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Consciousness and Cognition 13 (2004) 213–240
Consciousness and Cognition
www.elsevier.com/locate/concog

Consciousness, art, and the brain: Lessons from Marcel Proust

Russell Epstein*

Department of Psychology and Center for Cognitive Neuroscience, University of Pennsylvania, 3815 Walnut St., Philadelphia, PA 19104-6196, USA

Received 24 July 2002
Available online 20 February 2003

Abstract

In his novel *Remembrance of Things Past*, Marcel Proust argues that conventional descriptions of the phenomenology of consciousness are incomplete because they focus too much on the highly-salient sensory information that dominates each moment of awareness and ignore the network of associations that lies in the background. In this paper, I explicate Proust's theory of conscious experience and show how it leads him directly to a theory of aesthetic perception. Proust's division of awareness into two components roughly corresponds to William James' division of the stream of thought into a "nucleus" and "fringe." Proust argues that the function of art is to evoke the underlying associative network indirectly in the mind of the observer by using carefully chosen sensory surfaces to control the stream of thought. I propose a possible neural basis for this Proustian/Jamesian phenomenology, and argue that the general principles of Proustian aesthetics can be applied to all forms of art. I conclude that a scientific theory of art should follow in a straightforward manner from a scientific theory of consciousness.
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1. Introduction

William James defined psychology as "the science of mental life." Under this definition, there are two possible tasks that psychology can undertake. The first is an exploration of the phenomena of mental life—what experience is like from the point of view of the subject. The second is an exploration of the mechanisms that underlie this experience. James developed a psychology

* Fax: +1-215-898-1982.
E-mail address: epstein@psych.upenn.edu.

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doi:10.1016/S1053-8100(03)00006-0

that combined introspection with experiment in an attempt to address both questions. This mixed psychology was supplanted by behaviorism, which held that the basic assumption that psychology should study "mental life" was ill-founded. Modern cognitive psychology has resurrected the idea that there is such a thing as "mental life," but generally concerns itself only with the mechanisms—cognitive or neural—that underlie it.

Now, however, psychologists and neuroscientists are beginning to ask questions about the nature of consciousness. This inevitably requires us to make some investigation of the phenomenology of consciousness, for one cannot begin to explain something without having some idea of what one is trying to explain. Works of literature are one possible source of data about the subjective nature of experience, for the job of the writer is to record experiences (including internal experiences) that have not been noticed before. In this paper, I will discuss the works of Marcel Proust, one of the most brilliantly introspective writers of all time. Proust is well-known as an observer of memory. Those who have not read him in detail may assume that his massive novel—which goes by the misleading English title of *Remembrance of Things Past*—consists of nothing more than page upon page of recollected details, interesting perhaps for the aesthete, but ultimately having little to commend itself to the scientist. In fact, nothing could be further from the truth. For Proust does more than just recount his past, he also observes his memory in action, and he uses these observations to develop a comprehensive theory of conscious experience and artistic creation that potentially has profound implications for any scientific theory of consciousness.

The goal of this paper is to explicate Proust's theory of conscious experience, and to show how it might illuminate cognitive and neuroscientific theories about the structure of consciousness, and ultimately, cognitive and neuroscientific theories of art. I will first outline how Proust develops his theory of consciousness from his examination of certain unusual experiences of "involuntary" memory recall (Section 2). I will demonstrate connections between this theory of consciousness and the description of the stream of thought proffered by William James (Section 3). A critical element of both views of consciousness is a distinction between the highly conscious sensory material that dominates each individual thought and the underlying network of associations that controls the transition from one thought to another—distinct elements of consciousness that James labeled the "nucleus" and "fringe." I will then explicate Proust's theory of aesthetics (Section 4), which emphasizes the role of art in conveying the associative networks that control consciousness but are not themselves directly experienced. This aesthetic theory will be mapped (Section 5) onto the neural-cognitive theory of the Jamesian stream of thought developed previously (Epstein, 2000a; Epstein, 2000b). Finally, I will show how the Proustian theory of aesthetics can be generalized from narrative art to non-narrative art (Section 6) and discuss similarities between Proust's aesthetic theory and the theory of visual art developed by Zeki (1999).

This paper is intended to be quite speculative. It attempts to map out some tentative connections between three very different domains of observation: Proustian aesthetics, Jamesian phenomenology, and neuroscience. Many of the specific claims made here will almost certainly turn out to be wrong. However, it is hoped that these initial observations might eventually lead to more solid theories of the neural basis of aesthetic experience and the neural basis of conscious phenomenology. Insofar as all three domains refer to the human mind (and the human brain), it does not seem unreasonable to hope that a unified theory might ultimately be achievable.

The argument I will present has been anticipated in spirit and often in details by Langer (Dryden, 1997, 2001; Langer, 1942, 1953) and Mangan (1991). Langer argued persuasively that works of art were a useful source of data about the subjective nature of experience and explored the idea that art acts as a kind of symbol for the mind that creates it. Mangan was the first to link James' phenomenology of consciousness to aesthetic perception, and argued that beauty is a feeling that conveys information about a network of relationships that cannot be fully elaborated within the nucleus. As we will see, Proust's description of the phenomenology of aesthetic perception supports Mangan's thesis.

2. Voluntary vs. involuntary memory

The novel *Remembrance of Things Past* follows the course of the life of the narrator from childhood through middle age. For most of its 3500-page length, it is a tale of increasing disappointments. As a child, he is filled with a sense of enchantment with the world. As he grows older, he becomes gradually disillusioned by all the things—love, friendship, aristocratic society, and art—that he had desired in life. At the point at which we will meet him—200 pages away from the end of the novel—he has come to the conclusion that life is essentially meaningless, and that he might as well spend his time on frivolous entertainments that he knows will not offer him any real pleasure. He has spent many years in isolation in a sanatorium, but now he decides to return to society and give up his ideal of being a writer.

In a railway carriage returning to Paris, he reads a prose piece in a literary journal that seems to confirm his lack of any aptitude for literature. The piece describes a dinner party given years earlier, attended by many of his friends, and it is filled with details that he never noticed: "my eyes were blind to the sort of necklace an old woman might be wearing, and the things I might be told about her pearls never entered my ears." (Proust, 1923–1927/1981, p. 737) Without having an eye for such details, he thinks, how can he hope be a writer? Not only does the piece not interest him or move him, he feels that he lacks the sensitivity necessary to produce it.

Looking out the window of the railway carriage, the narrator sees a line of trees half-illuminated by sunlight and half in shadow. He recognizes this as exactly the sort of image that should delight him as a writer, but instead it fills him with nothing but "lassitude and boredom." (897)[1] Sadly, he thinks about other things he has seen in life that he once thought beautiful, but that fill him now with little joy:

> I tried next to draw from my memory other "snapshots," those in particular which it had taken in Venice, but the mere word "snapshot" made Venice seemed to me as boring as an exhibition of photographs, and I felt that I had no more taste, no more talent for describing now what I had seen in the past, than I had had yesterday for describing what at the very moment I was, with a meticulous and melancholy eye, actually observing. (897)

The next day, he goes to a party given by the Prince de Guermantes. As he alights from his coach and enters the courtyard of the Guermantes mansion, he trips against an uneven paving stone. Recovering his balance, he puts his foot on a stone that is slightly lower than its neighbor,

[1] Unlabeled quotations are taken from Volume III of the Vintage edition of Remembrance of Things Past (Proust, 1923–1927/1981).

and at that moment all his discouragement vanishes. He recognizes a happiness that he has felt only a few times in his life.

What is this mysterious feeling? He concentrates on it, determined not to let it get away. He senses vague images: "a profound azure intoxicated my eyes, impressions of coolness, a dazzling light, swirled round me." (899) He tries to grasp at these inchoate images, but their deeper significance eludes him. And then, suddenly, these indistinct sensations resolve themselves:

> [a]lmost at once I recognized the vision: it was Venice, of which my efforts to describe it and the supposed snapshots taken by my memory had never told me anything, but which the sensation which I had once experienced as I had stood upon two uneven stones in the baptistery of St. Mark's had, recurring a moment ago, restored to me complete with all the other sensations linked on that day to that particular sensation... (899)

He realizes that he is experiencing a similar phenomenon to the one he encountered years before, when the taste of a madeleine pastry dipped in tea brought back all his memories of his childhood in the village of Combray. (This incident is famously described at the beginning of the novel.) But he still does not understand how these experiences operate, or why they bring him such joy.

A servant brings him into the library, where he waits to enter the party. There he experiences a series of four similarly vivid memory recollections:

(1) He hears the noise of a spoon accidentally knocked by a servant against a plate. This sound fills him with a sensation of "heat combined with a whiff of smoke and relieved by the cool smell of a forest background" (900) and sends him back to the railway carriage of the previous day. The noise of the spoon knocking against a plate has brought back the noise of a railwayman's hammer knocking against the steel wheels of the train, and with it all the sensations he felt at that moment. This time, he is filled with delight at the image of the row of trees that earlier brought him no pleasure.

