

PROUST, MEMORY AND THE ENGRAM

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Marcel Proust's book *A la recherche du temps perdu* has in the past 50 years earned a reputation as one of the great books of the world. In it Proust uses recovered memories to present a picture of Paris society at the turn of the century. His ideas on memory were derived entirely from introspection and this essay presents the categories of memory which he worked out for himself. These show a notable resemblance to modern neurophysiological and scientifically-acquired views, with the possible exception of 'involuntary memory', which is discussed in detail.

Marcel Proust came from a family of doctors: his father, an authority on cholera, was a professor of medicine in Paris, and his brother, a leading surgeon who wrote a monograph on gynaecological anatomy, of which Proust is reputed to have remarked that he could have done as well without the expense of attending medical school. His paternal grandparents owned a small store, his affluence deriving from his mother's family of Jewish stockbrokers. In religion he swung midway between Catholicism and Judaism, embracing neither. He was friendly with Abbé Mugnier, a saintly priest who ministered to the high society of Boulevards Haussmann and Saint Germain, and to whom is attributed the *bon mot*: 'Of course Hell exists, but I do not believe there is anyone in it'. An asthmatic from childhood, Proust died from infective pulmonary complications. On his deathbed he said 'After I am gone, place in my hand a crucifix and then let the good Abbé enter!'

Proust had a formidable intellect and probed deeply into the vagaries of sexual behaviour. Muriel Spark, the Edinburgh author, believes his monumental work *Remembrance of things past* is the book of the twentieth century. He penetrated French aristocratic society and produced a book not just on snobbery but human nature itself. According to Proust the main motivating factor of our lives is memory, and from memories he created the work that can be read about in his book.

PROUSTIAN MEMORY

Proust was interested in the processes of memory, memory and reality, memory and imagination, memory and mood, memory and chronology. Like William James he believed in the values of introspection: 'The impression is for the writer what experiment is for the scientist, with the difference that in the scientist the work of the intelligence precedes the experiment and in the writer it comes after the impression'.¹

Snapshot or voluntary memory

This was his everyday working memory, and he describes this memory as a sort of pharmacy, a chemical laboratory in which the groping hand may come to rest now on a sedative drug, now on a dangerous poison. This memory is commanded by the intellect, which recalls events as snapshots. For example: Proust has been obsessed by the beautiful Albertine who has rejected him early in their

The French novelist Marcel Proust (1871-1922) was born at Auteuil, Paris and was a semi-invalid all his life, cosseted by his mother until her death in 1905 when he was 34 years old. His hitherto 'social butterfly' existence was transformed. He withdrew himself from society and lived in a sound-proof flat giving himself entirely to introspection. Delving into the 'self' below the levels of superficial consciousness, he set himself to transforming into art the realities of experience as known to the inner emotional self. In his monumental 13 volume novel, *A la recherche du temps perdu*, it is evident how no detail ever escapes the amazingly observant eye of the artist, and how his experience is subjected to close scrutiny and a searching analysis. His characters are described in terms of their concealed emotional lives, evolving in a plane that has nothing to do with temporal dimensions.

relationship. Sitting with her in a café, he notices two ladies 'of a certain sort' who stare intently at her. She submits to this visual contact with a passivity which is clearly voluptuous. This image of Albertine watching these two girls comes back to him, and he says 'I possessed in my memory a series of Albertines, separate from one another, incomplete, a collection of profiles or snapshots'. His memories of his love for Albertine embrace episodes of galleries, concerts and conversations. Some of these make him happy, others make him wretched. These snapshots are influenced by mood and context, as modern research clearly confirms.

Context-dependant memory

Context-dependant memory has been studied in two different environments, on land and under water. Lists of words learned on land were best recalled on land.² Words learned when sad were best recalled when sad.³ Proust gives many similar examples and clearly understood the importance of context and mood in the recall of memory: 'The glimpse of a star behind a tree in the courtyard was enough to remind me of the times we set out in our carriage after dinner for the woods of Chantpie, carpeted with moonlight'.⁴

Recognition memory

The neuroscientist, Sir John Eccles,⁵ proposed two distinct types of memory for retrieval of information. Databank memory is retrieved by a deliberate mental act; this is then checked for errors by the recognition memory. Proust also wrestled with the problem of recognition and pondered the process of recapturing a name. We try to guess what the name is, we try to link our guess to various associations,

all manners of misleading names file past and then the answer is there! He emphasises: 'that great game of hide-and-seek which is played in our memory when we seek to recapture a name does not entail a series of approximations. We see nothing and then suddenly the correct name appears'.⁶

Misleading memory

Neuroscientists have described how the brain may misinterpret visual images. Proust intuitively recognised that memory could also be mistaken. Memory does not keep a chronological order. It may give rise to conflicting visual images as when errant memory made Albertine's beauty spots wander all over her face!

