Koninklijke Nederlandse Akademie van Wetenschappen,
Verhandelingen Afdeling Letterkunde, Nieuwe Reeks, Deel 136

Guyau and the Idea of Time

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North-Holland Publishing Company, Amsterdam/Oxford/New York, 1988

ISBN 0-444-85700-1

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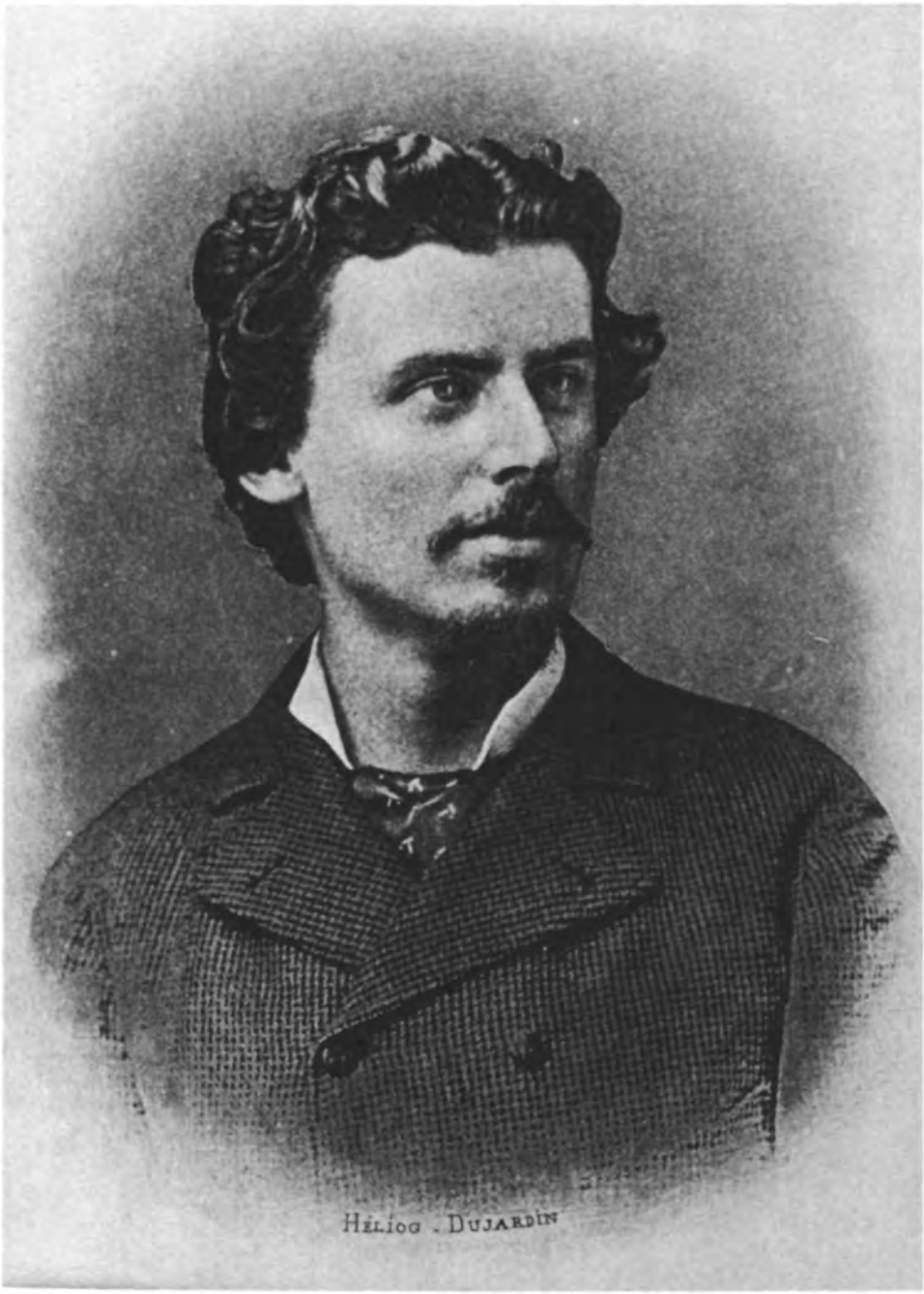
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Preface

Anyone who acquires an interest in the idea of time cannot fail to become familiar with the name *Jean-Marie Guyau*. But until now familiarity will hardly ever have gone beyond that name, at least outside France. My own introduction to Guyau's work was by way of Fraisse's classic book on the psychology of time. It appeared in 1957, just when my own interest in the psychology of time was beginning to take shape (Fraisse, 1957). The relative importance attributed to Guyau by Fraisse may be inferred from the author index of *Psychologie du temps* which contains 435 names. A citation count shows that Guyau ranks fifth – with 12 citations – immediately after Piaget (44), Fraisse (32), Piéron (30) and Wundt (16) but before well known authors like Pierre Janet (11), Eugène Minkowski (10), H.H. Woodrow (10) and, surprisingly perhaps, Bergson (9)!

I soon borrowed a copy of *La genèse de l'idée de temps* from the university library. It made a lasting impression (see e.g. Michon, 1965) and I agree with the opinion of Pierre Janet that 'the book is fundamental and it is one of these volumes one reads simply because it makes psychology interesting' (Janet, 1928; p. 47).

In 1982 I discovered a copy of *La genèse* in a bookstall in Paris. A few days later I decided that, with the centennial of Guyau's premature death only six years ahead, a new edition and a (first) translation into English might be appropriate. That same summer I prepared a first rough draft translation, which only strengthened my conviction: it seemed evident that Guyau had 'solved' the philosophical problem of time by reformulating it as a psychological problem. And what is more, his arguments were consistent with present views on infor-

mation processing and the structure of memory: Guyau's description of dynamic memory, for instance (*OIT* p. [59–84])[1] could easily pass for the introduction to, say, Schank's recent book on patterns of explanation (Schank, 1986) or as a chapter in Rubin's volume of autobiographical memory (Rubin, 1986).

By the end of 1985 it dawned upon me that quick action had to be taken if the idea of an annotated, centennial edition of *La genèse* was to materialize in time. To my delight I found Dr. Viviane Pouthas of CNRS in Paris, and Dr. Janet Jackson from my own department so enthusiastic about the enterprise that the likelihood of success suddenly changed from the merely possible to the extremely likely. While Dr. Pouthas began her heroic attempts to redress my totally anachronistic draft translation and to restore, assisted by Dr. Constance Greenbaum, some of the depth and some of the slightly ancient flavor of the original text, we succeeded in securing the cooperation of several prominent colleagues who shared our interest in the mental representation of time: Paul Ricoeur, famed philosopher and recently author of a most impressive three volume study on *Time and Narrative*; Frederick T. Melges, psychiatrist and author of numerous studies on time and psychopathology; and William Friedman, psychologist and recognized authority on the developmental aspects of time. Their careful reading – or in the case of Professor Ricoeur rereading – and interpretation of Guyau's little great book resulted in the chapters that the reader will find in the present volume. Paul Fraisse, whose influence on every aspect of contemporary time psychology cannot be overestimated, kindly agreed to contribute the foreword to this volume.

While we were rounding off the work for this volume we learned of the death of Fred Melges. The predicate *untimely* does certainly apply not only to Guyau's demise! We realize how fortunate we are to have Professor Melges contribution in the final form which he had completed only weeks before.

Thanks are due to the Royal Netherlands Academy of Sciences for the opportunity to publish this commemorative volume in their Verhandelingen. Part of the preparations of this book took place during an extremely stimulating year as visiting professor in the Psychology Department of Carnegie Mellon University in Pittsburgh, Pennsylvania. Also the contacts with the University of Pittsburgh's celebrated Center for the Philosophy of Science intensified my awareness – if not my competence – regarding some problems in theoretical psychology. In particular I appreciate Professor Adolf Grünbaum's patience when he listened to some of my immature thoughts; it is comfortable for me to realize that we share some views on Heidegger.

Among those who took a part in the preparation of this book I should mention first of all my co-editors, Viviane Pouthas and Janet Jackson to whom I am deeply indebted. Constance Greenbaum made an invaluable contribution to the authenticity and the stylistic consistency of the translation of Guyau's text. I thank Ans van Rijsbergen, Janine Poort and Albert Spijkers for their assistance

in typing, correcting and re-correcting the draft texts. Increasingly authors (and, as it turns out, editors) become directly dependent on the quality of their text processing facilities. In the past I have gone through a lot of frustrating experiences related to that important issue. I feel it is appropriate to mention that *Nota Bene*, an extremely sophisticated text processing and text base system, marketed by Dragonfly Software, Inc. in New York, has made the composing and editing of this book a delightful experience.

A number of colleagues directly or indirectly provided ideas and comments to the content of this book. Some may recognize their influence immediately, others will have to delve more deeply. I wish to mention Roman Taraban, Robert Siegler, and Mark St. John from Carnegie Mellon University, Adolf Grünbaum from the University of Pittsburgh, John J. Haldane from St. Andrews, Scotland, who helped to clarify specific issues.

John A. Michon
Haren, 8 August 1988

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NOTE

[1] Throughout this book *La genèse de l'idée de temps* will be referred to as *GIT*, and the translation, *The Origin of the Idea of Time* as *OIT*. Page numbers in square brackets follow the pagination of the first edition (1890) of *GIT*; these page numbers appear in the text of the present edition of *GIT* as well as in *OIT*. Thus (*OIT* p. [117]) refers to page 117 in the translation.

In *GIT* and *OIT* Guyau's original footnotes (marked a, b, etc. in the text) will appear as footnotes in the main text. Editors' notes are marked 1, 2, etc., in the text and appear at the end of *OIT*.

Foreword

Paul Fraisse

La genèse de l'idée de temps. The crucial term in this title is: *genèse* – origin. But why is it so important? Because philosophers and scientists, faced with changes within themselves and around themselves, have nearly always sought to understand these changes from the point of view of the educated adult.

The earliest thinkers, the great philosophers of antiquity, were interested in the *being of time*, time conceived as existing independent of human experience. Then, beginning with Saint Augustine (in Book XI of his celebrated *Confessiones*) and increasingly from the Renaissance onward, the main problem was the origin of our *idea of time*. The essential issue – even as late as the middle of the 19th century – was to achieve true knowledge about the soul and its faculties through the study of consciousness. This was the time when the idealists clashed with the empiricists, amongst whom the associationists held an important position.