(2) He wipes his mouth with a starchy napkin, which gives him a sensation of "an azure that...was pure and saline and swelled into blue and bosomy undulations" (901). This sensation unfolds into memories of the seaside resort town of Balbec, where he spent summers as an adolescent:

> I thought that the servant had just opened the window on to the beach and that all things invited me to go down and stroll along the promenade while the tide was high, for the napkin which I had used to wipe my mouth had precisely the same degree of stiffness and starchedness as the towel with which I had found it so awkward to draw my face as I stood in front of the window on the first day of my arrival at Balbec, and this napkin now, in the library of the Prince de Guermantes' house, unfolded for me—concealed within its sealed surfaces and its folds—the plumage of an ocean green and blue like the tail of a peacock. And what I found myself enjoying was not merely these colors but a whole instant of my life on whose summit they rested. (901)

(3) He hears the shrill noise of water running through a pipe, which reminds him of the whistles of the steam boats he used to hear on summer evenings at Balbec, and brings back the moment

> [a]t the end of the afternoon in Balbec when, the tables already laid and glittering with linen and silver, the vast window-bays still open from one end to the other on the esplanade without a single interruption, a single solid surface of glass or stone, while the sun slowly descended upon the sea, and the steamers in the bay began to emit their cries, I had, if I had wished to join Albertine and her friends who were walking on the front, merely to step over the low wooden frame not much higher than my ankle, into a groove in which the whole continuous range of windows had been wound down so that the air to come into the hotel. (907)

(4) He opens a book at random in the library, and recognizes it as a George Sand novel that his mother had read to him long ago when he was a child. This was the first real novel he had ever encountered. Although he no longer thinks of this book as anything extraordinary, he recalls the mystique it held for him when he was a child when it seemed to embody "the essence of the novel"

(919). This sensation reminds him of what it was like to be a child, and in particular the emotionally-charged night in which his mother read the book to him, and then suddenly: "a thousand trifling details of Combray which for years had not entered my mind came lightly and spontaneously leaping, in follow-the-leader fashion, to suspend themselves from the magnetized nib in an interminable and trembling chain of memories" (920).

Contemplating these experiences (often referred to as *moments bienheureux*—fortunate moments), Proust[2] concludes that all of them involve what he describes as a "true" re-instantiation of an earlier experience. In contrast, the day before, when he had been contemplating "snapshots" of Venice, he had not been remembering things as they actually were. Rather, these snapshots were "images which preserve nothing of life" (902).

This distinction between ordinary memories which can be recalled at will (voluntary memories) and the very rare vivid memories that can only be triggered by a sensory cue (involuntary memories) is central for Proust, and for this paper. For in making this distinction, Proust is not just identifying two different kinds of memory mechanisms, he is making a claim about *the nature of experience itself*. According to Proust, involuntary memories re-instantiate a moment in the past as it *actually* occurred—"a fragment of time in the pure state" (905). Voluntary memories, in contrast, instantiate a worked-over interpretation of the past that is not equivalent to re-experiencing the event. We do not usually notice that voluntary memories are insufficient reproductions of the past only because we are not usually aware of what experience is really like.

But what could this possibly mean? How could we be unaware of what experience is "really" like? In order to understand what Proust means here, we need to answer two questions. First, what are the essential differences between the "true" experience recalled by involuntary memory and the "false" experience recalled by voluntary memory? Second, how is it possible to recall aspects of an experience in retrospect that one was not aware of at the time? In answering these two questions, Proust is led to answer a third question, which is critical to his vocation as a writer: How does one convey experience truly, in literature? Although this may seem to be secondary issue, it is in fact completely intertwined with the other two questions. As we will see, Proust's theory of awareness leads inexorably to a theory of art.

3. Proustian reality and the Jamesian stream of thought

One striking aspect of the involuntary memories recalled by Proust in the Guermantes mansion is that all of them involve recollection of an entire nexus of sensations, thoughts, and impressions from the past. For example, when he steps on the uneven paving stones, he is not just reminded of the feel of the paving stones he walked on in Venice, but "all the other sensations linked on that day to that particular sensation" (900). This nexus of sensations extends beyond the single view or scene conveyed by the "snapshots" of voluntary memory to encompass "all of the sensations

[2] *Remembrance of Things Past* is a work of fiction written in the first person. The narrator is never explicitly named. Although it would be a mistake to equate the narrator with Proust, there are portions of the novel that are written in the form of an essay. Indeed, Proust originally conceived the work as a kind of speculative, half-fictional essay. For ease of discussion, I will refer to the ideas presented by the narrator as if they were presented by Proust without a fictional intermediary.

which I had felt there, reuniting the piazza to the cathedral, the landing-stage to the piazza, the canal to the landing-stage, and to all that the eyes see the world of desires which is seen only by the mind'' (910). He feels as if he is experiencing all of Venice at once—more, in fact, than he would experience if he were actually standing in the piazza and could only see what was right in front of him. A similar recollection of an entire section of the past occurs when he wipes his mouth with a starchy napkin and Balbec is reinstantiated. In this case, he re-experiences ''not only... the sight of the sea as it had been that morning but... the smell of my room, the speed of the wind, the sensation of looking forward to lunch, of wondering which at the different walks I should take'' (909). Note that in both cases (Venice, Balbec) Proust recovers not only perceptual and spatial information, but also the whole tangled web of sensory, emotional, and appetitive experiences that made up these earlier moments in time *as well as* an appreciation for how all these experiences fit together into a coherent whole.

These experiences contrast with the ''snapshots'' of voluntary memory, which represent individual sensory events that have been abstracted from their contexts and can be recalled at will. In contrast, the process of recollection for involuntary memories is guided by the relationships between previously-experienced events rather than by current goals. According to Proust, it is precisely this surrender to the seemingly illogical structure of an event that makes involuntary memory so vivid, because by surrendering to this structure one becomes aware of it. Each episode is a unique conjunction of sensations, goals, and desires which are related to each other largely by contingency. These contingent relationships are what give an episode from the past its distinct ''savour:''

> the slightest word we have said, the most insignificant action that we have performed at any one epoch of our life was surrounded by, and colored by the reflection of things which logically had no connexion with it and which later have been separated from it by our intellect which could make nothing of them for its own rational purposes, things, however, in the midst of which—here the reflection of the evening upon the flower-covered wall of a country restaurant, a feeling of hunger, the desire for women, the pleasure of luxury; there the blue volutes of the morning sea and, enveloped in them, phrases of music half emerging like the shoulders of water-nymphs—the simplest act or gesture remains immured as within a thousand sealed vessels, each one of them filled with things of a color, a scent, a temperature that are absolutely different one from another. (902)

Voluntary memory does not recall the experience itself; it recalls the experience as reworked by intelligence and at least partially translated into concepts. Our intellect is not interested in the details of individual episodes except insofar as they provide generalizable knowledge about the world that allows us to predict the consequences of current action. However, something important is lost in this reworking of the original episode: the ''color, scent, and temperature'' that gave the episode its unique feel. Instead, this is replaced by ''a uniform depiction of life'' that ''make[s] varied patterns out of elements that were homogeneous'' (906) (i.e., concepts), elements whose ''reality [the will] still further reduces by preserving of them only what is suitable for the utilitarian, narrowly human purpose for which it intends them'' (905). Such a depiction gets the facts right, but not the feel.[3] Thus,

[3] Beckett (1957) makes the important point that one of the critical things lost in the translation from experience to concepts is the feeling of novelty one gets when experiencing something new, which is not yet assimilated into one's conceptual schema: ''The most successful evocative experiment can only project the echo of a past sensation, because, being an act of intellection, it is conditioned by the prejudices of the intelligence which abstracts from any given sensation, as being illogical and insignificant, a discordant and frivolous intruder, whatever word or gesture, sound or perfume, cannot be fitted into the puzzle of a concept. *But the essence of any new experience is contained precisely in the mysterious element that the vigilant will reject as an anachronism*. It is the axis about which the sensation pivots, the center of gravity of its coherence.'' (Beckett, 1957, pp. 53–54, italics mine)

in answer to our first question, the essential difference between the "true" experience recalled by involuntary memory and the "false" experience recalled by voluntary memory is that the former is structured by concepts ("the intellect") and thus by current goals, while the latter is structured by the contingent relationships that are present in the episode itself.

Proust claims that the nexus of sensations and relationships recovered by involuntary memory is what experience is "really like." At first glance, one might rightly feel a little skeptical of this claim. Certainly, the narrator has a strong feeling of recognition when he recovers this information. But the quality of the "true" experiences of Venice, Balbec, and Combray that are recovered through involuntary memory comes as a surprise to him, which makes one wonder why he did not notice what these places were like in the first place. This brings us to our second question: how is it possible to recall aspects of an experience through involuntary memory that one was not aware of at the time?

