (in press). I want to thank John Eastwood and Dan Lloyd for their extremely helpful comments on earlier drafts of this paper, and John Eastwood for bringing Whittlesea's research, and the literature cited on Capgras' and OCD, to my attention. Finally I want to thank Patrick Wilken for his infinite patience.

<2>. James himself never used the term "non-sensory experience" so far as I know, and I use it as the most neutral and pre-theoretical way I can find to name these phenomena. James' "fringe" and "non-sensory experience" are used as synonyms in this paper.

<3>. For an attempt to separate many recurring observations of non-sensory phenomenology from the traditional philosophical theories in which they are embedded, see Mangan (1991).

<4>. For a discussion of the phenomenological side of Wittgenstein, his treatment of non-sensory experience and his debt to James, see Mangan (1991). For a critique of Dennett, see Mangan (1993a), and for Dennett's response, see Dennett (1993).

<5>. This effect, sometimes called semantic satiation, has been confirmed objectively by many experimental studies going back to Severance and Washburn (1907).

<6>. All page references without further specification are to the standard pagination of James' *Principles of Psychology*, the 1890 edition.

<7>. For instance, Bechtel (1988) and Flanagan (1991). Mangan (1991) devotes two chapters to Kant's view of cognition, focusing on Kant's *Critique of Judgement*, his final view of the constitution and operation of consciousness and its relation to non-conscious cognitive processes.

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