In his remarkable little book *La genèse de l'idée de temps*, published only two years after his death, Guyau created a new perspective on the study of our *experience of time*. His was an approach that was to be adopted only later by those who favored the experimental study of human experience. What was new in this approach? Like so many of his contemporaries Guyau looked for the constituents of consciousness, but he understood how complex they are and how impossible it is to reach their source. He compared consciousness with a dark, seemingly forbidding forest. However, 'once we penetrate we distinguish long alleys under the trees, undergrowths and open spaces....soon one begins picking out landmarks that serve to orient oneself.' (*OIT* p. [42]). Dreams testify to this. The ways we analyze dreams resemble observations rather than introspections,

and this is where the term *genèse*, taken in the evolutionary sense, obtains its significance. When he studies experience, Guyau always compares man with animal, adult with child, in order to establish how our idea of time is acquired and how it evolves. In the process, Guyau also deals with other problems, such as conditioning, that would be studied *in extenso* only much later. Animals seem to live only in a present, even though they can hide food for the near future, or show that a painful past experience does leave its marks. His evolutionary stance also led Guyau to the insight that our behavior in time is closely linked to physical and biological cycles. Indeed, the importance of chronopsychology has since been established.

Let us now consider the fundamental question that Guyau addressed. By what genetic process do we achieve the idea of time, he asks. His answer is rooted in the age-old idea that our experience of time is based on the ability to discriminate successive changes. These changes are not all specified on one single experiential level: 'If there were no division, no change and no transition in activity or sensitivity, there would be no time' (*OIT* p. [24]).

Changes shape the *streambed* of time, but this is not a sufficient condition: changes as such do not yet make time flow. This is where Guyau's central idea comes in. The streambed of time is ready to receive the *course* of time, which manifests itself in the sequence of present, future, and past. The order of these three terms here is not arbitrary. The course of time emerges from our activities which are directed from the actual to the not yet. This can be observed in the infant reaching for a desired object. Duration is born *from* action and *in* action, and it first appears – to use Guyau's own words - in 'the conscious gap between a need and its satisfaction, the distance between the goblet and the lips' (*OIT* p. [34]). Guyau follows Maine de Biran in stressing the importance of *effort*, but he goes one step further. What counts in effort is the intention, the goal that one is striving for. The effort involved in reaching a goal is the source of an internal perspective that projects forward towards the future. The future, once it is reached, becomes the past in which our memories are localized, in much the same way fossils are deposited in an orderly way in geological strata. In order to mentally relive a past experience, we often must reconstruct the past by using spatial and temporal cues, and particular 'landmarks' – a voyage, an incident – all of which help us to remember.

The past engenders duration by its variety, but this constructed duration is not measured directly by its physical length but by the number of recollections. This is where Guyau's conception brilliantly anticipates the proposals of a number of later authors, particularly of Fraisse (1957) and Ornstein (1969). We *conceive* duration by somehow calculating the sum of our experiences, even though we know how to measure it with clocks and calendars.

Our temporal perspectives towards the future and towards the past have been

analyzed by Guyau with astounding acuity. But if we speak of perspective, we must also speak of a reference point, and that must obviously be the present. The present is not a point; it is not instantaneous. We do not perceive all that takes place in it as if it occurred simultaneously. In short, the present has a duration. Inspired by Taine and Ribot, Guyau develops the concept of an empirical present, which has later been referred to as the psychological present, the mental present, the specious present, and which I prefer to call the *perceived* present, to stress its *presentational* character and to distinguish it from the future and the past, both of which are *representations*. Guyau strongly argues for this present as the starting point for 'acting and undergoing.' For him the present is ultimately a stretch of duration, with a beginning and an end, which quickly turns into the immediate past.

Thus we are facing two fundamental experiences, engendered by our activities in a dynamic world: succession and duration. According to Guyau the genesis of the idea of time lies in the relations that experience establishes between these two phenomena. Nowadays we actually have more insight in the mechanisms that play a role in this origin, thanks to the experimental study of child development.

This idea of time is obviously quite different from the *a priori* intuition, or form of sensitivity, proposed by Kant. Guyau indeed emphasizes this difference. But unlike his stepfather, Alfred Fouillée, who wrote a lengthy introduction to the first edition of *La genèse de l'idée de temps* in which he explained where, in his opinion, Kant had gone wrong (Fouillée, 1890), Guyau himself prefers to smile: 'Kant endows us outright with an *a priori* notion of continuous and even infinite time, which he calls 'a given, infinite quantity'. But he is really too generous.' (*OIT* p. [115]). I like Guyau's understatement here, since Fouillée (and many others) have, in my opinion, misunderstood Kant. Kant speaks of *a priori* because time is obviously not an object offered to our external or internal senses. Time, and space as well, are given through the empirical representations of phenomena. That is why they are called *a priori synthetic judgments*: they are only formed on the basis of phenomena. The intuition of time is *ideal*, but becomes apparent only through the activity of the subject. Kant does not explicitly dwell on this point, and it was developed only much later by Havet (1946). This view was, however, anticipated in a striking way by Guyau. Like Kant Guyau postulates the ideal nature of our notion of time, but he stops short of idealism because, in his opinion, we acquire this idea of time only through the experiencing of our active involvement in a changing world. If it is Kant's merit to have shown that our idea of time is not an image of physical reality but a way of experiencing change, it is the merit of Guyau to have described the genesis of an idea that is not an *a priori* given. Where Kant gives preference to judgment, Guyau emphasizes the role of human action.

Guyau's book impressed Bergson, who devoted several pages to it, the year following its publication. Bergson (1891, p. 186) summarized Guyau's position as

follows: 'It is movement through space that creates time in human consciousness.' Although he used the term movement, he actually devoted a much more detailed discussion to space, reproaching Guyau for having spatialized time. Thus he adopted an opposite point of view from Guyau who, himself, had criticized Spencer (with some exaggeration) to have reduced space to time.

Bergson's critique is not without its consequences. He agrees with Kant that time is not an object of experience. Kant found the origin of time in an *a priori* intuition, while Bergson is looking for it in an intuition of pure duration that is the result of the natural and continuous penetration of our states of consciousness into the external world. This process would provide us with our sense of duration – Bergson's well-known term is *durée vécue* – whereas our awareness of time would only consist of more or less instantaneous flashes, moments that do not last unless we succeed in spatializing them, with a front and a rear.

The difficulty of criticizing the closely knit philosophy of Kant, together with the fact that Bergson rapidly became the leader of the philosophical and psychological thought of the day, did put Guyau's work in the shadow – unfinished as it was because of his untimely death. And the forty years of behaviorism that would follow made a reconsideration of his views even less probable. It was only in the second half of the present century, when the cognitive approach to time became '*à la page*', that the importance of Guyau's work could be appreciated.

While most of Guyau's philosophical work was translated in Russian, German, English and Spanish, and some of it in still other languages, *La genèse de l'idée de temps* – being a somewhat isolated exercise in psychological theory – has received relatively little attention. To make this remarkable essay newly available in the original French, together with a first translation in English and several annotative chapters is a fortuitous event, giving depth to the circumstance that this year we commemorate the centennial of Guyau's death in 1888.

For me part of the fascination of *La genèse de l'idée de temps* derives from the fact that it contains a complete theory despite its brevity. Succession and duration interact to give us our notion of time, an ideal notion both anchored in, and emerging from experience. The basis of this notion is our activity which pulls us forward, leaving a past to construct. Future and past both open up temporal perspectives, hinged on a present that is ever changing in a discontinuous fashion because it is composed like the unit of a rhythmical structure – a sentence, reaching for an object, filling a cup.

Psychology has been exploring all these dimensions of time, memory and experience for one hundred years, and with considerable success. As a result we are now able to appreciate that at the beginning of that period, Jean-Marie Guyau had already proposed the relevant framework in which all these insights can be integrated.

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Jean-Marie Guyau: Life and Ideas

John A. Michon
with
Viviane Pouthas and Janet L. Jackson

GUYAU'S LIFE[1]

Jean-Marie Guyau[2] was born in the late afternoon of 28 October, 1854, as a citizen of Laval, some 300 kilometers south-west of Paris. Laval, a medium-sized manufacturing town, is located on the Mayenne, the river that gives its name to the *Département* of which Laval is the prefecture. The city's history dates back to the early Middle Ages when it became the residence of Count Guy II, first *Seigneur* of Laval, who played a highly visible role in the France of his days.

At the time Jean-Marie was born the Guyaus had probably been residents of Laval for many generations. The name Guyau – referring to the early Seigneurs – suggests such a firm rooting. Jean Guyau, manufacturer in a family of manufacturers, was born in 1817. As was quite usual then, he married relatively late. His bride, Augustine Tuillerie, was a full thirteen years younger than her husband.[3] Jean and Augustine were married in 1853. A year later Jean-Marie, their only child, was born.

Augustine may have had no clear ideas about Hell when she married, but she was to find out very soon. Jean Guyau was an extremely violent man who maltreated his wife and even made a deliberate attempt to kill her. The quiet community of Laval was shocked, but Augustine found the courage to leave her husband.[4] With little Jean-Marie she set up home with her cousin Alfred Fouillée in 1857. Fouillée[5], while five years younger than Augustine, had been in love with her for some time, and he solemnly vowed that he would devote his life to restoring Augustine's happiness, a promise he kept in an admirable, moving way. Much later, a visitor will describe the marriage as 'a poem of intimate and

beautiful life, of joint efforts to achieve the good and the ideal'.[6] For the outside world Alfred and Augustine were married: French laws in these days did not permit divorce. Only thirty years later, in 1885, would they be united in holy matrimony.

Jean-Marie received his primary education from his mother. School was not obligatory in these days but, in fact, the boy could not possibly have found a better teacher. Augustine was an accomplished pedagogue, author, under the pseudonym G. Bruno, of one of the most successful educational texts of all times. Her *Le tour de la France par deux enfants* was first published in 1877 (Ozouf & Ozouf, 1984). Ten years later three million copies had been sold, and before the century was out, sales had hit the six million mark. When the book finally went out of print in 1976, almost nine million copies had found a destination. Even as a best selling author Augustine remained hidden behind her pseudonym. As late as 1910, when the secret had long been disclosed, Fouillée was occasionally still believed to be the author (Ozouf & Ozouf, 1984, p.300). In her private life Augustine was hiding too: in France the position of women who left their husbands – for whatever reason – was very difficult at the time. But Alfred and Augustine kept their secret until after their official marriage, and Augustine passed successfully for Mme Fouillée in the busy social life that Fouillée's academic career imposed on them.

When it is time for Jean-Marie's secondary education Fouillée takes over. Like the mother, he considers the task of teaching the brilliant boy a very serious matter. Fouillée adores his stepson 'this other self, this child of my thought that I cherished, perhaps more than if he had been my own.'[7] In Jean-Marie he recognizes his beloved Augustine 'with her great intelligence and even greater heart'.[8]

Reading Plato and Kant at a very tender age was not uncommon for children in 19th century France, and it was certainly the natural thing to do in the family of a professional philosopher. The exercise pays off. When Jean-Marie is 15 years of age, Fouillée, who is then writing his major works on Plato[9] and Socrates[10] seriously overworks himself, in the end being totally unable to read or write. Jean-Marie takes on the task of reading to his stepfather, taking notes, editing and even adding to the text (Fouillée, 1913, p. vii).