To answer this question, I will refer to the description of conscious experience developed by William James in the Principles of Psychology (1890/1950). James' account emphasizes the dynamic nature of consciousness—the way consciousness moves continually from sensation to sensation, thought to thought. In a famous metaphor, James likened the stream of thought to the life of a bird:

> As we take, in fact, a general view of the wonderful stream of our consciousness, what strikes us first is this different pace of its parts. Like a bird's life, it seems to be made of an alternation of flights and perchings. 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 before the mind for an indefinite time, and contemplated without changing; the places of flight are filled with thoughts of relations, static or dynamic, that for the most part obtain between the matters contemplated in the periods of comparative rest. (James, 1890/1950, p. 243)

One of James' most brilliant insights was that the "thoughts of relations" that guide the stream of thought from one substantive thought to another were real, albeit elusive experiences. He described these experiences in terms of a "fringe" of dimly-felt contextual information that surrounds the more salient sensory information in the focus of consciousness (or "nucleus"). According to James, the fringe consists of three components: a faint memory of preceding thoughts and sensations, an understanding of the relationship between the currently focal thought or sensation and other thoughts and memories that might be relevant to it, and a feeling for where the focus of our consciousness is heading. Although this contextual information is present in each moment, we are not usually much aware of it. Rather, it expresses itself only as a vague "suffusion" or "overtone" that gives a thought its particular savour and plays an important role in conveying its meaning.[4] We are highly aware of the sensory experiences in the focus of consciousness, but only dimly sense the network of relations and associations that link the different "nuclei" together into a train of connected thoughts. (For further

[4] In describing how the fringe operates, James tended to emphasize situations where it directs our thought in accordance with immediate goals to reach some kind of "resolution." However, there are other states such as fantasy or daydreaming where our thoughts are not directed by immediate goals, but by long-term goals that might better be described as underlying emotional states. Thus, for example, in the absence of an immediate goal, our thoughts might turn to a recurrent fantasy of romantic or professional success. The power of the *moments bienheureux* seems to stem largely from a recovery of these long-term emotional states.

discussion, see Chafe, 1994, 2000; Epstein, 2000a; Epstein, 2000b; Galin, 1994, 2000; Mangan, 1991, 1993a, 1993b).

It is precisely this relational information that is recovered by involuntary memory. At any moment, we are not only aware of the material in the focus of our consciousness, we also have a dim sense for how this material relates to sensations we have recently experienced, goals that we might have, or lines of thought that we might pursue. According to Proust, it is this tissue of dimly-felt associations that makes up "true" reality:

> An image presented to us by life brings with it, in the single moment, sensations which are in fact multiple and heterogeneous. The sight, for instance, but the binding of a book once read may weave into the characters of its title the moonlight of a distant summer night. The taste of our breakfast coffee brings with it that vague hope of fine weather which so often long ago, as with the day still intact and full before us, we were drinking it out of a bowl of white porcelain, creamy and fluted and itself looking almost like vitrified milk, suddenly smiled upon us in the pale uncertainty of the dawn. An hour is not merely an hour, it is a vase full of scents and sounds and projects and climates, and *what we call reality is a certain connection between these immediate sensations and the memories which envelope us simultaneously with them*... (924; italics mine)

But it is almost impossible to clearly perceive this network of dimly-felt associations within immediate experience. For when we are immersed in an experience, the salience of the substantive thoughts overwhelms any faint awareness we might have of the contextual information that helps guide the progression. Furthermore, it is frequently the case that our thoughts are not guided by internal forces at all. External reality imposes itself upon us, in the form of highly salient sensory information that demands attention and directs our consciousness towards it. In many cases, the internal associations and goals that relate to the current nucleus may be felt only as a dim "coloration" of the stream of thought—as James says, an emotional "overtone" or "suffusion."

Not surprisingly, we usually only remember the substantive thoughts—which when assimilated into concepts become the "snapshots" of voluntary memory. However, if we are to recover the experience as it truly is, we must recover the dynamics of the stream of thought—the flights of the bird in addition to the perches. To do this, we must become aware of the space in which the bird flies. We can only do so by becoming aware of the network of associations that guides the bird's flight. Involuntary memory brings the contextual information that shaped the remembered episode into the foreground where it can be explicitly experienced. By doing so, it makes one aware of the fact that each thought or sensation is part of a chain of associations that cannot all fit into consciousness at once. By recovering the dead ends, the byways, the frivolities of thought, one recovers the vibrant soup, the savour of experience.

How does involuntary memory do this? According to Proust, in the *moments bienheureux* one is in a highly unusual situation in which one can simultaneously experience an episode: (1) in the present, so that it is an "actual shock to [the] senses" (905) and (2) in the past, so that "[the] imagination [is] permitted to savour it" (905). He attributes our normal inability to appreciate the savour of events in the present to our inability to apply imagination to them, because "we can only imagine what is absent" (905). What does he mean by this? By "imagination," I take him to mean the ability to fantasize about a place, person, or event. In fantasy, we are free to direct our thoughts according to the whims of free association. In contrast, when we are immersed in an experience, our thoughts are largely controlled by unpredictable external events. Thus, we are not free to speculatively associate about an event in the present while it is happening. Furthermore, we can only think one thought at a time. Consequently, an event experienced in the present can only

immediately result in a single reactive line of consciousness from the observer.[5] Although we might almost immediately backtrack and consider another line of association, this association must begin with the memory of the event—not the event itself. Immersed in the present, we cannot "step back" and see the present moment as a part of a larger whole. Only memory can provide a perspective that allows us to see a whole city or period of time "lie spread out before [us]" (910), rather than just seeing it one scene at a time or one moment at a time.[6]

Proust notes that a lengthy interval between the experience and subsequent recollection of an episode is usually necessary for the operation of involuntary memory (although at least one of his examples—No. 1 above—is of recollection of an event from the previous day). Indeed, he claims that we must forget the past to truly remember it again. Why should this be the case? When we are immersed in an event, we concentrate only on what is right in front of us. We are only barely aware of contextual information such as the organization of a city, the nexus of inchoate desires that motivates us, our understanding of the rituals of a Grande Hotel, our memories for what happened the previous day. After all, this contextual information is pretty much the same from minute to minute, from day to day, so we quickly cease to notice it. However, when this information is recovered years later, it suddenly stands out. We become aware of aspects of a period of time that we were not previously aware of, and we feel that we are experiencing it in a way that we never experienced it before. In fact, we *have* experienced it before, but with different emphasis: the contextual information that had fallen into the background has now been brought into the foreground. The passage of time has made this information novel once again, and thus we attend to it. Shattuck (1963) has suggested that involuntary memory operates under the same principle as a pair of binoculars: by superimposing a stimulus from the present with the memory of the same stimulus experienced in the past, the memory of the past gains three-dimensional "depth." We then remember the stimulus as part of an episode whose structure and "feel" are now apparent to us, instead of as a sensation detached from its episodic context. But just as one cannot obtain depth information from two images that have insufficient disparity, so one cannot retrieve the context of an episode by comparing it to a present that is insufficiently separated from it. It is the mechanism of contrast that drives the *moments bienheureux*.

One particularly important form of contextual information that can only be recovered after the passage a significant amount of time is information about the network of goals that suffuses a

[5] The mind contains several cognitive mechanisms that can finesse this limitation. For example, working memory allows us to keep several different representations simultaneously "on-line" and available for easy access to consciousness, while the fringe provides some awareness of representations that are not yet fully elaborated in focal consciousness or have recently been replaced. However, despite these mechanisms, we can still only fully develop one mental "path" at a time. This situation is similar to that of physical navigation. I might be able to walk down one path while casting my gaze down another and I might be momentarily in two different rooms at the same time as I walk between them. But the general principle that I cannot be two places at once still holds.

[6] Alternatively, one might be tempted to suggest that this is an artifact of Proust's individual personality and his proclivities towards nostalgia. In fact, several writers who have approached Proust from a psychoanalytical point of view have argued that Proust felt unusually threatened by the chaos of raw experience and consequently could only allow himself access to the emotional aspects of experience in retrospect. Although this hypothesis might be based on an accurate assessment of his personality, I believe that it is essentially irrelevant. Proust may have displayed exaggerated sensitivity towards recalled as opposed to immediately experienced information; however, in doing so he only exaggerates patterns that are present in all of us. Proust may have been an extreme case, but this does not make him an irrelevant case.

particular section of time. In Proust's description of involuntary memory, separation from the emotional consequences of a stimulus is critical for "the imagination" to operate. Thus, as Proust states, "we can only imagine what is absent." Many times in the novel, Proust emphasizes the fact that it is almost impossible for us to separate ourselves from our current emotional context—only the passage of time allows us to view our previous emotions with equanimity. Insofar as our goals directly determine our thoughts and actions, we cannot become aware of the network that controls our thoughts until this network has loosened its grip and allows us some freedom of association. In the *moments bienheureux*, the network of associations attached to a stimulus is recovered *after* the emotional power of the associations has passed. This allows us to appreciate these associations not as compelling goals that demand immediate action, but as objects that can be considered in their own right. In particular, rather than choosing one action or thought, we can simultaneously be aware of a number of actions or thoughts that might have been compelled by the network of goals.