Consolidation of memory

This term refers to the changes that go on as the brain organises and restructures information that eventually becomes part of permanent memory. This 'shaking down' process was known to Proust. He remembers that Mme Swann would sit down at the piano, her lovely hands emerging from her *crepe de Chine* housecoat drooping over the keys. The music, the *Vinteuil Sonata*, was complicated and not understood on the first hearing, and yet when the sonata had been played several times he knew it perfectly well. He says 'probably what is wanting the first time is not comprehension but memory. Several hearings are needed and of these multiple impressions our memory is not capable of giving an immediate picture, but that picture gradually takes shape in our memory'.⁷

Some forms of memory depend on temporal lobe structures that include the hippocampus and adjacent areas. The role of this system is only temporary. Recent memories are impaired after damage to this area but very remote memories are preserved intact. Memories initially dependent on this system gradually became established in other areas of the brain.⁸

Short-term memory

Retention of information may be either long- or short-term. Proust is well aware of the existence of short-term memory: 'memory as brief as that of a man in his second childhood, who cannot recall a minute afterwards what one has said to him'.

Proust by introspection defined many qualities of long-term memory. We now know that long-term storage depends on passage from the short-term depot to the hippocampus. This large curved structure lies deep in the brain, close to the medial or inner aspect of the temporal lobe, and is connected to the frontal cortex, to the limbic system and the hypothalamus (wherein lurk appetites of hunger, desire and anger); the left hippocampus lays down verbal memories; the right is concerned with spatial and pictorial memories.

A patient, famously known as H.M., suffered from intractable seizures and was treated by surgical excision of the hippocampus and part of the medial temporal lobes. His seizures were cured and all seemed well until it was realised he was unable to find his way back to bed! His memory for recent events was grievously impaired; a jigsaw of today became a mystery on the following day. He has been observed over 25 years by Brenda Milner who noted that each of her visits was entirely novel to H.M.. Several examples are now on record, all pointing to the importance

of the hippocampus in long-term memory. Does this signify the hippocampus is the storehouse of the long-term memory? The general opinion is probably not. What then does the hippocampus do? An uncertain answer is that its granular cells have the distinctive property of firing off electrical impulses enthusiastically when stimulated. This may drive the memory traces through neuronal circuits to their final destination. But where is the final destination? The physiologist Lashley spent a lifetime searching for the anatomical location of memory and concluded it was either everywhere or nowhere.

Gregory⁹ defines the engram as a physical brain change which takes place as a result of experience and which represents memories. Repeated activation of groups of neurones leads to strengthening of their connections or synapses. Thoughts or sensations can activate these assemblies and bring into play memory loops. The structural changes are accompanied by laying down of protein molecules, which in some way are preserved from rapid degradation, a necessary precaution if memories are to persist.¹⁰ How is it that the substantial world of physical structures translates into thoughts and dreams?

It seems now that memories are stored in that part of the cortex appropriate to the source of stimulation: visual memories are laid down in the visual cortex, hearing memories in the auditory cortex and so on.

Neuroscience and memory

Socrates¹⁰ supposed that humans have in their souls a block of wax which can be looked on as the gift of memory, the mother of the Muses. We make impressions on this of our perceptions and thoughts. What is impressed in the 'wax' we remember so long as the image remains in the 'wax'.¹¹

More than 2,000 years later neuroscience has progressed along a broad front covering the individual cells of nervous tissue and the structure of brain, and extends into cognitive psychology.

The nerve cells of the snail and sea-slug are very large and electrodes are easily placed in them. Stimuli, both innocuous and harmful, can then be transmitted and changes which occur during the learning process can be measured. Chemical changes, which take place in one-day-old chicks, have been well-described.¹² It now seems that during the memory process profound alterations take place in the chemistry and structure of the nervous system. Increased protein synthesis, and increases in the size and shape of the electrical connections between nerve cells, occur rapidly. These changes in the connections or synapses have been observed with the electron microscope.