Altogether young Guyau displayed a remarkable precociousness in his scholarly achievements. Fouillée informs us that Jean-Marie showed a deep and genuine intellectual interest in poetry, especially in the work of Corneille and that of contemporary poets like Victor Hugo and Alfred de Musset. He studied Plato and Kant in considerable depth, and of his own initiative he became engrossed in the Stoic philosophers, Epictetus and Marcus Aurelius in particular. The Stoa made such an lasting impression on the boy's mind that for the rest of his days he would remain strongly oriented towards its way of life, trying to incorporate its fundamental views in his own philosophical system.

Fouillée had been a teacher of philosophy at the *lycée* in Douai, and then in Montpellier, after which he became a professor at the University of Bordeaux. Later, in 1872, the family moved to Paris. In 1876 Alfred was offered a position as professor of philosophy at the *École normale supérieure*, the university's prestigious teachers college. This appointment emphasizes Fouillée's caliber, for, never having been a student at the *École*[11], he lacked what was almost a *conditio sine qua non* for a professorship.

Jean-Marie enters the university at an extremely young age: he becomes *licencié ès lettres*[12] when he is only seventeen. His major achievement in this early period is his annotated translation of the *Encheiridion*, the Manual of Epictetus[13], the classic summary of Stoic thought.

In 1873 he takes part in an American competition with a brief essay on *Education and Morality*. He is not very pleased with it and suspecting that his stepfather would not be pleased either, Jean-Marie forgets to tell him (Bergmann, 1912, p. 4). He gets the award. One year later, in 1874, he wins an important prize from the *Académie des Sciences Morales et Politiques*[14] with a very substantial treatise on the utilitarian views of morality from Epicurus to the contemporary philosophers, altogether more than one thousand pages long. The work has a considerable impact and it is praised by many of the leading philosophers of the time. It establishes Guyau's fame as a thinker and a writer. Later it would expand into two substantial volumes which saw the light in 1878 and 1879 respectively.[15] In 1874 Guyau is called to teach philosophy at the well known *Lycée Condorcet* in Paris. Among his pupils there is Henri Bergson, four years Guyau's junior (Copleston, 1974, p. 174).

And so, barely twenty years of age, Jean-Marie Guyau seems on his way to a splendid career as a philosopher. But then, 'as if crushed by his excessive workload' (Fouillée, 1895, p. iii) he becomes ill, the first manifestation of the tuberculosis that will eventually take him to his early grave. So serious already were the consequences of this first attack that he decided to abandon his newly found position and to seek more clement atmospheric conditions near the coast. From then on he spends the winter periods at the seaside. In the fall of 1875 Guyau moves from Paris to Pau and later to Biarritz searching, and initially finding, relief for his symptoms. However, the vicissitudes of the weather in the land of Gascogne force him, the next year, to decide in favor of Nice on the mediterranean coast with its warmer and more reliable climate.

In 1879 when his failing health forces Fouillée to resign from his position at the *École normale supérieure* he and Augustine move to the Provence too, where they are joined by Jean-Marie, and – a little later – by the young Mme Guyau, the bride carefully chosen for Jean-Marie by the parents. The four of them settle permanently in the hills outside Menton in 1879. Here Guyau will live and work until his death in 1888.

Despite Guyau's fragile health, the mediterranean period is marked by consid-

erable activity. All his major works are published in these ten years and all meet with appreciable success; most of them will eventually go through at least a dozen editions. Most have been translated into German and Russian, some also into Spanish, English and Italian, and several in various other languages. But not only does he write high level philosophical treatises. Like his mother he has ideas about education which he puts to work in a number of texts for schools, although he cannot match his mother's talent for this task.[16] Actually the Fouillée residence has been compared to a pedagogical beehive: all four members of the household are involved in the composition of school texts, while Fouillée and Guyau, supplement these efforts with voluminous philosophical works to support their views on man, morals, society and education[17].

There is, altogether, a great deal of interaction between the faculty members of this tiny Open University. Particularly interesting for our present purposes is a pedagogical principle that lies at the root of Augustine's exceptional *Le tour de la France par deux enfants*. It appears to be based on an explicit view on the art of memory, specifically as an art of *spatial* rather than *temporal* memory. The long journey of the two children, victims of the French-German war of 1870 in search of their lost family, is meant to establish in the reader a symbolic representation of the newly established Third Republic.[18] It is a *spatial* representation, so faithful to topography that it seems as if the author did actually match the lengths of paragraphs to the distances traveled or at least to the effort invested in traveling. In contrast the historical and other temporal relations appear to be derived, incidental, and much less under textual control; they are 'like the ornaments in a Christmas tree; sparkling but disposable, with no other relation between them than the creation of an effect.' (Ozouf & Ozouf, 1984, p. 298).

In *La genèse de l'idée de temps* we find a theoretical justification of this very practical, and apparently effective educational strategy, leaving us with the question of what came first, the mother's strategy or the son's theory. Altogether the evidence seems to favor the strategy!

Not only is Jean-Marie successful in his work, he is also happily married. His wife, we mentioned this already, writes educational books too. She too uses a pseudonym: Pierre Ulric.[19] The Guyaus enjoy parenthood – their son Augustin is born in 1884.[20] But then, early in 1888, an earthquake shakes the mediterranean basin, causing considerable damage in nearby Italy. The French coast is less badly affected, but Guyau is forced to stay in a damp garden shed for several nights. There he catches a cold which quickly deteriorates and confines him to a sickbed from which he will not rise again. In the course of three months what physical strength remains gradually fails him, although he tries to hide this from his relatives. Towards the end there seems to be a slight remission; for a brief while Guyau feels better. Then his condition takes a rapid turn for the worst. He dies, on March 31, 1888, thirty-three years of age.

Alfred Fouillée, as his stepson's chronicler, has described Guyau's last hours

in some detail (Fouillée, 1889, pp. 193/4). Guyau did not retire from his work until the very last. On the evening before his death he even dictated a few pages. But the effort had exhausted him, and he knew and accepted that the end was near. To be spiritually and physically close to his mother, as he had been throughout his life, he asked her to hold his hand. And then, smiling at the three who were with him – his parents, his wife – he passed away, quietly and peacefully. His son Augustin, four years old at the time, was soundly asleep, unaware of the tragic events in the adjacent room. Augustin would remain unaware of his father's death for a long time: his mother and grandparents sustained the fiction that his father had only departed on a long journey (Ozouf & Ozouf 1984, p. 310).

Jean-Marie Guyau died on the eve of Good Friday, and was buried on the morning of Easter Sunday 1888. This coincidence seemed to Fouillée to underscore the philosophical tension which had been the inspiration for one of Guyau's major works, *L'irréligion de l'avenir*, in which he had expressed his conviction that eventually religion will free itself from dogma and no longer depend on unfounded beliefs in a transcendent power. Alfred Fouillée, shocked by the loss of his beloved stepchild, bestowed metaphysical significance upon the event when he wrote:

> The tragedy of the Passion is the ultimate human tragedy, the symbol for the tormented mind possessed by a transcendental idea to which humanity shall say, like Christ to His Father: Why hast Thou forsaken me?[21]

GUYAU'S IDEAS

Fouillée has captured the essence of Guyau's philosophy in one sentence:

> How to reconcile the Platonic and Christian ideas of the good, the Kantian categorical imperative, with the analyses of experimental psychology and the immutable laws of evolution.[22]

For Guyau the fundamental question of philosophy is how to derive a moral principle from natural, empirically observable processes, rather than from some rationalistic or idealistic and transcendental process. This brings him close to contemporary empirical psychology. Taking his point of departure in the theory of evolution and fashioning it in an essentially Stoic mould, the pivotal idea in Guyau's philosophy became that of life as the guiding principle of all human values – moral, artistic, and religious.

Vital force

Life as such embodies a natural, expansive force. It provides the driving force of human existence. Humans are not directly moved by conscious considerations, as rationalism would have it, but by a deep and initially hidden vital force.

Reflective thought, once it develops, can only gradually and by careful reflection dissolve the primordial confusion of everything we inherit genetically from our ancestors.[23] The vital force is morally indifferent, a blind force. However, the thinkers with whom Guyau became involved early in his life – notably Plato, the Stoics, and Kant – had installed the strong belief in the fundamental good will and the social nature of human consciousness that is so characteristic for his later work (Fouillée, 1889, p. 1). Consequently the vital force, despite its moral indifference, is characterized by an expansive benevolence towards others (*o.c.* p. 4), rather than being, as it was for Nietzsche, a blind will to power.

As a philosopher Guyau was first and foremost a moralist. Morality, for him, has as its function to re-establish the harmony between reflection and spontaneity. Our vital force is the measure of our obligations, the fundamental rule of conduct being: *We must because we can*!

Stoicism

We have seen that Guyau became interested in Stoicism at a very early point in his career as a philosopher. Throughout his life, he remained faithful to his own interpretation of Stoic thought, one that was, according to Fouillée (1889, p. 4), 'tempered with a smiling tènderness, and an expansive benevolence towards others rather than being of the original egoistic sort.'

Fouillée's characterization betrays a rather disapproving view of Stoic thought that was widespread at the time and that Fouillée apparently shared. More recently, however, it has become clear that at least Epictetus himself entertained views that were much more compatible with Guyau's perceptions. But Epictetus' ideas have come to us mostly through the *Encheiridion*, the Manual that Guyau translated when he was 17. Although the Manual offers a brilliant summary of the views of the founder of the Stoa, and although it has exercised a great influence on Western thinking, it is heavily biased: much of what makes the Stoic way of life *humane* has been neglected. Thus the *Encheiridion* distorts the image of Epictetus, leaving out his explicit emphasis on the humanly love towards others, poor and rich, ruler and slave, a humanistic, cosmopolitan expansiveness, and a warm, personal relation to the Godhead.[24]

Even though we realize that Guyau did instill some of this more complete, more humane version of Stoic philosophy in his own way of life, we should distinguish between his ontological and his epistemological position. One may certainly view Guyau as a methodological Stoic in the traditional sense. As such he deliberately adopted the attitude of 'a cold eye and an indifferent mind' as the only adequate method for his philosophical research. Guyau's poetry reflects this same attitude: although his poems have a remarkably personal accent, they deal with impersonal thoughts.[25] He attempted, in other words, to fathom the consequences of a completely value-free approach to the intellectual endeavor of

Western thought. In this sense Guyau did anticipate the methodological behaviorism that would become a standard for psychological research several decades later.