Thus, Proust's description of the *moments bienheureux* implies a distinction between two aspects of consciousness: the immediate (largely sensory) stimulus in the focus of consciousness, and a network of potential associations that surrounds it. I have identified these two aspects of consciousness with James' nucleus and fringe. Proust describes the *moments bienheureux* as being particularly illuminating for understanding the structure of consciousness because they are rare moments where we become aware of the network of memories and goals that guides the stream of thought—a network that is usually only vaguely sensed in the "fringe" of consciousness. As we will see, Proust describes art as operating in much the same way.

4. The Proustian theory (and practice) of art

4.1. The Proustian project: conveying experience

Proust's interest in the network of associations undergirding experience is more than academic. For the *moments bienheureux* are intensely emotional events—so much so, that they seem to him to be "the only genuine and fruitful pleasure that I had known" (908). He decides to devote his life to the "essence of things" that these moments seem to reveal. But what does this entail? Is he simply to sit and wait for further experiences of this kind? Given the fact that years can go by and between such experiences, this does not seem to be a sensible plan. Furthermore, even when they do occur, the moments are fleeting—suggesting but not leading directly to something beyond themselves. But Proust soon realizes that there are other sources for the emotions he feels during the *moments bienheureux*: for these emotions are, at root, aesthetic emotions, and they can be explored through art. Rather than waiting passively for true experience to come to him, he will become a writer who uncovers that truth and conveys it to others.

Proust recognizes that this is by no means an easy task. He recalls incidents in the past when he had been overwhelmed by beautiful experiences; in each case, he failed to find language that was adequate for the task of description: "the words in each case were a long way removed from the impressions" (926). For example, in one incident he was so moved by the beauty of a rustic landscape that all he could say was "gosh!"—an honest expression of his emotion, no doubt, but far from sufficient as a representation of his experience.

How does one accurately describe one's experience of a landscape in words? According to Proust, one cannot do it simply by describing what one sees. In fact, literature that contents itself simply with describing things gives us "merely a miserable abstract of lines and surfaces" (921) which is "the furthest removed from reality" (921) because it "severs all communication of our present self. . .with the past" (921). It provides us with "a mere vain and tedious duplication of what our eyes see and our intellect records" (931). It describes the landscape without describing our experience of the landscape, and fails to notice that the two are not the same. The landscape *is* only a bunch of lines, surfaces, and identified objects, but the essence of our experience of it is the whole nexus of associations, memories, and emotions that the landscape evokes. We may not even be aware of all these associations when we experience the landscape, but they do provide a background that gives it its savour and significance. Proust's goal is to create a work of art that brings this savour into the foreground: "to think—that is to say, to draw forth from the shadow—what I had merely felt. . .what was [this] but the creation of a work of art?" (912) But how is this to be done?

4.2. The role of metaphor

To convey experience, Proust must reconstruct the nexus of associations that make up a moment—the "connection between. . .immediate sensations and the memories which envelope us simultaneously with them" (924). He assigns a key role to *metaphor* in the performance of this task. In a famous passage, he writes:

> [The writer] can describe a scene by describing one after another the innumerable objects which at a given moment were present at a particular place, but truth will be attained by him only when he takes two different objects, states the connection between them. . . and encloses them in the necessary links of a well-wrought style; truth—and life too—can be attained by us only when, by comparing a quality common to two sensations, we succeed in extracting their common essence and in reuniting them to each other, liberated from the contingencies of time, within a metaphor. (924)

Metaphor allows the writer to do more than just describe individual sensations: by comparing one experience to another, the entire network of thoughts, memories, and inferences common to both can be evoked. One can then go beyond the sensation in the focus of consciousness towards awareness of the associative milieu that accompanies it. Indeed, Lakoff and Johnson have argued that this process of elaboration by metaphor underlies almost all of thought (Johnson, 1987; Lakoff & Johnson, 1999). By stating that one thing is like another, the writer merely reconstructs the associative process that automatically occurs in our minds when we experience that thing.

For Proust, the term "metaphor" encompasses more than just the standard definition as a literary trope. It means any description of relationship between two sensations, objects, situations, or events. In fact, the technique that Proust uses most frequently to convey associations is not metaphor in the standard sense (in which one object is compared to another that has similar features), but something one might term narrative metaphor, in which one event is compared to another event that has a similar social or emotional structure. I will quote just one of the several hundred examples that appear in the text. Near the beginning of the novel, the child Marcel is sent to bed early because his parents are hosting a dinner party. Unable to sleep without his usual good night kiss from his mother, he writes a note to his mother asking her to come upstairs. Francoise, the servant who takes this note, returns with a negative response:

> My mother did not appear, but. . . told Francoise to tell me, in so many words: "There is no answer"—words I have so often, since then, heard the hall-porters in grand hotels and the flunkeys in gambling-clubs and the like repeat to some poor girl who

> replies in bewilderment: "What! He said nothing? It's not possible. You did give him my letter, didn't you? Very well, I shall wait a little longer." And, just as she invariably protests that she does not need the extra gas which the porter offers to light for her, and sits there, hearing nothing further except an occasional remark on the weather which the porter exchanges with a bell-hop whom he will send off suddenly, when he notices the time, to put some customer's wine on the ice, so, having declined Francoise's offer to make me some tea or to stay beside me, I let her go off again to the pantry, and lay down and shut my eyes, trying not to hear the voices of my family who were drinking their coffee in the garden. (Proust, 1913–1919/1981, p. 34)

It is striking how fully Proust develops the imagined episode in the lobby of the hotel. One can almost see the chair that the rejected woman sits in, in the dimly-lit corner beneath the unlit gas lamp. Long after we have grasped the point of the metaphor, Proust keeps our consciousness in the hotel lobby by describing the banter between the porter and the bell-hop. The result is to make the reader momentarily forget the main thread of the narrative, just as one momentarily forgets one's surroundings as one remembers an event from the past. Proust's metaphors do more than just make a point: they induce a train of thought in the reader that is analogous to that which (putatively) exists within the mind of the narrator as he experiences an event. By doing so, they turn the reader's attention away from the event itself and towards the system of knowledge and valuations that shapes the narrator's understanding of the event. In this way, the reader can, in effect, read the narrator's mind.

Proust's digressions are sometimes taken by the uninformed reader to be frivolous and self-indulgent. In fact, they are a critical element of the Proustian project. For only through digressions can Proust convey the meanderings of the stream of thought, and even more importantly, the associative network within which the stream of thought meanders. This last point should not be ignored. Some readers may complain that Proust describes a stream of thought which is much more digressive than their own. However, in doing so, he conveys something universal about conscious experience. For even when we think clearly and directly, with one thought following another in a logical progression, our thoughts are still guided by the presence (of which we may be only dimly aware) of other thoughts that have been, could be, or will be. It is this sense for the relationship between the single thought in the focus of one's consciousness and other thoughts that have *not* been elaborated that William James described as the "fringe" of consciousness. By making some of these potential pathways explicit, Proust is able to portray the associative network that guides our stream of thought and shapes our experience.

It is important to remember that this associative network is not experienced directly in normal cognition. It only makes its presence known by its consequences on the stream of thought (Mangan, 1993a, 1993b). Thus, the Proustian project is to make explicit something that is usually experienced only implicitly (Cohn, 1978). The tissue of metaphors that he creates acts as a symbol for something that cannot itself be directly represented—the network of associations, expectations, and understandings that usually express themselves only as an emotional overtone in the fringe. In this way, Proust aimed to capture the "essence" of things—a stable structure of knowledge and memories that he believed existed *outside* of time (in the sense that it cannot usually be experienced all at once, but rather makes its presence known only by guiding the stream of thought *through* time) and could be encountered only through involuntary memory or through art. The critical feature of metaphor is that it allows one to see the same features in two different events, thus permitting the features to become "liberated from the contingency of time" (924). By placing the "essence" of experience outside of time, Proust emphasizes the fact that it cannot usually be encountered or represented directly.

4.3. Surface and network: Art as a "hieroglyphic"

In an important sense, Proust is a Platonist: the unchanging and elusive "essences" behind transient experience resemble the "ideal forms" that Plato believed lay behind the illusion of reality conveyed by perception. However, Proust's Platonism takes a highly unusual form. While Plato believed that the world of ideal forms could not be approached through experience but only through reason, Proust believes that "essences" can *only* be approached through experience. Furthermore, unlike the universal truths that make up the Platonic ideal forms, Proust's "essences" may be in some way unique to a particular individual (a point I take up below). He calls experience the raw material out of which the artist creates his works: "the impression is for the writer what experiment is for the scientist" (914).

However, Proust emphasizes that sensory impressions are only valuable insofar as the lead the writer (and the reader) on to something more essential. Proust refers to impressions as *hieroglyphics*—at first glance they appear to be direct pictorial representations of one thing, but they are actually symbols for something else. The artist must attend closely to the impressions that strike him as beautiful and significant, and attempt to "decipher" them:

> Already at Combray I used to fix before my mind for its attention some image which had compelled me to look at it, a cloud, a triangle, a church spire, a flower, a stone, because I had the feeling that perhaps beneath these signs their lay something of a quite different kind which I must try to discover, some thought which they translated after the fashion of those hieroglyphic characters which at first one might suppose to represent only material objects (912).