The octopus had made a singular contribution to memory studies; this creature can remember different shapes and can be taught to react either with aggression or to retreat. In the octopus there are anatomically defined sites where memory is located; visual and tactile memories are segregated.¹³

For the neuroscientist, memory is a process which involves the acquisition, retention and retrieval of information. Information from the outside world reaches different parts of the brain: the eye to the visual cortex, the ear to the auditory cortex, and touch, heat and pain to the somesthetic cortex. Olfactory sense is wired differently, the connections passing to the piriform cortex and from there to the limbic system. This part of the brain, the 'old' cortex, evolved early, and is related to emotion and feeling. The smell of a

Madeleine* would have passed straight to the piriform cortex and Proust's emotional outburst over his grandmother must surely have involved the limbic system (*vide infra*).

Involuntary memory

These memories are driven deep by the passage of the years, driven deep by changes in the personality. Mysterious and not even recognisable at first as memory, only prolonged effort can bring its source to consciousness. A moment of time is regained, a fragment of the past is preserved in eternity. 'Unconscious memory is linked with ecstasies of inexplicable delight, a world without disappointment, without sin and without death'.¹⁴

Some examples make this clear. Visiting his mother one day, Proust felt tired and cold; she gave him with tea one of those little cakes called '*petites Madeleines*'.

No sooner had the warm liquid and crumbs touched his palate than he was invaded by an exquisite pleasure, by an all-powerful joy; he became a new being. These sensations faded away, and he asked from where they had come. Suddenly the doors of memory were unlocked and he was transported back to his Aunt Leonie who treated him with this little cake and a decoction of lime blossom. The memory went back not just to her but unfolded other distant events long since thought to be dead, broken and scattered.¹⁵ Seeing the cakes in a shop did not bring back the vision; only taste and smell could do this and even then it was not reproduced by another tasting.

On entering the courtyard of the Guermantes mansion he failed to see an oncoming car and stumbled against the kerb. Quite suddenly images of colour and coolness surrounded him, all intellectual doubts disappeared and all anxiety about the future. He tried to recapture this moment of joy by childishly hopping along the kerb to the amusement of the chauffeurs standing by. And then he recognised the vision; he was back in the baptistry of St. Marks in Venice where he had fallen on two uneven stones.¹⁶

One night, suffering from cardiac fatigue, he bent cautiously down to take off his boots, trying to master his pain. Scarcely had he touched the top button when his chest swelled and filled with a divine presence. Shaken by sobs, tears streaming from his eyes, he recognised his grandmother who many years earlier had stooped down to unfasten his stifflingly hot boots. He had become his childhood self. It was as if time consisted of a series of different parallel lives; the self he was then, that had disappeared for so long, had returned.¹⁷

Essential features of these visions were intense emotion, a feeling of well-being and detachment from the world. This leads to the question of whether these symptoms can be imitated by either drugs or electrical stimulation of parts of the brain.

Stimulation of the exposed surface of the human brain with weak electrical currents has yielded a huge amount of information. Penfield reported that stimulation of the temporal lobe cortex of epileptics evoked scenes of song and sight from the past. The electrical stimulus acts as a mode of recall of past experiences but present opinion doubts if the temporal lobes are the storehouses of memories: they certainly are part of the circuitry or wiring.

The emotional content of involuntary memory suggests involvement of the limbic system.

The limbic system is linked round the inside edge of the cerebral cortex and sits above the brain-stem under the cortex. Its component structures are interconnected and include parts of the thalamus, hypothalamus, hippocampus and septal nuclei. Over 60 years ago, James Papez proposed that emotion was a function not of specific brain centres but of circuitry. The Papez circuit is largely made up of the limbic system; he called this circuit the 'stream of feeling' and said that it gave emotional colouring to sensory excitations. The lateral hypothalamic nuclei play an important role in the experience of pleasure. Electrical stimulation of this part results in feelings such as 'I feel good' or 'I feel excited'.¹⁸

Peter Nathan¹⁹ mentions that stimulation of the temporal lobes caused stronger and purer emotions than occur in real life. An ecstatic feeling that all problems are soluble can be brought about by electrical stimulation of parts of the temporal lobe. Do we have here a clue to Proust's involuntary memories? It seems likely that Proust's brain contained unusually active circuits linked with the limbic system. Although his images are not those of temporal lobe epilepsy, they are somewhere in that category. It seems to the author that in Proust the 'Loop of Papez' was hyperactive.