But this strict methodological position does not at all reflect his ontological perspective. There Guyau sided with Rousseau in giving priority to emotion over intelligence, involvement over indifference. In this respect he resembles Schopenhauer, although he resolutely rejected the latter's fashionable pessimism. Instead he was convinced that the driving, non-reflective vital force possesses a fecundity and generosity which will ultimately eliminate the need for any sort of enforcement.[26] For Guyau life is, in the best (*i.e.* non-idealistic) vitalistic tradition, an intrinsically positive, benevolent force that will ultimately lead to universal love. It acts likewise on art and religion: life attempts to expand and to coincide with universal life, and art supports these efforts.[27] Just as value and beauty do not perish in the absence of a transcendent principle of life, religious feelings will not perish in the absence of dogma, the latter ultimately being no more than an unjustified feeling of dependence.[28]

It does not surprise us that Guyau was an atheist. Fouillée (1889, p. 1) even claims that 'his first and only faith was the idealism of Plato and Kant.' But that seems too limited a characterization of his stepson's position. Guyau does more: he connects the atheistic and rationalistic thinking of the Enlightenment with elements of the new theory of evolution, and he does it in an original and unmistakably French way.

The impact of the theory of evolution

The philosophy of Guyau must be considered against the background of the theory of evolution which was just then making its first major impact on European science. Guyau was strongly influenced by Darwin, but even more so by Herbert Spencer, as a result of his analysis of the British utilitarians. Spencer had launched his own version of the theory of evolution in 1850 and had, since 1862, begun work on a series of monographs dealing with its ramifications for a number of disciplines, including biology, psychology, and sociology. Especially in the latter domain Spencer had a deep and lasting influence which was to become known as social Darwinism. Guyau was the first in France to fully recognize the impact that Spencer and his school would eventually have on the development of social science and, as a result, on the evolution of future society. Although in Germany Wilhelm Wundt adopted a similar perspective in his *Völkerpsychologie*, Guyau was recognized as one of the principal continental defenders of this point of view. On the basis of Spencer's ideas Guyau developed an evolutionistic ethics. Spencer who, at this time had not yet developed a coherent conception of ethics[29] was apparently quite pleased to accept the outcome of Guyau's analysis.

The significance of that analysis has remained. Walch (1939), for instance, has

recognized Guyau as the philosopher who introduced the theory of evolution into French thinking in an original way, and who extended both Darwin's and Spencer's ideas to moral, esthetic and religious issues. In his celebrated multivolume history of philosophy Copleston (1974, pp. 174–179) has reached a similar conclusion.

This then seems to have been Guyau's major personal contribution to philosophy. Without it French philosophy would not have participated in the discussion about evolution the way it would later through, for instance, the work of Bergson. What made it a unique contribution is that Guyau succeeded in connecting the Stoic way of thinking with evolutionary thought, all imbedded in a deep concern for human values which, for him, were first and foremost social values.

Optimism, pessimism and indifference

What is there at the root of morality, art, religion? In other words, what is the metaphysical attitude, the irreducible principle? Guyau emphatically argued that the concept of evolution is the only primitive force that could possibly provide the basis for a rigorously founded morality. But what if it would become clear that natural indifference is *not* the bedrock basis for a metaphysics of good and evil? What will become of ethics in this case? And what will become of art and religion? How can one then find one's way among the facts of science and the presumptions of metaphysics? (Fouillée, 1889, p. 15). Guyau, who had to cope with an intellectual climate dominated by Nietzsche and Schopenhauer, pointed out that both optimism and pessimism are likely to exaggerate their claims. In the end neither optimism, nor pessimism, nor indifference for that matter, can be *proven* to be a proper foundation for metaphysics. Although natural indifference, as it is seen to operate in evolution, is likely to gain more support from science than the other two principles, Guyau ultimately denied that this evidence might ever become decisive. Yet the most plausible, if flawed, candidate remains in the last analysis the indifference of nature with respect to good and bad, pleasure and pain. This is the conclusion Guyau reached in the *Esquisse d'une morale sans obligation ni sanction* (1885), his most important and original work.

Death

Guyau's interest in life and in the intensity of the vital force as the fundament of morality is tragic if seen in the light of the philosopher's delicate health. The vital strength that is required if ethics, art, and religion are all to be animated by what Bergson would soon call the *élan vital*, is tremendous and of course Guyau realized how much he lacked in this respect.

We understand why death has been one of Guyau's preoccupations. He went even so far as to judge the strength of a moral principle by the strength it gives us to face death. His own principle, the Stoic maxim *Do not resign!* does readily

pass this test. But Guyau went further by claiming that humans must transcend their own death. We possess a continuity towards the future (Fouillée, 1889, p. 187), and what one has been will never be lost.

It seems appropriate to describe Guyau's conception of immortality as *oceanic*. Fouillée has repeatedly pointed out how important the sea, as a source of strength and inspiration, was for Guyau and how fascinated he was by its unbounded energy:

> There is this inexhaustible source of unrestrained force; how acutely I felt the impotence of man to cope with the power of this entire ocean on the move.[30]

Human beings must face death, and with the progress of medical knowledge they will increasingly know in advance when their time will come. Our religions and other superstitions that deal with immortality and afterlife are no longer of any help to us. Human beings must guard their own fate and dare to face the unknown!

If death happens to come slowly, there is a comforting aspect that is inherent in the vital force, and in nature. The gradual loss of vitality leads to a natural evaporation of the will to live: 'Breathing already makes one suffer.'[31] The observation applies in fact to all kinds of physical activity: lack of exercise kills the appetite for such exercise.

But even death has its positive side. For the philosopher it has a particularly interesting aspect. It remains forever his last, unanswered, question.[32]

A positive morality

Indifference as the basic principle for morality implies that ultimately no external source of obligation or sanction should be required to govern human behavior. The expansive force of life, that is, the tendency of life to live or unfold at its most intense, is the basis for morality, art, and religion. The fecund and generous character of the vital force eliminates the need for enforcement.

In other words, life itself supplies the basis for a positive morality, free from prejudice and pressures from outside. The expansive nature of life, oriented towards others, is the source for morality that human beings find within themselves: the vital force that can impose structure on culture and its prominent values. This leads Guyau to his Copernican revolution, the inversion of Kant's categorical imperative. *We must because we can*, he claims, *hence there is no need for obligations or sanctions*. Violations of natural morality carry their own punishment: egocentrism is paid for with loneliness and emptiness. This is the message of the *Esquisse* (1885).

Several authors have pointed out that Guyau's position is essentially immoralistic; in this respect he resembles Nietzsche (Brehier, 1932). Nietzsche was indeed aware of Guyau's claims but evidently could not agree with him. In

Nietzsche's copy of the *Esquisse* we read among numerous other marginal remarks the following:

> This book contains a 'funny' error: in his effort to prove that the moral instincts have their root in life itself, Guyau has overlooked the fact that he has actually proved the opposite – namely that all fundamental instincts are 'immoral,' including the so-called *moral* ones. The greatest intensity is indeed necessarily related to life's greatest expansion but that is actually the opposite of everything altruistic – this *expansion* expresses itself as unrestrained 'will to power.'[33]

The most dramatic consequence of his position, formulated by Guyau in his last major work, *L'irréligion de l'avenir* (1887), is that religion requires no dogma because there is ultimately no need for a transcendent principle, a Godhead.

Part of his arguments to defend this radical position derived from Guyau's interest in the neo-platonic idea of process, and his own interpretation of this idea was consistent with modern thoughts about *possible worlds* (Fouillée, 1889, p. 3). All possibilities of which we dream, he argued, are already realized in an infinite series of worlds. We can therefore not conceive of any degree of being, moral good, or evil, that is not already a part of universal existence.

Ultimately we can do without religious dogma and rely on an ideal of universal love. This belief rests on the strong and – in our opinion not very well-supported – metaphysical assumption that life cannot in principle produce negative outcomes, harmful to itself. Here lies the interesting contrast with Nietzsche's *will to power*.

LA GENESE DE L'IDÉE DE TEMPS

In this section we shall outline a few of the basic aspects of Guyau's philosophical position with respect to time. Strongly empirical and psychological in outlook, his theory seems nevertheless to be philosophically based, directly and indirectly, on Leibniz in its relational aspect, on Locke in its genetic aspect and on Kant in its idealistic aspect.

La genèse de l'idée de temps, which appears in this volume for the first time in an English translation, was edited by Fouillée and published posthumously in 1890. It is based on two earlier articles which had appeared in *Revue philosophique* in 1880 (La mémoire et le phonographe) and 1885 (L'évolution de l'idée de temps dans la conscience).

As a psychological study on the human sense of time *La genèse de l'idée de temps* had its competitors. Some of them should be considered more impressive and influential than Guyau's text, especially the chapters on the stream of consciousness, on the perception of time, and on memory in William James' *Principles of Psychology* (1890), and Henri Bergson's dissertation *Sur les données immediates de la conscience* (1889). Although in his vitalistic outlook Guyau is very close to Bergson's views, he is psychologically much closer to William James' ideas.

As we have seen, Guyau put himself in direct opposition to Kant with respect to the categorical imperative. He did likewise in his analysis of time. Instead of conceiving of time as a determining factor of consciousness, Guyau claims that 'time is not a condition, but (instead) simply a product of consciousness.' (*OIT* p. [117]). Time is not an intuition in Kant's sense, but a set of relations which experience establishes between events. The chapter by Ricoeur (pp. 149–159) highlights the intricate connections between Guyau and Kant with respect to this issue.

We already stipulated the influence Spencer had on Guyau's position, but we also saw that Guyau did not accept Spencer's views without considerable criticism and revision. With respect to the development of the idea of time this was again the case. While Spencer claimed the primacy of time over space, by assuming that the experience of *sequence* or *succession* is the ultimate basis of experience, Guyau argued instead that the notion of time derives from, and depends on the initial reaching out in space that is required to interact with the world. Guyau also took issue with Maine de Biran, for whom the experience of transitions in sensation (or change, in other words), *is* in fact what we call time or duration. According to Guyau the experience of these properties of the world provide at best the streambed of time, its form of structure. Time, however, is what streams in consciousness, in this bedding.

We find in Guyau's position a clear case of a fundamental difficulty we still encounter in modern ideas about the mental representation of events in time. It is presently known in cognitive science as the *frame problem* (McCarthy & Hayes, 1969). For Leibniz time was simply the succession of events in nature. But, as Locke had pointed out, the succession of events, or even the succession of ideas does not necessarily lead to the idea of succession. And thus, how can one ever get from a static representation to a 'truly' dynamic one? This issue has colored the debate about the nature of time since Clarke first posited it in its modern form in his correspondence with Leibniz. It plays, for instance, an important role in the work of both William James (1890) and Bergson (1889), and also the later phenomenological perspective outlined by Husserl (1928).

Time, in Guyau's sense, is a strategy of coping with the world: our awareness of time is the byproduct of goal-directed activity. Without goals, without desires, there would be no time. Time is a notion that is achieved by experimenting with the world through the dynamics of needs and their satisfaction.