According to Proust, the sense of beauty we feel when we encounter a beautiful object is the sense that it has a deeper meaning that is not entirely expressed in its surface features. Based on the previous discussion, I postulate that the "something of a quite different kind" that underlies these sensations is the same network of associations that underlies the stream of thought. The sense of beauty we obtain from the object is actually a sense for the organization of the network of associations that the object evokes in us. These associations are not inherent in the object, but exist only in ourselves. And when the beautiful object is a work of art, the associations it evokes in the observer will be similar in some way to the associations within the mind of the artist that created it.

4.4. The function of art

According to Proust, the function of the work of art is to permit the observer/reader to partake in the consciousness of the artist. In particular, the work of art allows the observer to appreciate aspects of the artist's consciousness that cannot be conveyed explicitly (for example, in direct depictions or factual statements):

> Is it not true that those elements—all the residuum of reality which we are obliged to keep to ourselves, which cannot be transmitted in talk... that ineffable something which differentiates qualitatively what each of us has felt and what he is obliged to leave behind at the threshold of the phrases in which he can communicate to others only by limiting himself to externals, common to all and of no interest—are brought out by art... which exteriorises in the colors of the spectrum the intimate composition of those worlds which we call individuals and which, without the aid of art, we should never know? (259)

When the artist looks out onto the world, his way of looking at things is ordered by his sensibility. In creating a work of art, the artist attempts to convey this sensibility—guiding *our* attention to the same things that captured *his* (or her) attention. For example, Proust observes that great writers always have key images and themes and that reappear in their works: "[t]hat new and

terrible beauty of a house, that new and two-sided beauty of a woman's face, that is the unique thing that Dostoievsky has given to the world'' (385). Of course, houses and women have always existed. But by describing them a certain way or attributing to them certain characteristics, Dostoievsky allows us to look at them the same way that he looked at them. In this way, Dostoievsky's sensibility is reconstructed in the reader.[7]

The universe contains an infinite number of objects—we choose what to look at based on our concerns, our memories, our sensibility. A work of art, on the other hand, is a carefully chosen subset of the universe, containing only a limited number of relationships, all of which were chosen (consciously or unconsciously) by the artist. In making these choices, the artist communicates information about his mind—his associations, memories, emotions, and goals. He cannot convey this information directly, but he can convey it indirectly by showing the things in the world that his mind chose to concern itself with.[8] In this way, the work of art acts as a sort of symbol that implies but does not explicitly represent the mind that created it (Langer, 1942, 1953). Although Proust emphasizes the kind of art that attempts to convey the aspects of the creator's mind that

[7] I am arguing that the basis of the Proustian aesthetic is the transfer of consciousness from the artist to the subject. However, no such transfer can completely recreate a whole world in another mind. *Remembrance of Things Past* is unusual among novels in the extent to which it attempts—and succeeds at—this task. The length of the work contributes no small measure to the success of the endeavor. A book of over 3000 pages can only be read over a long period of time; thus, the reader experiences changes occurring in fictional time as also occurring in (albeit compressed) real time. When at the end of the novel Marcel recalls events that occurred at the beginning of the novel which he has subsequently forgotten, the reader most likely has subsequently forgotten the same incidents, and consequently experiences the same feelings of recall. Similarly, by the end of the novel we have followed the narrator through so many byways of thought and reminiscence that it is almost impossible not to feel that we know him. Other novels, however, contain neither the Proustian digressions nor the Proustian length, and yet we still feel that they are beautiful and significant. They do not attempt to explicitly represent the author's associative memory network—but they do not have to. The associations already exist in the mind of the reader—the work merely acts as a cue to refresh and reorganize them. Thus, Proust writes:

> [E]very reader is, while he is reading, the reader of his own self. The writer's work is merely a kind of optical instrument which he offers to the reader to enable him to discern what, without this book, he that perhaps never have perceived in himself. And the recognition by the reader in his own self of what the book says is the proof of its veracity... (949)

One cannot appreciate the beauty of a novel without having some prior experience with the basic human interactions that it portrays. A person who has never been in love is unlikely to fully appreciate *Anna Karenina*. The beauty of a novel exists somewhere between the words and the reader, and arises in the interaction between them.

[8] This account provides a natural answer to the question ''why create Art?'' Art has been a universal throughout human culture, even though it provides no obvious survival benefits. The Proustian scheme provides an explanation. Art allows us to communicate our consciousness in a way that cannot be communicated in direct language. But why do humans have a need to express themselves to each other in this way? Proust makes it clear that his own motivation for writing his novel is to preserve his personality from death—not only the death that occurs at the end of life, but the death of the successive personalities that we exhibit throughout our life and which we discard as we change and forget the past. Clearly, desire to preserve the personality is practically universal in human experience and has been taken to be a general organizing principal by many observers (e.g., Becker, 1973; Neumann, 1954; Peterson, 1999). I do not have any speculations about why this may be the case, and only note that it seems unlikely that we will ever be able to fully explain the motivations behind artistic creation until we have a well-developed cognitive theory of the self. Interestingly, the aesthetic emotion—particularly when provoked by romantic art—often comes intertwined with a heavy dose of nostalgia, an emotion that might be described as sadness over the transient nature (and consequent ungraspability) of experience. *Remembrance of Things Past* is suffused with nostalgia, and one of Proust's major themes is that both individuals and eras are too complex and too rapidly changing to ever be grasped completely by human consciousness.

are unique to him or her (we might refer to this kind of art as "romantic"), the same principle applies even to art that attempts to convey sensibilities that are universal to all human minds. (I discuss this point further in Section 6.)

It is often said that art "conveys emotion"—for example, a sad story reminds us of what it is like to be sad. However, art does more than just evoke a raw emotion in the observer/reader. It conveys a network of significances by which a particular person (the artist) assigns meanings to individual elements of the world. The critical information is not about the emotion per se but about how a specific mind interacted with a specific world context to bring forth these emotions. Some aspects of this interaction will be unique to the artist, while others will apply to all human beings. In either case, the importance of the work of art is not that it conveys the emotion, but that a conveys the sensibility of the person who has the emotion.

Proust strongly emphasized the fact that works of art are not creations made out of thin air. They are "translations" of something that already exists: the organization of the artist's mind. He preferred to think of art as being discovered rather than invented: "in fashioning a work of art we are by no means free... we do not choose how we shall make it but...it pre-exists us and therefore we are obliged, since it is both necessary and hidden, to do what we should have to do it were a law of nature, that is to say to discover it." (915) This is the case even for works are not autobiographical, for even works of pure invention are necessarily expressions of the author's memory network: "when [the writer] writes, there is not a single gesture of his characters, not a trick of behavior, not a tone of voice which has not been supplied to his inspiration by his memory; beneath the name of every character of his invention he can put sixty names of characters that he has seen" (936). Artworks are not inspired by the gods; they are indirect representations of our internal memory networks. I will take of this point again below.

4.5. Summary

In the Proustian scheme of things, a work of art is an object that implies something that it cannot directly represent. The thing in question is the associative network that guides the stream of thought of the artist. This network of relationships cannot be experienced directly, but it does control the entry of sensory representations into the focus of consciousness. By presenting us with an ordered set of sensory surfaces, the artist implies the structure of the mind that ordered them, and thus conveys an essential aspect of experience that would be otherwise inexpressible.

5. Neural-cognitive basis of Proustian aesthetics

In the preceding section I argued that Proust's theory of aesthetic perception rests on a distinction between two fundamental components of experience: sensations, and a network of associations that controls the order in which these sensations are experienced (insofar as this order is not completely determined by the outside world). These two components correspond in a general way to James' nucleus and fringe. In an earlier paper (Epstein, 2000a, 2000b), I outlined several hypotheses about the neural and cognitive bases of these two aspects of consciousness. Here I will revisit these hypotheses, and show how they can be used to map the Proustian theory of aesthetics

onto our current knowledge about the functional organization of the brain. (The reader is referred to the earlier paper for additional discussion.)

In the earlier paper, I postulated that the Jamesian stream of thought involved at least three distinct neural/cognitive mechanisms: (1) a global process by which information from different cortical regions can combine to form a momentarily stable and coherent "nucleus;" (2) a network of associations supported largely by the medial temporal lobes that determines the relationship between the current nucleus and other potential thoughts; (3) control mechanisms in the frontal lobes that guide the instantiation of different thoughts and choose associations that are consistent with current goals. Here I will elaborate on these three proposed mechanisms.