Perhaps drugs played a role. The drug psychobilin gives rise to feelings of ecstasy and exaltation. Proust sometimes took 'veronal' (a barbiturate) as a soporific, and he described the effect of drugs on memory, notably the lecturer from whose lecture, otherwise intact, all Greek quotations had been removed! In no way was Proust a drug addict. Smith²⁰ described the phenomenon of 'cosmic consciousness' which closely resembles Proust's involuntary memory. If so, then Proust was able to connect with this as yet mysterious source of experience.

What then is special about Proust's views on memory? It is remarkable that by introspection, helped by a meticulous and melancholy eye, he recognised categories of memory in use today by neuroscientists. But surely the most striking are those experiences which accompany 'involuntary' memory. Proust had a sharply clinical judgement which recognised the involuntary memory as a real and important phenomenon. He tried to discover the source of these memories, which were so different from snapshot memories and which gave him the inspiration for his remarkable book.

He focussed attention on the 'Being Outside Time'. The Being within him, which enjoyed these impressions, was Outside Time. He says that on tasting the little Madeleine 'the Being which at that moment I had been was an extra-temporal Being' and therefore he was not alarmed by the vicissitudes of the future.²¹ This Being came to him on rare occasions when a miracle of analogy had made him escape from the present and only this Being had the power to make him rediscover days that were long past, the Time that was lost.

The recovery of these memories was accompanied by intense joy, the dissociation of self and the loss of Time. These happy impressions were experienced in the present, but in the context of the past; the past encroached on the present and Proust did not know if he was in the one or the other. It was a 'Being' within him who enjoyed these impressions, an extra-temporal Being who was not alarmed

*Madeleines are small cakes made with caster sugar, self-raising flour, eggs and butter and baked in fluted moulds.

by the vicissitudes of tomorrow. He made the point that the self accompanying the return of a memory is the self of that time and not the contemporary self, indeed we are composed of a succession of 'selves'. George Painter²² commented that in Proust two ways had met, the self we are born with and the self we acquire; these always join at last in death, and to find them we must travel in time.

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REFERENCES

All references made to Proust in the text are taken from *Remembrance of things past*. Scott Moncrieff CK, Kilmartin T (translators). London: Penguin Books; 1984.

- ¹ Proust M. In: *Remembrance of things past*. Scott Moncrieff CK, Kilmartin T (translators). London: Penguin Books; 1984:914.
- ² Godden DR, Baddeley AD. Context-dependant memory in two natural environments: on land and under water. *Br J Psychol* 1975; 66:325-1.
- ³ Bower GH. Mood and memory. *Am Psychol* 1982. 3b:129-48.
- ⁴ op. cit. ref. 1, p. 491.
- ⁵ Eccles J. *The self and the brain*. Popper KR, Eccles JC (eds). Routledge and Kegan Paul; 1977:400.
- ⁶ op. cit. ref. 1, p. 675.

- ⁷ op. cit. ref. 1, p. 570.
- ⁸ Alvarez P, Squire LR. Memory consolidation and the medial temporal lobe. A simple network model. *Proc Nat Acad Sci* 1994; 91:7041-5.
- ⁹ Gregory RL. *The Oxford companion to the mind*. USA: Oxford University Press. 1987; 527.
- ¹⁰ Dudai Y. Consolidation: fragility on the road to the engram. *Neuron* 1996; 17:367-70.
- ¹¹ Plato. In: *Thaetetus*. Williams B (ed). Levett MJ (translator). 190c-191e. Indianapolis/Cambridge: Hackett Publishing Co. 1992.
- ¹² Rose S. In: *The making of memory*. Bantam Press; 1992.
- ¹³ Young JZ. In: *The memory system of the brain*. London: Oxford University Press; 1966.
- ¹⁴ Painter GD. In: *Marcel Proust, a biography*. Pimlico Edition; 1996: 38.
- ¹⁵ op. cit. ref. 1, p. 48.
- ¹⁶ op. cit. ref. 1, p. 899.
- ¹⁷ op. cit. ref. 1, p. 783.
- ¹⁸ Beckham K, Michaels K. Personality, emotion and the temporo- limbic system; a neuropsychological approach. *Acta Neurol Belg* 1996; 96:35-42.
- ¹⁹ op. cit. ref. 9, p. 527.
- ²⁰ Smith AL, Tait TC. Cosmic consciousness experience. *J of Consciousness Studies* 1998; 5:97-107.
- ²¹ op. cit. ref. 1, p. 904.
- ²² op. cit. ref. 14, p. 364.