The measurement of time, therefore, is based on the number and the variability of events, their syntax, and their cognitive and emotional significance, rather than on their actual duration. With this Guyau seems quite far removed from the views of some of his contemporaries, in particular Bergson. Bergson's ideas, first brought to light in *Sur les données immédiates de la conscience* (1889), had a tremendous impact. The contents of this book resemble Guyau's work in several respects. Bergson was undoubtedly aware of his one time teacher's analysis of

the notion of time and he may have used some of its results. Some authors, on the other hand, suggest that Fouillée used certain of Bergson's views to complete Guyau's book (Copleston, 1974, p. 177). However, Guyau had already published the essential parts of *La genèse de l'idée de temps* in 1885, in his contribution to the *Revue philosophique*. Altogether it seems therefore more likely that the two authors developed their thoughts along more or less parallel but basically independent lines. As a further distinction Guyau's position may be characterized as psychological and empiristic, whereas Bergson gradually drifted towards a more and more metaphysical, idealistic, position. While we may consider Bergson's view as the doctrine of *time as consciousness*, that of Guyau is better qualified as the defense of *time as a product of consciousness*.

The review by Bergson in *Revue philosophique*, devoted to Guyau's position, clearly brings out the differences between the two thinkers (Bergson, 1891; see also pp. 165–168 in this volume). One of the surprising things about this review is that Fouillée has never mentioned it. Yet Bergson's opinion was fair and quite favorable, and Fouillée was usually very quick to pay public attention to any positive reference to Guyau.

A different, and perhaps somewhat unexpected angle on the impact of *La genèse de l'idée de temps* may be found in Pierre Janet's celebrated lectures on the evolution of memory and of the notion of time (Janet, 1928). Janet, psychologist more than philosopher, largely accepted Guyau's position, which he qualified as 'opening up a new era in the psychology of time' and he refers to *La genèse de l'idée de temps* as one of these extremely valuable and fundamental books that everyone reads simply because they make psychology interesting (*o.c.* p. 47). Janet specifically adopted Guyau's dynamic view of time and memory (*o.c.* p. 297). He extended Guyau's views on temporal perspective as the construction of a coherent personal history, but he also went a considerable distance towards a theory of time and narrativity as it would be developed in great detail only much later (*e.g.* Ricoeur, 1983/1985; Fawkner, 1983). Through Janet a different light again is thrown on the fundamental significance of Guyau's essay.[34]

GUYAU'S SIGNIFICANCE

In several respects Guyau was very much an exponent of his time: he had a strong, positivistic interest in science and society, and he considered himself a harbinger of the twentieth century. In his opinion, philosophers must first analyze in depth whatever science might have to say about a problem and then should attempt to interpret these findings in the context of evolutionism.

In particular he saw it as the aim of 19th century philosophy to uncover the social side of the human individual, the side that the egoism of an earlier, 18th-century materialism had hidden. The mechanistic metaphor of La Mettrie[35] is

in Guyau's opinion fundamentally inadequate as an account of human nature. Even something as local and individual as the nervous system cannot be studied in isolation. Mind and brain can be understood only if we take into account the external, social influences: 'solidarity dominates individuality.' (Fouillée, 1895, p. viii). It is equally difficult to describe the actual functioning of the brain mechanisms and to account for mental phenomena, such as happiness, sympathy, etc. They are equally complex and interpenetrating, and they require essentially a holistic approach. This is a rather radical form of philosophical contextualism which, as a reading of *La genèse de l'idée de temps* will show, has determined Guyau's psychological views as well.

In line with the trends of late 19th century science, Guyau expected that the 20th century, in turn, would witness discoveries in the world of value that would be as fundamental as those of Newton and Laplace in the world of facts. At last there would be a scientific psychology and – especially important in Guyau's eyes – a scientific sociology.

Guyau's speculative approach to psychology was buried under the weight of experimental psychology as it originated in Germany around 1880.[36] Yet his outlook on scientific psychology was very much in accord with this development. As we saw before, his position was essentially that philosophers (or at least theorists) should review and analyze the results of empirical science and then interpret these results in terms of evolutionary theory. In this Guyau remains faithful to Spencer's ideas.

The Origin of the Idea of Time is in fact his only work that we may qualify as psychological in the modern sense. It is one of his last projects, and perhaps Guyau would have moved towards an even more outspoken psychological position had he lived longer.

Even during his lifetime Guyau's importance as an innovative thinker was not undisputed. As a matter of fact he was not even entirely convinced of it himself. Struck by the vastness and overwhelming energy of the ocean, important source of inspiration to both the philosopher and the poet Guyau, he contemplates his smallness and weakness: 'What role does thought play in this All?' [37] This emphasis is understandable if we realize, once more, how heavily Guyau's interest in life and in the intensity of the vital force as the fundament of morality was determined by his delicate health. And so, perhaps, the predicament in which he found himself added to his modesty: the philosopher, he said, echoing Socrates, should be the first to realize how little he knows and understands.

Guyau did nothing to hide his doubts and his inability to encompass this vast enigma. Indeed, if one is to qualify his philosophical work, one of its outstanding characteristic is its sincerity. Guyau carries his investigations to their consequence without stepping out of the way for conceptual or ideological difficulties. Since sincerity is also the hallmark of sublime art, Guyau may, if we are to agree with Fouillée, be remembered as 'one of these rare authors who, in their best moments,

as if liberated from themselves, touch naturally and delicately upon the feeling of the sublime.'[38] Perhaps one would expect that this characterization of his admired stepson is another of Fouillée's over-emphatic statements. But even Guyau's most explicit and severe critic, Archambault (1911), who qualified Guyau as a mediocre and not very original thinker, recognized him for the open-minded and brilliant writer he was.

> Guyau's work remains to be done all over – but let us hope that whoever will undertake this task shall have the same spiritual flexibility, the same vivid imagination, the same cordiality, the same ability to bring his ideas to life, to dress them in sublime form, to prolong their echo and finally, to give them, by virtue of an often brilliant expression, their utmost force and effect. For even if Guyau, mediocre inventor, ultimately had only a few ideas, he knew how to give them exceptional relief and liveliness.[39]

Archambault, we think, was unreasonable. In a period of fifteen years, out of a total of not quite thirty-four, Guyau did actually produce a wealth of ideas and, had he had an opportunity to consolidate his views, his achievement might have reached towering proportions. A letter written by his wife to a friend in Berlin puts it simply: 'His life was so short that he had no chance to express more than one quarter of his ideas.'[40]

At least some of the doubts about the originality of Guyau's philosophical ideas expressed by Archambault and others, may derive from precisely that lucid and parsimonious style of writing which helps to make complicated issues look simpler then they really are. This was correctly pointed out by Dauriac (1891) who warns us how easy it is to be moved by Guyau's writing at the risk of being seduced by his

> ...incomparable talent for thinking and wording, his almost magic power to persuade rather than convince and to win over the mind after having assured himself of the sympathy of the soul.[41]

Reading *La genèse de l'idée de temps* will not fail to confirm these impressions. We trust that the elegance, warmth, and – indeed – sincerity of the original text are strong enough to survive our translation.

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NOTES

[1] Most details about Jean-Marie Guyau's life have come to us through Fouillée (1889, 1895/1913). Substantial information was obtained from Bergmann (1912), Pfeil (1928), and Ozouf & Ozouf (1984). Additional facts were derived from a variety of additional sources but used only when they were consistent with the major references.

[2] There is some confusion about Guyau's given names. The birth certificate from Laval shows *Jean Marie*, but later sources usually give the hyphenated form Jean-Marie. Guyau's own signature has the initials. *J.-M.* Later, in books and journal articles, one will frequently find *M.* Guyau which, however, conventionally stands for *Monsieur* Guyau. Any reference to Marie-Jean (as, for example, in the catalog of the New York Public Library, or the Encyclopaedia of Philosophy) is incorrect. We shall follow Guyau and use the hyphenated form Jean-Marie throughout.

[3] Augustine Tuillerie was born in Laval on July 31, 1833. She died in Lyon in 1920.

[4] The conventional account was as follows. Guyau's father died at an early age. Then his mother decided to remarry with her cousin Alfred (see e.g. Pfeil, 1928, p.3).

[5] Alfred Fouillée, one of the most prominent philosophers of his time and eventually a member of the Institut de France, was born in La Pouèze on October 18, 1838. He died in Lyon on July 16, 1912.

[6] G. Calderòn (1907) in a work entitled *Profesores de idealismo*. Quoted by Ozouf & Ozouf (1984, p. 307).

[7] 'Cet autre moi même, cet enfant de ma pensée que je chérissais plus, peut-être, que s'il eût été mon propre fils.' (Fouillée, 1889, p. 193).

[8] 'Une grande intelligence, une coeur plus grande encore.' (Fouillée, 1889, p. 194).

[9] This was Fouillée's *La philosophie de Platon*. Paris: Librairie Hachette, 1869 (2 vols.). It received an award from the *Académie française* in 1871.

[10] A. Fouillée, *La philosophie de Socrate*. Paris: Félix Alcan, 1870.

[11] The reason was the untimely death of Fouillée's father. It left the family with insufficient financial means to pay Alfred's fee for the École.

[12] In those days the licencié ès lettres was equivalent to the present Master of Arts degree.

[13] The *Encheiridion* (Manual) is a synopsis of the views of Epictetus (who lived roughly from 50–130 A.D.) compiled by his pupil Flavius Arrianus.

[14] With the *Académie française* one of the altogether five divisions of the *Institut de France*.

[15] *La morale d'Épicure* and *La morale Anglaise contemporaine*. The reception of these two books can be judged from two reviews by G. Boirac (1878, 1879) in *Revue philosophique*.

[16] Among Guyau's more successful efforts were two readers, *Première année de lecture courante* (1875) and *Année préparatoire de lecture* (1884). Mme Fouillée adapted some of the materials of the first book for her *Le Tour de la France*. She understood better than Guyau the value of presenting educational materials in the context of a continuing story.

[17] For more details see Ozouf & Ozouf (1984).

[18] The Second Empire (1852–1870) collapsed when France lost the battle of Sedan during the French-German war of 1870. The Third Republic was established in 1870 and anchored in the constitution of 1875. It came to an end in 1940.

[19] See A. Guyau (1913, p. 15). Among the books by Pierre Ulric are *Aux domaines incertains* (1906) and *Parmi les jeunes* (1911).

[20] Augustin Guyau was admitted to the *École supérieure d'électricité* in Paris in 1907. He earned the degree of *Ingénieur* and later obtained a doctorate under Paul Janet. He was killed during the first world war (1917).

[21] 'Le drame de la passion est le drame humain par excellence, l'emblème des tourments de la pensée, éprise d'un idéal auquel l'humanité peut dire, comme le Christ à son père, 'Pourquoi m'avez-vous abandonné?'. (Fouillée, 1889, p. 194).

[22] 'Comment concilier l'idée platonicienne et chrétienne du bien, l'idée kantienne de l'imperatif catégorique, avec les analyses de la psychologie expérimentale et avec les lois inflexibles de l'évolution.' (Fouillée, 1889, p. 5).