5.1. The nucleus

A number of researchers have noted the striking difference between the vast computational abilities of the brain and the relatively limited informational capacity of awareness (e.g., Mangan, 1993a, 1993b). Tasks such as visual object recognition and language comprehension are performed effortlessly and unconsciously, while tasks such as problem solving are performed slowly, sequentially, and consciously (Fodor, 1983). These observations have led to the hypothesis that consciousness is a global operation of the brain and can be distinguished from more local processes that operate on specialized kinds of information (Baars, 1988; Edelman & Tononi, 2000). A number of different mechanisms have been proposed as the neural basis of this "global workspace" (e.g., Engel, Fries, Konig, Brecht, & Singer, 1999; Singer & Gray, 1995). For example, some researchers have proposed that synchronous firing at a 40 Hz timescale binds together neural activity in disparate regions of cortex (e.g., Rodriguez et al., 1999). In the earlier paper, I argued that this mechanism may be the neural basis of the Jamesian nucleus—the highly conscious material that forms the core of each substantive thought. However, for the present argument, the precise mechanism by which the nucleus is formed is not important. The critical point is that it is the result of some kind of global operation of the cerebral cortex. In particular, insofar as most moments of thought are dominated by some kind of perceptual representation such as a visual image or snippet of inner speech, the nucleus must relate to neural firing in regions of the cortex that support perceptual representations.

5.2. The associative memory network

The "bird's life" described by James reflects the sequential activation of different nodes of an internal associative network. I previously hypothesized that the medial temporal lobes—in particular, the hippocampus—play a critical role in mediating this network. There are several major theories of hippocampal function in the literature. Here I will summarize three of the most prominent, and show how they are all consistent with a hippocampal role in supporting the Jamesian stream of thought.

In Gray's *anxiety theory*, the primary role of the hippocampus is to detect conflicts between competing courses of action (Gray & McNaughton, 2000). The hippocampus is hypothesized to use information about the current perceptual situation and the current motor program to make a prediction about what the world is expected to be like approximately 100 ms in the future. It then compares this prediction to the obtained situation. If the prediction and the world are consistent

with each other, the current motor program continues. But if there is inconsistency, the motor program may be aborted, and the organism may orient towards the source of inconsistency. In humans, this feeling of inconsistency between expectations and reality may be experienced as anxiety—indeed, Gray's theory was originally developed to explain the effect of anti-anxiety drugs. However, it is also consistent with a number of other lines of evidence, including neuroimaging experiments that show hippocampal activation in response to novelty (Dolan & Fletcher, 1997; Knight & Nakada, 1998; Strange, Fletcher, Henson, Friston, & Dolan, 1999). Importantly, the "actions" processed by the hippocampus need not be external—the hippocampus may also detect conflict between different potential streams of thought, directing attention towards one while suppressing others. Gray has hypothesized that the output of the hippocampal comparison process may in fact determine the contents of consciousness (Gray, 1995). In other words, the hippocampus determines the progress of the stream of thought.

In O'Keefe and Nadel's *cognitive map theory*, the hippocampus supports a map of the spatial structure of the world that can be used to plan routes to different goals (O'Keefe & Nadel, 1978). This theory was originally developed from neurophysiological studies that identified "place cells" in the rat hippocampus that fired whenever the animal was in a particular location. Hundreds of subsequent studies have confirmed this basic result and have shown that lesions to the hippocampus lead to the expected navigational impairments (Morris, Garrud, Rawlins, & O'Keefe, 1982). Neuroimaging studies have further demonstrated that hippocampal activation correlates with successful navigation when subjects must choose between a number of possible routes (Maguire, Frackowiak, & Frith, 1997, 1998) but not when the number of possible routes is limited (Aguirre, Detre, Alsop, & D'Esposito, 1996).

Although there has been considerable debate about whether the rodent hippocampus is involved exclusively in spatial processing (Burton, Murphy, Qureshi, Sutton, & O'Keefe, 2000) or in non-spatial processing as well (Wood, Dudchenko, Robitsek, & Eichenbaum, 2000), O'Keefe and Nadel postulated that hippocampal cognitive maps in humans involved both spatial and non-spatial components. Consistent with this, I have argued (Epstein, 2000a, 2000b) that the "bird's life" of consciousness described by James may be thought of as a kind of internal navigation. Just as the hippocampus may be critical for choosing a route through the external world, so may it be critical for choosing a route through an internal memory network (Eichenbaum, Dudchenko, Wood, Shapiro, & Tanila, 1999). Importantly, in this view, the hippocampus does not necessarily contain the memory network that we navigate through in its entirety, any more than it contains the world that we navigate through. Rather, it is a mechanism that allows us to choose a "route" within the network of possible associations that are at least partially instantiated by neuronal connections within different regions of cerebral cortex (Hebb, 1949; Sakai & Miyashita, 1993). Consistent with this, Teng and Squire (1999) recently reported on a patient with virtually complete hippocampal damage who retained a normal understanding of the spatial relationships within the town he grew up in—suggesting that his internal map of the town was not actually stored in the hippocampus.

Finally, the *declarative memory theory* of hippocampal function postulates that the primary function of the hippocampus in humans is to support memory encoding and retrieval. The original motivation for this theory came from the famous case of HM, who suffered an almost complete inability to encode new facts or episodes after bilateral surgical removal of the hippocampus and other medial temporal lobe regions. Insofar as HM retained some ability to recall

events prior to his surgery (in contrast to his complete inability to recall anything occurring afterwards), this suggested that the medial temporal lobes might be necessary for consolidation of novel information into long-term memory. Squire and colleagues hypothesized that the hippocampus and parahippocampal regions (including the entorhinal, perirhinal, and parahippocampal cortices) act as a unified memory system for facts and events (Squire & Zola-Morgan, 1991). Subsequent researchers have argued that there might be a differentiation of function within the medial temporal lobe memory system, with the hippocampus being more critical for episodic memory recall while parahippocampal regions are more critical for semantic memory recall (Brown & Aggleton, 2001; Murray & Bussey, 1999; Nadel & Moscovitch, 1997; Vargha-Khadem et al., 1997). For present purposes, however, the critical point is that all versions of the theory postulate that the medial temporal lobes are involved in retrieving a consciously-experienced memory from a memory cue. In other words, they are involved in moving from one substantive thought (awareness of the cue) to another (awareness of the retrieved fact or event).

How do these three theories fit together? Suppose the hippocampus originally evolved to support a mechanism to monitor the progress of ongoing actions, as Gray suggests. In particular, it makes predictions about the expected outcome of actions based on information about the current state of the world, the current motor program, and knowledge about the outcomes of similar previous situations. Gray has argued that this computation takes place over a rather brief timescale: the hippocampus predicts the way it expects the world to be 100 ms into the future. However, this system might further evolve to allow a series of predictions to be made, thus allowing the organism to predict the consequences of a making sequence of actions—for example, the sequence of bodily movements involved in following one route as opposed to another. In this way, Gray's hippocampal comparator mechanism could evolve into O'Keefe and Nadel's route planning mechanism. Importantly, once the animal has developed the ability to imagine the consequences of a sequence of actions, it potentially has the ability to imagine any sequence of events. Although this mechanism might have originally evolved to predict the consequences of a series of events in the future, it could just as well be used to re-experience a series of events that occurred in the past. In other words, this "imagination" device would be critical for conscious memory recall, especially for episodic material.

Irrespective of whether or not this evolutionary story is true, it is clear that all three theories of hippocampal function suggest that this region plays a key role in determining the direction of the stream of thought. In particular, the hippocampus is the mechanism that allows stored information about the regularities of the world to be applied to the current substantive thought in order to obtain a subsequent thought that is related to the current thought in a sensible way. Although the associative memory network implied by Proustian aesthetics may be represented partially in the cortex, the hippocampus is the organ that allows this network to apply itself to the stream of thought.

5.3. Frontal-lobe monitoring mechanisms

However, the network itself is not enough. The hippocampus may provide the "roads" along which the stream of thought can move, but there still must be a driver who chooses the particular path that is taken. In the earlier paper, I hypothesized that this control mechanism was in the frontal lobes.

Consider the evolutionary hypothesis developed above. In this account, the original function of the hippocampus is to monitor the progress of actions *as they happen*. Although this mechanism may eventually evolve into a mechanism that can also be used to predict the outcome of a *sequence* of actions, it can also operate in its original on-line mode. Thus, there must be some region of the brain that can distinguish between action sequences that are actually happening and action sequences that are merely imagined. Many lines of evidence implicate the frontal lobes in this role. Indeed, one of the main symptoms of schizophrenia is an inability to distinguish between real events and imagined events. Schizophrenia is associated with neurochemical imbalances in the dopamine system (Cohen & Servan-Schreiber, 1992) which enervates the frontal lobes. In addition, there must be a system that can evaluate the desirability of following one route or sequence of actions as opposed to another. Again, a frontal lobe region—orbital frontal cortex—has been strongly implicated in this function (although the amygdala plays a key role here as well).