[23] See Guyau's *Esquisse d'une morale sans obligation ni sanction* (1885, p. 245). This aspect is one of the pivots on which Guyau's theory of the origin of the idea of time is turning. In this theory the young child is a 'victim' of a primordial state of confusion in which it has to bring order by gradually constructing space and time. It is what distinguishes his position from the transcendentalism of Kant.

[24] See the entry 'Encheiridion' in *Kindlers Literatur Lexikon*, Vol. 8. München: Deutscher Taschenbuch Verlag, 1974, pp. 3091/92.

[25] Guyau published only one volume of poetry, the *Vers d'un philosophe* (1881).

[26] *Esquisse*, 1885, p. 193.

[27] *L'art au point de vue sociologique* (1889).

[28] *L'irréligion de l'avenir* (1887).

[29] See Guyau's (1879) article in the *Revue philosophique*. Spencer's own *Ethics* would appear only later, in 1879.

[30] 'Il y a là un réservoir de forces infini, inépuisable; comme je sentais bien l'impuissance de l'homme à arrêter l'effort de tout cet océan en marche!' (*Esquisse*, p. 105).

[31] 'Respirer seulement devient douloureux.' (Quoted by Fouillée, 1889, p. 188).

[32] 'Notre dernière douleur reste aussi notre dernière curiosité.' (*Irréligion*, p. 479).

[33] 'Dies Buch hat einen 'komischen' Fehler: in dem Bemühen, zu beweisen, dass die moralischen Instinkte ihren Sitz im Leben selbst haben, hat Guyau übersehen, dass er das Gegenteil bewiesen hat - nämlich, dass all Grundinstinkte des Lebens 'unmoralisch' sind, eingerechnet die sogenannten moralischen. Die höchste Intensität steht in der Tat in notwendigen Zusamenhang zu *sa plus large expansion:* nur ist diese der Gegensatz aller 'altruistischen' Tatsachen - diese Expansion drückt sich als unbändiger Wille zur Macht aus.' (*Kindlers Literatur Lexicon*, 1974, p. 3250).

[34] An interesting monograph by Kern (1983) deals with the culture of time and space in the period between 1880 and 1918. The author explicitly recognizes the importance of Guyau's views on the cultural developments of this era.

[35] J.O. de la Mettrie, *L'homme machine*. First published anonymously in Leyden, The Netherlands, in 1748.

[36] In 1879 Wilhelm Wundt established the first laboratory for experimental psychology at the University of Leipzig. This is conventionally considered the birth of scientific psychology.

[37] 'Que'est-ce que la pensée dans le grand Tout?' (Quoted by Fouillée, 1889, p. 12).

[38] 'Il aura le rare honneur de compter parmi les écrivains qui, en leurs meilleurs moments, comme soulevés au-dessus d'eux-mêmes, excitent naturellement et sans effort le sentiment du sublime.' (Fouillée, 1895, p. ix).

[39] 'L'oeuvre de Guyau reste donc à refaire - souhaitons à celui qui l'entreprendra à nouveau d'y apporter même souplesse d'esprit, même vivacité d'imagination, même chaleur de coeur, même habileté surtout à animer ses idées, à les parer de grandes images, à prolonger leur echo, à leur donner enfin, par la vertu d'une expression souvent magnifique, le maximum de force et d'éclat. Car si Guyau, médiocre inventeur, n'eut en somme que peu d'idées, il sut du moins leur donner un relief et une vie extraordinaires.' (Archambault, 1911, p. 62).

[40] 'Sa vie fut si courte qu'il n'a pu exprimer le quart de ses pensées.' In a letter to Elisabeth Schwarz in Berlin (Quoted by Pfeil, 1928); Elisabeth Schwartz translated the *Esquisse d'une morale sans obligation ni sanction* into German (1910).

[41] 'Cet incomparable talent de penser et d'écrire, cet art presque magique de persuader avant que de convaincre et de gagner à soi les intelligences après s'être tout d'abord assuré de la sympathie des âmes.' (Dauriac, 1891). Similar views can be found in more recent evaluations of Guyau's work. Thus, for instance about the *Esquisse*: 'Er legt mit diesem Werk ein glühendes Glaubsbekenntnis ab, dessen sprachliche Schönheiten die mangelnden Fundierung der Gedankengänge weithin vergessen lassen.' (Kindler, 1974; p. 3250).

La Genèse de l'Idée de Temps
par
Jean-Marie Guyau

[i]

Préface de l'Auteur

Une des conséquences les mieux établies par la psychologie moderne, c'est que tout est présent en nous, y compris le passé même. Quand je me souviens d'avoir, dans mon enfance, joué au cerceau, l'image que j'évoque est présente, tout aussi présente que celle de ce papier sur lequel j'exprime en ce moment des idées abstraites. Penser à jouer au cerceau, c'est même préluder déjà intérieurement aux actions que suppose ce jeu. De même, penser à une personne absente, c'est l'appeler tout bas par son nom et **[ii]** commencer presque avec elle un dialogue. Une chose n'est réellement passée que quand nous en perdons toute conscience; pour revenir à la conscience, elle doit redevenir présente. Mais si, en somme, tout est présent dans la conscience, si l'image du passé est une sorte d'illusion, si le futur, à son tour, est une simple projection de notre activité présente, comment arrivons-nous à former et à organiser l'idée du temps, avec la distinction de ses parties, et quelle est l'évolution de cette idée dans la conscience humaine? – L'idée du temps, selon nous, se ramène à un effet de perspective. Nous montrerons, en premier lieu, que cette perspective n'a pas toujours existé et n'est pas nécessaire *a priori* pour l'exercice de la pensée dans sa période de confusion et d'indistinction originaire. Puis, nous essayerons d'expliquer comment s'est formée cette perspective et de suivre le travail de la nature à ses divers degrés: ainsi on suit sur **[iii]** un tableau le travail du peintre; on voit comment, sur une toile plane, il a pu rendre sensible la profonde obscurité d'un bois, ou, au contraire, faire pénétrer et s'épanouir joyeusement dans une pièce un rayon de lumière. La perspective en peinture est une affaire d'art ou d'artifice; la mémoire aussi est un art: nous montrerons, dans la conception du temps, le plan naturel et inévitable

que cet art suit toujours. Pour cela, nous essaierons de faire successivement la part: 1. de l'imagination passive et purement reproductrice, qui fournit le cadre immobile du temps, sa *forme*; 2. de l'activité motrice et de la volonté, qui, selon nous, fournit le *fond* vivant et mouvant de la notion du temps. Les deux éléments réunis constituent l'*expérience* du temps.

[5]

CHAPITRE PREMIER

Période de Confusion Primitive

Que l'idée de temps, telle qu'elle existe aujourd'hui dans l'esprit adulte, soit le résultat d'une longue évolution, c'est ce qu'il est difficile de nier. A l'origine, le sens exact du passé est bien loin d'exister chez l'animal et chez l'enfant comme il existe chez l'homme. Il comprend une période de formation. Nos langues indo-européennes ont la distinction du passé, du présent et du futur nettement fixée dans les verbes; l'idée de temps se trouve ainsi imposée à nous par la langue même, nous ne pouvons pas parler sans évoquer et classer dans le temps une foule d'images. Des distinctions même assez subtiles entre tels **[6]** ou tels aspects sous lesquels se présente à nous la durée, comme le futur et le futur passé, le parfait, l'imparfait et le plus-que-parfait, pénètrent peu à peu dans l'esprit des enfants; encore n'est-ce-pas sans difficulté qu'on les leur fait comprendre. Enfin on leur donne mille manières de distinguer les divers moments du temps: cours du soleil, horloges sonnantes, minutes, heures, jours. Toutes ces images sensibles entrent peu à peu dans la tête de l'enfant et l'aident à organiser la masse confuse de ses souvenirs. Mais l'animal, l'enfant qui ne sait pas parler éprouvent sans doute des difficultés bien grandes pour se représenter le temps. Pour eux il est probable que tout est presque sur le même plan. Toutes les langues primitives expriment par des verbes l'idée d'*action*, mais toutes ne distinguent pas bien les divers temps. Le verbe, en sa forme primitive, peut servir également à designer le passé, le présent ou le futur. La philologie indique donc une évolution de l'idée de temps.

Il en est de même de la psychologie comparée. L'animal, l'enfant même ont-ils vraiment un passé, c'est-à-dire un ensemble de souvenirs mis en ordre,

organisés de façon à produire la perspective des jours **[7]** écoulés? Il ne le semble pas. On dit souvent qu'un enfant, qu'un homme a de la mémoire lorsqu'un ensemble d'images est très vivant chez lui. Sous ce rapport, un animal peut avoir une mémoire aussi bonne et parfois même meilleure que l'homme. C'est une affaire de mécanique: tout dépend de la force de l'impression reçue, comparée avec la force des autres impressions qui l'ont suivie. Mais, au point de vue psychologique, le trait distinctif de la mémoire humaine, c'est le sentiment exact de la *durée*, c'est l'*ordre* des souvenirs, c'est la *précision* donnée par cela même à chacun d'eux; toutes choses que nous devons en grande partie au soleil, aux astres, à l'aiguille qui tourne sur le cadran de nos horloges, au retour rythmé des mêmes fonctions physiologiques dans l'horloge de notre organisme. L'animal et l'enfant, faute de moyens de mesure, vivent 'au jour le jour'. Un éléphant se jette sur un homme qui l'a frappé il y a plusieurs années; s'ensuit-il que l'éléphant ait pour cela l'idée claire de la durée et une mémoire organisée comme la nôtre? Non, il y a surtout association mécanique d'images actuelles. A l'image de cet homme s'est jointe l'image encore vivace et présente de coups reçus, et les deux images **[8]** se meuvent ensemble comme deux roues d'un engrenage; on peut dire que l'animal se représente presque l'homme comme le frappant actuellement; sa colère n'en est que plus forte. Il n'y a pas prescription pour l'animal, parce qu'il n'y a pas chez lui un sens net de la durée.

De même, toutes les sensations que l'enfant a eues continuent de retentir en lui, coexistent avec les sensations présentes, luttent contre elles; c'est un tumulte inexprimable, où le temps n'est pas encore introduit. Le temps ne sera constitué que quand les objets se seront disposés sur une ligne, de telle sorte qu'il n'aura qu'une dimension, la longueur. Mais primitivement il n'en est pas ainsi: cette longue ligne qui part de notre passé pour se perdre dans le lointain de l'avenir n'est pas encore tirée. L'enfant n'ayant pas développé l'art du souvenir, tout lui est présent. Il ne distingue nettement ni les temps, ni les lieux, ni les personnes. L'imagination des enfants a pour point de départ la *confusion* des images produite par leur *attraction* réciproque; ils mêlent ce qui a été, ce qui est ou sera; ils ne vivent pas comme nous dans le *réel*, dans la *déterminé*, ne circonscrivent aucune sensation, aucune image; en d'autres **[9]** termes, ne distinguant et ne *percevant* rien très nettement, ils *rêvent* à propos de tout. L'enfant retient et reproduit des images beaucoup plus qu'il n'invente et ne pense; et c'est précisément à cause de cela qu'il n'a pas l'idée nette du temps: l'imagination reproductive, étant seule, ne se distingue pas, ne s'oppose pas à l'imagination constructive, qui n'est pourtant elle-même que son développement supérieur. L'enfant ou l'animal n'ont donc pas un passé nettement opposé au présent, opposé à l'avenir qu'on imagine, qu'on construit à sa guise. L'enfant confond sans cesse ce qu'il a fait réellement, ce qu'il aurait voulu faire, ce qu'il a vu faire devant lui, ce qu'il a dit avoir fait, ce qu'on lui a dit qu'il avait fait.[a] Le passé n'est pour lui que l'image dominante

[9]a. Voir sur ce sujet *Éducation et hérédité.*

dans le fouillis de toutes les images enchevêtrées; il n'a en lui qu'une masse indistincte, sans groupement, sans classification: ainsi apparaissent les objets pendant le crépuscule ou la première aube, avant que les rayons du soleil n'y aient apporté à la fois l'ordre et la lumière, distribué tout sur divers plans. Nous verrons plus loin les degrés successifs de ce travail distributeur.

[10] Les observateurs reconnaissent que ce qui se développe avant tout chez les animaux, c'est la perception de l'espace. Le degré de cette perception est en rapport avec les mouvements que l'animal doit exécuter pour satisfaire ses appétits, et il est probable que ce sont ces mouvements mêmes, accomplis en tous les sens, qui fournissent la représentation de l'espace. Au contraire, les observateurs confirment le fait que les animaux, mêmes les plus voisins de l'homme, ont une perception très confuse des relations de temps et de tout ce qui s'y rapporte. Les animaux n'ont en effet besoin que des sens et de l'imagination spontanée pour se diriger dans l'espace, aller et venir, boire, manger, etc. La mémoire des animaux est toute spatiale: ce sont des images visuelles, tactiles, olfactives, etc., qui se réveillent et s'associent automatiquement; il y a bien classification des objets dans l'espace, mais rien n'indique une vraie classification dans le temps, puisque l'animal agit avec le passé comme présent. L'instinct même, qui semble tourné vers l'avenir, est un ensemble d'appétitions devenues automatiques, où le temps agit sous forme d'espace sans que l'animal dégage bien le futur du présent. En un mot l'animal est tout aux images. L'adaptation **[11]** à un avenir conçu comme tel, et en vertu de cette conception même, est un caractère de l'homme.

Si, même chez l'homme et surtout chez l'enfant, l'idée du temps demeure très obscure comparativement à celle de l'espace, c'est là une conséquence naturelle de l'ordre d'évolution qui a développé le sens de l'espace avant celui du temps. Nous imaginons facilement l'espace; nous en avons une vraie vision intérieure, une intuition. Essayez de vous représenter le temps, comme tel; vous n'y parviendrez qu'en vous représentant des espaces. Vous serez obligé *d'aligner* les phénomènes successifs; de mettre l'un sur un point de la ligne, l'autre sur un second point. En un mot, vous évoquerez une file d'images spatiales pour vous représenter le temps.

Il est donc contraire aux vraies lois de l'évolution de vouloir, comme Spencer, construire l'espace avec le temps, quand c'est au contraire avec l'espace que nous arrivons à nous représenter le temps. La représentation des événements dans leur ordre *temporel*, nous venons de le voir, est une acquisition plus tardive que la représentation des objets dans leur ordre *spatial*. La raison en est: 1. que l'ordre spatial est lié **[12]** aux *perceptions* mêmes, aux *présentations*, tandis que l'ordre temporel est lié à l'imagination reproductive, à la *représentation*. 2. Non seulement le temps est lié à des *représentations*, – phénomènes ultérieurs, – mais encore il ne peut être perçu que si les représentations sont reconnues comme représentations, non comme sensations immédiates. Il faut donc l'*aperception* de la *représentation* d'une *présentation*. Au contraire, l'étendue et ses parties plus

ou moins distinctes, mais certainement étalées devant les yeux, se laisse percevoir en un seul moment par un grand nombre de sensations actuelles ayant des différences spécifiques (signes locaux). Pour percevoir l'étendue, l'enfant et l'animal n'ont qu'à ouvrir les yeux: c'est un spectacle actuel et intense, tandis que pour le temps, c'est un 'songe effacé'.

Les enfants atteignent même des idées très élevées sur la position des objets dans l'espace, sur les relations de *près* et *loin*, de *dedans* et de *dehors*, etc., bien avant d'avoir des idées définies sur la *succession* et la *durée* des événements. James Sully parle d'un enfant de trois ans et demi qui avait une connaissance très précise des situations relatives de diverses localités visitées dans ses promenades, mais **[13]** qui brouillait tous les temps, n'avait aucune représentation définie répondant aux termes '*cette semaine*' ou '*la semaine dernière*', et pour qui même *hier* était un passé absolutement indéterminé, indiscernable de toute autre époque. James Sully, qui fait cette observation, s'imagine pourtant encore, avec presque toute l'école associationniste et évolutionniste de l'Angleterre, que nous acquérons l'idée d'espace par le moyen de l'idée du temps. Nous croyons, pour notre part, avec plusieurs psychologues allemands, tels que Hering et Stumpf, avec MM. William James et Ward, avec M. Alfred Fouillée, que c'est là une illusion de l'analyse psychologique, qui confond ses procédés de décomposition d'idée avec les procédés spontanés et synthétiques de l'enfant ou de l'animal.[a]

Spencer suppose que les aveugles-nés n'ont conscience de l'espace 'que sous la forme de termes successivement présentés qui accompagnent le mouvement.' A part 'quelques menues perceptions de coexistentes', dues à des impressions simultanées, c'est 'dans le nombre, **[14]** l'ordre et le temps' que l'aveugle pense se mouvoir, et non, comme nous dans l'étendue.[a] Riehl admet aussi que l'espace est un caractère appartenant exclusivement aux sensations visuelles. Cette doctrine nous paraît tout à fait imaginaire, et nous ne croyons pas à cette antériorité de l'ordre du temps sur celui de l'espace. D'abord, comment se représenter l'*ordre*, sinon d'une manière *figurative* qui est toujours plus ou moins *spatiale*? L'aveuglené se représente la sensation de sa main prenant le morceau de pain et en ayant le contact, puis le contact du morceau de pain avec sa bouche, puis le contact de la bouchée traversant l'oesophage. Ce sont là des représentations d'*espace* tactile, et non pas seulement de temps tactile, car il y a là des contacts localisés en divers points de l'organisme. L'aveugle connaît aussi bien que nous la place de sa main droite, celle de sa main gauche, celle de sa bouche, celle de son gosier, etc. Il n'a pas besoin de les voir; il fait mieux que voir, il sent et touche. Nous pensons

[13]a. Sur ce point, M. Morselli, dans ses études psychologiques sur la perception du temps et de l'espace (Rivista di Filosofia scientifica, 1886) nous donne raison, et se range aux conclusions de notre étude sur le temps, publiée d'abord dans la *Revue philosophique*.

[14]a. Psych. II, p. 209.

donc, avec les psychologues cités plus haut, que *toutes* nos sensations, internes et externes, ont une forme d'*extension* plus ou moins **[15]** vague, que plonger sa main dans l'eau froide, par exemple, donne une sensation de froid moins *étendue* que le bain du bras entier. Il n'y a pas besoin de voir, ni même de toucher son corps pour sentir qu'on est tout entier dans l'eau ou qu'on y a seulement le petit doigt. 'L'espace, comme dit M. Fouillée, est le mode naturel de représentation des sensations simultanées venues des divers points de l'organisme.' Nous ne pensons donc pas qu'il y ait besoin de mesurer des temps et des distances entre nos divers organes pour penser les choses dans l'espace. Spencer fait appel à l'idée la plus obscure, l'idée du temps, pour éclaircir celle qui l'est le moins et qui est le plus directement intuitive ou imaginative, l'idée d'espace.

[17]

CHAPITRE II

Forme Passive du Temps; Sa Genèse Part des Notions de Différence de Ressemblance, de Pluralité, de Degré et d'Ordre

Le premier moment de l'évolution mentale, avons-nous dit, c'est une multiplicité confuse de sensations et de sentiments, multiplicité que nous pouvons d'ailleurs, aujourd'hui encore, retrouver en nous-mêmes par la réflexion. En effet, il n'y a pas d'état de conscience vraiment simple et bien délimité; la multiplicité est au fond de la conscience, surtout de la conscience spontanée. Une sensation est un mélange de mille éléments. Quand je dis: j'ai froid, j'exprime par un mot une multitude d'impressions qui me viennent de toute la surface du corps. De même que **[18]** chaque sensation particulière est multiple, un état général de conscience, à un moment donné, est composé d'une très grande multiplicité de sensations. En ce moment j'ai mal aux dents, j'ai froid aux pieds, j'ai faim, voilà des sensations douloureuses; en même temps le soleil me rit aux yeux, je respire l'air frais du matin et je pense à déjeuner tout à l'heure, voilà des sensations ou images agréables. Tout cela est entremêlé de la recherche d'idées philosophiques, d'un sentiment vague de tension d'esprit, etc. Plus on y songe, plus on est effrayé de la complexité de ce qu'on appelle *un* état de conscience et du nombre indéterminable de sensations simultanées qu'il suppose. Il faut tout un travail pour introduire dans cet amas l'ordre du temps, comme la Psyché patiente de la fable mettait en ordre tous les éléments minuscules qu'on lui avait imposé de ranger.

Le premier moment de ce travail d'analyse, c'est ce que les Anglais appellent la *discrimination*, la perception des *différences*. Supprimez cette perception des différences, et vous supprimerez le temps. Il y a une chose remarquable dans les rêves, c'est la métamorphose perpétuelle des images, qui, quand elle est **[19]**

continue et sans contrastes tranchés, abolit le sentiment de la durée. L'autre jour, je rêvais que je caressais un chien de Terre-Neuve; peu à peu le chien devint un ours, et cela graduellement, sans provoquer de ma part aucun étonnement. De même les lieux changent quelquefois non par un coup de théâtre, mais par une série de transitions qui empêchent de remarquer ce changement: j'étais tout à l'heure dans une petite maison, me voici maintenant dans un *palazzo* italien regardant des tableaux du Corrège; j'étais tout à l'heure moi-même, maintenant je suis un autre. Cela se passe comme sur un théâtre où l'on voit peu à peu des arbres et des maisons s'en aller, remplacés à mesure par d'autres décors, avec cette différence que, dans le rêve, l'attention étant endormie, chaque image qui disparaît *disparaît tout entière*: alors la comparaison entre l'état *passé* et l'état *présent* devient impossible; tout nouvel arrivant occupe seul la scène et nous fait entièrement oublier les autres acteurs ou les autres décors. A cause de cette absence de contraste, de différences, les changements les plus considérables peuvent s'accomplir en échappant à la conscience et sans s'organiser dans le temps. C'est une preuve que nous n'avons point de cadre *a priori* pour y placer **[20]** les objets, que ce sont nos perceptions mêmes qui se font leurs cadres quand elles sont distribuées régulièrement. Dans une masse absolument homogène rien ne pourrait donner naissance à l'idée de temps: la durée ne commence qu'avec une certaine variété d'effets.