The importance of the frontal lobes becomes even clearer when we consider the role of this region in memory retrieval. Neuroimaging studies of memory have consistently activated frontal regions (Buckner, Kelley, & Petersen, 1999). These results have often seemed puzzling in the context of the neuropsychological literature, insofar as frontal lobe damage is more often associated with impairments in organization, planning, and control than by impairments in memory. However, the above evolutionary story provides a possible explanation for this. For in this account, the hippocampal memory system is not a memory system per se. Rather, its key function is to instantiate an imagined sequence of events. This sequence can either be in the past, or it can be in the future. In order to make sure the imagined sequenced is a *recollection* rather than a *fantasy*, there must be some mechanism that can distinguish between the two. Just as the frontal lobes are necessary to distinguish between imagination and reality, so they are necessary to distinguish between imagination and memory.

Indeed, the frontal lobes may support many different kinds of monitoring processes that are necessary for successful memory recall. First of all, they may monitor the imagined sequence of events for *narrative consistency*: given what is known about how the world operates, could this episode have possibly happened this way? A special version of this might be monitoring of the imagined sequence for *autobiographical consistency:* given what I think I know about my own past, it is likely to have happened? Finally, the association process must be monitored for *consistency with current goals*—a key component to successful performance of any laboratory memory task (Thompson-Schill, D'Esposito, & Kan, 1999). Interestingly, Schacter (1996) has reported that the inaccurate memories retrieved by frontal lobe patients are not wholly false, but contain elements of actual facts or events. These patients can recover pieces of the past, but they cannot monitor whether the pieces are put together correctly.

5.4. Sensory surfaces and associative networks

I have hypothesized that the Jamesian stream of thought involves an interaction between perceptual representations in the cerebral cortex, an associative network that is instantiated by the hippocampus (but may be stored in the cortex), and frontal lobe mechanisms that monitor and control the association process. Each substantive thought corresponds to a certain pattern of firing within the cerebral cortex. In particular, there may be a momentary global organization mediated by synchronous neural firing. This firing pattern activates the hippocampus,

which receives input from most of the cortex. The hippocampus then acts as an "association machine:" given a partial input pattern, it completes the pattern with elements that were associated with that input pattern in the past. In this way, the hippocampus makes a prediction about what further elements it expects to find. This information is then back projected down into the cortex, where it evokes a new consciously-experienced substantive thought (i.e., a mental image), which triggers the whole process over again. The role of the frontal lobes is to monitor this association process and to choose the associations that are appropriate given the current behavioral context.

In order to map this process onto Proustian aesthetics, it is necessary to understand the experiential correlates of all three elements. Importantly, not all neural processes have the same experiential salience. In particular, the substantive thoughts—corresponding to firing patterns in the cerebral cortex—are much more salient than the other proposed components. Indeed, Jackendoff (1987) has argued that *only* modality-specific, mid-level representations (i.e., imagistic representations) can be the contents of consciousness. For example, in language perception, he argues that we are strongly aware of phonological representations, but are not directly aware of syntactic or conceptual representations:

> we experience the inner speech stream as segmented into words and possibly further into syllables or individual segments... By contrast, the units of syntax—nouns, verbs, propositional phrases, and so on—do not present themselves to awareness at all. We do not *hear* syntactic categories in verbal images as we hear phonological categories. Still less are the units of conceptual structure available to awareness. (Jackendoff, 1987)

Similarly, in visual awareness, we do not experience "low-level" representations encoded by the retina (if we did, we would be able to distinguish between input from the two different eyes), nor do we represent "high-level" representations such as allocentric 3-D object models. Rather, we experience surfaces, which are an intermediate level of representation roughly equivalent to Marr's 2.5-D sketch.[9]

How do these observations map onto neuroanatomy? Several lines of evidence suggests that mid-level vision is supported by visual processing areas such as V2, V4, and MT (Prinz, 2000a; Zeki & Bartels, 1999). Importantly, these regions do not project directly to the hippocampus. For example, output from V4 must travel through inferior temporal cortex, perirhinal cortex, and entorhinal cortex before it reaches the hippocampal complex. Not all of these intervening regions are involved solely in visual processing. Perirhinal cortex receives tactile and auditory as well as visual input (Murray & Bussey, 1999; Suzuki, 1996), and is also tightly interconnected with temporal pole regions that support semantic representations. Perirhinal output is combined in entorhinal cortex with output from parahippocampal cortex, which processes orientational information. Thus, by the time a visual input reaches the hippocampus, it has been combined with information from other sensory modalities, as well as conceptual and orientational information. It is *this* multimodal and partially amodal representation that the hippocampus operates on to

[9] Interestingly, near the end of *Consciousness and the Computational Mind*, Jackendoff argues for the existence of another set of conscious experiences, which he labels affects. These include our felt sense of meaning, agency, familiarity, and effort—sensations that James would largely ascribe to the fringe. In aesthetic perception, the affects would include the felt sense that an object is beautiful which accompanies our awareness of its surface features such as its shape and color. (I thank David Galin for pointing this out to me.)

determine the next substantive thought. Put simply: the representations that directly determine the progression of the stream of thought are not the contents of consciousness.

Although he does not explain it in neural terms, Jackendoff makes precisely this point. He writes that we are *not* directly aware of our thoughts, only of imagistic representations that convey the results:

> Visual and verbal imagery are the two most common ways in which the outcome of thought is revealed to awareness. The stream of consciousness, made up of such images, is usually copious enough for us to be intuitively satisfied that it in itself constitutes thought. But it does not... the stream of consciousness is essentially nothing but our evidence that thought is taking place; but the process of thought, and its content are inaccessible to awareness (Jackendoff, 1987, p. 320)

Expanding on this, in a recent paper, Prinz has written: "I challenge every reader to introspect while reading these words and find anything but a flow of verbal and other imagery. You know what these words mean, to be sure, but that only affects consciousness insofar as your senses imagistically and emotively shadow the underlying barrage of unconscious associations and inferences" (Prinz, 2000b, p. 282).

These neuroanatomical and phenomenological facts help explain the profound difficulties involved in accurately describing the stream of thought. The progression of thought is determined by an associative network which is not itself directly experienced, but only expresses itself indirectly through its effects on the imagistic representations that are supported by the sensory regions of the cerebral cortex. How can the associative network be portrayed? This is precisely this challenge that Proust undertakes when he attempts to describe the unconscious "essence" behind experience. He concludes that this "essence" cannot be portrayed directly, but must be conveyed indirectly through metaphor. Art, like experience itself, is only a "hieroglyphic:" the consciously perceived surface implies a network of relationships beneath.

However, our experience of a work of art does not consist solely of our awareness of the surface of the work of art. We also *consciously* experience a feeling of beauty that accompanies the sensory surface. In the following section, I will argue that this feeling may be the phenomenological correlate of the operation of the frontal lobe control mechanisms.

5.5. The frontal lobes and aesthetic judgement

The Proustian theory of aesthetics as developed above shares many key features with the cognitive theory of aesthetics developed by Bruce Mangan (1991). Mangan was the first to propose a connection between aesthetic experience and William James' concept of the "fringe." Mangan argued that the fringe guides the stream of thought by conveying a sense for whether it is going in the right or wrong direction. Thus, the fringe conveys the result of a complicated judgment: given the current contents of consciousness, the relationship between that content in other thoughts which may be connected to it, and current behavioral goals, what thought should appear next? In order to make this judgment, some part of the brain must understand the relationship between a number of potential thoughts that are not themselves consciously instantiated.

According to Mangan, aesthetic perception involves the exact same kind of judgment. When we confront a work of art, we confront an object that contains a number of elements that have a

number of different relationships to each other. Because the capacity of our consciousness is limited, we cannot experience all of these parts and relationships at once. Instead, we must explore the work of art sequentially in order to create an internal representation of it. The same mechanism that allows us to judge the relationships between different uninstantiated potential thoughts allows us to judge the relationships between different parts of this complicated internal model. If this mechanism judges that the different parts of the aesthetic object "fit together" well, then we experience a feeling that a similar to the feeling we get when a new thought "fits" with the previous thought and with our behavioral goals. Mangan describes this feeling as a feeling of meaningfulness that is felt in the fringe. The meaning is attributed to the surface features of the aesthetic object (a beautiful landscape, a painting), but it is actually the result of a non-conscious judgments of "good fit."

What part of the brain is involved in making these judgments of fit? Mangan suggests that the frontal lobes may be involved. Indeed, the evidence discussed above strongly implicates the frontal lobes in making judgments about the relationship between the current thought and other thoughts which may appear as well as judgments about the relevance of potential thoughts to current behavioral goals. Thus, the conscious experience of beauty we feel when looking at a work of art may be the experiential correlate of judgments made in the frontal lobes.

Indirect support for this idea comes from a recent fMRI experiment by Bor and colleagues (Bor, Duncan, & Owen, 2001). Subjects performed a working memory task in which they were required to remember a sequence of four locations within a 4×4 spatial array. In some trials, the sequence was "structured" so that each location was on the same row, column, or diagonal as the previous location, while in other trials the sequence was "unstructured." Significantly greater cortical response was observed in lateral prefrontal cortex in the structured trials compared to the unstructured trials. Importantly, this difference in neural activity was observed even though subjects did not develop any awareness of the difference between the two kinds of trials. These results suggest that lateral prefrontal cortex may be involved in detecting ordered patterns in the world—and that this pattern detector may operate largely unconsciously. Clearly, this ability is a key element of aesthetic judgment. Related results have been reported from neurophysiological studies of monkeys (e.g., Freedman, Riesenhuber, Poggio, & Miller, 2001).

6. Generalization to non-narrative art

In his theorizing about art in *Remembrance of Things Past*, Proust often writes as if the ultimate goal of all art is to be Proustian art. However, Proustian art is not the only kind of art, and it has certain peculiarities that are certainly not universal. For example, Proustian art is profoundly *romantic*: its emphasis and avowed goal is to convey the *individuality* of the artist. In contrast, many works of art are more concerned with conveying universal aspects of human consciousness than with conveying the unique sensibility of the individual artist. In addition, Proustian art is *narrative* art: when Proust concerns himself with conveying the memory networks that guide his stream of thought, is clear that he is mostly interested in episodic memories—in telling stories. But many varieties of art do not tell stories at all.

Does this mean that the Proustian theory of aesthetics developed in this paper only applies to specific kinds of art? In this section, I will argue that this is not the case. My starting point will be Zeki's (1999) recent work on visual art, where he develops several ideas about the relationship between visual art and the brain. I will show that Zeki's ideas are remarkably consistent with the ideas developed here, and suggest a way that Proustian aesthetics may be generalized to all forms of art.

According to Zeki, the visual system has a definable goal: to allow us to acquire knowledge about the world. It provides answers to questions like "where am I?," "who is speaking to me?," "is this banana ripe or not?"—just about anything we need to know to choose the correct course of action and ensure our survival. But converting raw visual input into answers to these questions is no easy task. The visual world is constantly changing: objects move, their appearances vary with the lighting conditions, faces change their expression, and places look different from different viewing angles and at different times of day. To gain the information we need from incoming light, we must perform a good deal of processing on the retinal image to identify the relevant features and discard transient or incidental information. For example, if we want to identify the ripeness of a fruit by its color, we cannot simply measure the wavelength of the light reflected from the object, as this will vary depending on the wavelength of the light illuminating the object. Rather, we must perform a complicated calculation involving the comparison of the reflected light with light reflected off of nearby objects. This calculation is complicated enough that it is still not fully understood. Given the complexity of the relationship between the retinal image and the real world, it should come as no surprise that 40% of the primate brain is dedicated to visual processing—or that computer vision systems are far less reliable than human vision. Zeki writes: "knowledge about the world...is not easy to obtain since the brain has to extract information about the essential, non-changing, aspects of the visual world from the ever-changing information that is reaching it."

Zeki goes on to argue that visual art serves the exact same function as visual perception: it extracts the unchanging aspects of a constantly changing visual world. He refers to these unchanging aspects as "constancies:"

> In general, we can say that art, too, has an aim which, in the words of artists themselves, is to depict objects as they are. And art, too, faces a problem, which is how to distil from the ever-changing information in the visual world only that which is important to represent the permanent, essential characteristics of objects... I shall therefore define the function of art is being a search for constancies (Zeki, 1999, p. 12)

Zeki's definition of art is highly reminiscent of Proust's claim that art "extracts the essences of things." The "constancies" of Zeki are visual constancies while the "essences" of Proust are narrative constancies, but the basic idea is the same. Just as visual art attempts to convey universal aspects of colors, surfaces, and objects, so does literature attempt to convey universal aspects of character, emotion, or behavior. And in both cases, one cannot convey these universal aspects directly except through examples. The painter must take a specific view of an object and use specific colors, just as the writer of fiction must describe a specific love affair. But in both cases, it is the underlying "essence" that is the goal.

The "constancies" conveyed by visual art can be of many different varieties. On the lowest level, a painting may convey something universal about one of the basic components of vision, such as color, motion, or form. Zeki suggests that much of abstract art—which eschews depic-

tion—concerns itself with fundamental visual constancies. On the next level, paintings may convey something universal about individual objects. For example, Cubism attempts to convey essential aspects of three-dimensional objects that cannot be depicted directly in a veridical two-dimensional view. Finally, a painting may convey something important about a person, situation, or idea, and thus convey truths about human emotion or thought that are just as profound as those conveyed by narrative art.

Zeki presents Vermeer as an example of a painter who operates simultaneously on many of these different levels. On the one hand, Vermeer delights us by his mastery of light, color, and shade. Indeed, his depiction of color was far more sophisticated than that of other artists of his time, and represents a real advance in the understanding of color. However, Zeki points out that the real miracle of Vermeer is not his technical virtuosity but the psychological power of his paintings, which manage to convey something essential about human emotions. Interestingly, Zeki's analysis of the psychological power of these paintings leads him to a very Proustian conclusion about how the paintings operate on the mind.

> The painting, I believe, derives its grandeur from the way in which its technical virtuosity is used to generate ambiguity. . .[s]everal truths revolve around the relationship between the man and woman. . . All these scenarios have equal validity in this painting which can thus satisfy several 'ideals' simultaneously—through its stored memory of similar past events, the brain can recognize in this painting the ideal representation of many situations—and can categorize the scene represented as happy or sad. This gives ambiguity—which is a characteristic of all great art—a different, and neurological, definition; not the vagueness or uncertainty found in the dictionaries, but on the contrary, certainty—the certainty of many different, and essential, conditions, each of which is equal to the others, all expressed in a single profound painting, profound because it is so faithfully representative of so much (Zeki, 1999, pp. 24–26)

Thus, the painting is powerful because it simultaneously represents a whole network of ideas. This is exactly the Proustian aesthetic. What Proust attains through metaphor, Vermeer attains through ambiguity. In both cases, a portrayal of a specific scene or situation is used to imply an associative network that applies more generally. And just as Vermeer's ambiguity is particularly powerful because it is coupled with a stunning visual depiction, so are Proust's metaphors particular powerful because they are written in an eloquent and interesting style. Indeed, Proust noted that metaphor alone was not enough to make great literature, it must be "enclose[d]. . .in the necessary links of a well-wrought style."

We can now see how the theory of Proustian art developed in this paper can be applied more generally to all art. Both visual and narrative art operate by linking a technically well-executed (visual or linguistic) sensory surface with an underlying network of associations that cannot be directly experienced. The beauty is attributed to the consciously perceived sensory surface, but its power comes from its reference to the unconscious associative network beneath. In the case of narrative art, the referenced network primarily represents episodes and concepts and the relationships between them. In the case of visual art, the referenced network primarily represents objects, scenes, colors, and shapes and the relationships between them (although the episodic memory network may be referenced as well). However, the basic principle is the same in either case. At any one moment, we experience the conscious correlate of a particular neuronal firing pattern, but not the networks of neuronal connections that controls the transition from one firing pattern to another (Dehaene & Naccache, 2001). The goal of art is to indirectly represent these neuronal networks, which control the stream of thought but cannot themselves be directly experienced. Essentially, art is a trick that allows us to indirectly convey the structure of our minds.

7. Conclusion

A complete scientific theory of consciousness must include both an accurate description of conscious phenomenology and an explanation for how that phenomenology arises from neural activity. In this paper, I have focused primarily on the first issue. I have shown how Proust's introspections about the phenomenology of two kinds of experiences—involuntary memory recall and aesthetic perception—lead him to postulate certain ideas about the structure of human awareness are potentially highly relevant to modern efforts to devise a scientific theory of consciousness. In particular, Proust distinguishes between the sensations encountered in any one moment and the network of associations that control the order in which the sensations are experienced during internally-directed thought. This distinction maps generally onto William James' division of consciousness into a "nucleus" of highly salient, largely perceptual information and a "fringe" of dimly-perceived relationships that guide the transitions between different nuclei. The component elements of this Proustian/Jamesian phenomenology can be mapped onto well-studied cognitive and neuroscientific mechanisms. In particular, the nucleus may correspond to the global mechanism that integrates information from multiple cortical regions into a unified and momentarily stable representation, while the fringe may correspond to the medial temporal lobe declarative memory system and the frontal lobe mechanisms that control its instantiation.

Proust's description of the structure of conscious experience leads him inexorably to a theory of art. In Proust's view, art is a solution to a problem that is inherent in the structure of human consciousness: even though our minds have the potential to instantiate an infinite number of images or ideas, we can only think one thought, recall one situation, or imagine one view of one object at a time. How can we represent the manifold of possible conscious representations that our minds can create? In other words, how can we consciously experience the organization of the mind that gives rise to consciousness, rather than just one moment of consciousness? Art solves this problem by presenting the observer with a consciously experienced object which evokes a network of associations within his or her own mind. This network of associations is the "essence" of things that Proust sought in the taste of a madeleine, a metaphor, or a fragment of time. I conclude that a scientific theory of art is possible, and will be found as an inevitable corollary of a scientific theory of consciousness.

Acknowledgments

I thank David Galin for useful and enlightening discussions and for encouraging me to pursue this project, and Donald Dryden for helpful comments on the manuscript.

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