D'autre part une hétérogénéité trop absolue, si elle était possible, exclurait aussi l'idée de temps, qui a parmi ses principaux caractères la continuité, c'est-à-dire l'unité dans la variété. Si notre vie passe à travers des milieux trop divers, si des images trop hétérogènes viennent frapper nos yeux, la mémoire se trouble, met avant ce qui est après, embrouille tout. C'est ce qui se produit aisément dans les voyages, où une foule de sensations sans rapport l'une avec l'autre se succèdent avec rapidité. Pascal observait que les voyages ressemblent aux rêves: si nous voyagions toujours sans jamais nous arrêter et surtout sans avoir organisé nous-mêmes le plan du voyage, nous aurions peine à distinguer la veille du rêve. Il faut une certaine continuité dans les sensations, une certaine logique naturelle; il faut que l'une sorte de l'autre, qu'elles s'enchaînent toutes ensemble. *Memoria non facit saltus*. Pour constater le changement, il faut un point fixe.

[21] Quand nous nous analysons nous-mêmes, nous retrouvons sous chaque image actuelle, sous chaque objet ou série d'objets qui s'offre à nous, sous chacune de nos pensées et chacun de nos sentiments présents, un sentiment, une pensée, une image analogue que nous reconnaissons pour nôtres. Une longue expérience a fait peu à peu entrer en nous une partie du monde extérieur, et il suffit de creuser en nous-mêmes par la réflexion pour l'y retrouver sous la surface mobile des sensations et des idées présentes. Aussi rien d'absolument nouveau pour nous; et c'est là le secret de notre intelligence, car nous ne comprendrions pas ce qui n'aurait aucun analogue dans notre passé, ce qui n'éveillerait rien en nous. Platon avait raison de soutenir que connaître, c'était à moitié se souvenir, qu'il y

a toujours en nous quelque chose qui correspond au savoir qu'on nous apporte du dehors.

Ce qui fait que l'animal ne peut *connaître*, c'est précisément qu'il ne *se souvient* pas à proprement parler. Dans son monde intérieur existe, nous l'avons vu, une confusion qui rend non moins confus pour lui le monde extérieur. En effet, connaître, c'est comparer un souvenir à une sensation. Pour que la connaissance soit nette, il faut que le souvenir soit distinct, **[22]** précis, localisé à tel point de l'espace. Si tout s'écoulait en nous comme l'eau d'un fleuve, notre pensée s'en irait aussi et disparaîtrait avec les sensations fuyantes. La première condition de la pensée, c'est de se retenir soi-même par la mémoire; connaître, c'est reconnaître, au moins partiellement. C'est pourquoi la vie des animaux se passe comme un rêve; encore retrouvons-nous parfois nos rêves et les reconstruisons-nous en les opposant à la vie réelle; mais, si nous rêvions perpétuellement, nous n'aurions qu'une vague idée de nos rêves: ainsi en est-il des animaux.

La perception des différences et des ressemblances, première condition de l'idée de temps, a pour résultat la notion de dualité, et avec la dualité se construit le nombre. L'idée du nombre n'est autre chose à l'origine que la perception des différences sous les ressemblances; les diverses sensations, d'abord les sensations contraires, comme celles de plaisir et de douleur, puis celles des différent sens, par exemple du tact et de la vue, se distinguent plus ou moins nettement les unes des autres.

Ainsi la *discrimination*, élément primordial de l'intelligence, n'a pas besoin de l'idée de temps pour s'exercer: c'est au contraire le temps qui la présuppose. La notion même **[23]** de *séquence*, à laquelle Spencer ramène le temps, est dérivée. Primitivement, tout coexiste, et les sensations tactiles ou visuelles tendent à prendre spontanément la forme vague de l'espace, sans distinction de plans, sans dimensions précises. Quand nous disons que tout coexiste, nous empruntons encore au langage du temps un terme trop clair, exprimant une relation consciente et réfléchie de simultanéité: à l'origine, on n'a pas plus la notion de coexistence que celle de succession, on a une image confuse et diffuse de choses multiples, répandues autour de nous, et le terme même d'étendue est trop net pour exprimer ce chaos. Seul le mouvement y introduira plus tard des divisions, des distinctions, par l'effort qu'il suppose; c'est le mouvement volontaire qui créera pour notre esprit la troisième dimension de l'espace, et sans lui tout resterait sur le même plan. Bien plus, la notion même de plan et de surface ne naîtra que si la surface est parcourue par un mouvement de la main et des yeux. Nous verrons tout à l'heure qu'il en est de même pour le temps.

Outre les trois premiers éléments de l'idée de temps: *différences*, *ressemblances* et *nombre*, la conscience nous met bientôt en possession **[24]** d'un quatrième, dont l'importance est capitale: l'*intensité*, le *degré*. Selon nous, il y a une connexion intime entre le *degré* et le *moment*. Entre les diverses sensations et les

divers efforts moteurs de même espèce il existe en général des gradations et une sorte d'échelle qui permet de passer de l'un à l'autre. J'ai d'abord appétit, puis faim, puis une vive douleur d'estomac mêlée d'éblouissements et d'un sentiment général de faiblesse; voilà l'exemple d'une sensation passant par une foule de degrés. Il en est ainsi de la plupart de nos sentiments dans la vie habituelle: ils se ramènent à un petit nombre, mais ils sont susceptibles de variations perpétuelles, de dégradations ou d'accroissements presque à l'infini. La vie est une évolution lente; chaque *moment du temps* présuppose un *degré* dans l'*activité* et dans la *sensibilité*, un accroissement ou une diminution, une variation quelconque, en d'autres termes un rapport composé de quantité et de qualité, S'il n'y avait pas division, variation et degré dans l'activité ou la sensibilité, il n'y aurait pas de temps. Le balancier primitif qui sert à mesurer le temps et contribue même à le créer pour nous, c'est le battement plus ou moins intense, plus ou moins ému de notre coeur.

[25] Bain remarque avec raison que nous ne pouvons soulever un poids à la hauteur d'un pied, puis de deux pieds, sans avoir une expérience particulière de durée; dans le sentiment du *continu*, par exemple du mouvement continu, de l'effort continu, il y a 'une aperception de degré.' Mais Bain ajoute que 'cette aperception de degré est le fait appelé temps ou durée.' – Cette conclusion est inadmissible. Il y a autre chose dans la durée qu'un aperception de degrés d'intensité, quelque commode que soit cette aperception pour nous rendre sensible la succession, qui est la caractéristique du temps.

Les éléments qui précèdent nous fournissent simplement ce qu'on pourrait appeler le *lit* du temps, abstraction faite de son *cours*, ou, si l'on préfère, le cadre dans lequel le temps semble se mouvoir, l'ordre selon lequel il range les représentations dans notre esprit, en un mot la *forme* du temps. C'est *un ordre de représentations à la fois différentes et ressemblantes, formant une pluralité de degrés*. De plus, le souvenir même a ses degrés, suivant qu'il est plus ou moins lointain: tout changement qui vient se représenter dans la conscience laisse en elle, comme résidu, une série de représentations disposées selon une espèce **[26]** de ligne, dans laquelle toutes les représentations lointaines tendent à s'effacer pour laisser place à d'autres représentations toujours plus nettes. Tout changement produit ainsi dans l'esprit une sorte de traînée lumineuse analogue à celle que laissent dans le ciel les étoiles filantes. Au contraire, un état fixe apparaît toujours avec la même netteté, dans le même milieu, comme les grands astres du ciel. Ajoutons donc encore aux éléments qui précèdent les *résidus*, de netteté et d'intensité différentes, laissés dans la mémoire par le changement.

La preuve que la représentation de l'avant et de l'après est un jeu d'images et de résidus, c'est que nous pouvons très bien les confondre. C'est ce qui arrive dans les expériences psychophysiques où le sujet note un son avant de l'avoir entendu, et surtout dans les expériences où, étant données deux étincelles successives rapprochées, il confond celle qui est apparue la première avec la

seconde. Dans le phénomène de l'attente vive, on peut se représenter si fortement le son attendu qu'on l'entend avant qu'il ne se produise. Quant à l'ordre interverti entre les étincelles, il vient sans doute de ce que l'attention, s'appliquant tantôt à l'une, tantôt à l'autre, grossit celle à laquelle elle s'attache, lui donne **[27]** une intensité qui la *rapproche* au regard de la conscience, alors même qu'elle est la plus éloignée dans le temps.

Nous avons déterminé tout ce qui, dans le temps, n'est pas le changement même saisi sur le fait, ou ce que nous avons appelé le *lit* du temps par opposition à son *cours*. Reste à faire courir et couler le temps dans la conscience; il faut que, dans ce lit tout prêt fourni par l'imagination, quelque chose d'actif et de mouvant se produise pour la conscience. Jusqu'a présent nous avons fait de la pensée quelque chose de tout passif, où vient se refléter une variété d'objets ayant des *degrés* divers, avec des *résidus* disposés en un *ordre* d'accroissement ou de décroissance, le tout en quelque sorte *fixé*; essayons maintenant de montrer la part de l'activité, de la réaction cérébrale et mentale.

[29]

CHAPITRE III

Fond Actif de la Notion de Temps; Sa Genèse. Part de la Volonté, de l'Intention et de l'Activité Motrice. Présent, Avenir et Passé. L'Espace comme Moyen de Représentation du Temps

Le cours du temps se ramène, dans l'esprit adulte, à trois parties qui s'opposent entre elles et qui sont le présent, le futur, le passé. Tout d'abord, sous l'idée de *présent*, se trouve celle d'*actualité* d'*action*, qui ne semble nullement une idée dérivée de celle du temps, mais bien une idée antérieure. L'action enveloppe le temps, soit, et l'*actuel* enveloppe le présent, mais la conscience de l'actuel et de l'action ne provient pas du temps. Le présent même n'est pas encore le temps ou la durée, **[30]** car toute durée, tout cours du temps, pouvant se décomposer en présent et en passé, consiste essentiellement dans l'addition de quelque chose à la pure et immobile idée du présent. Cette idée même du présent est une conception abstraite, dérivée, qui n'existait à l'origine qu'implicitement dans celle de l'action, de l'effort actuel. Le vrai présent, en effet, serait un instant indivisible, un moment de transition entre le passé et le futur, moment qui ne peut être conçu que comme infiniment petit, mourant et naissant à la fois. Ce présent rationnel est un résultat de l'analyse mathématique et métaphysique: le présent empirique d'un animal, d'un enfant, et même d'un adulte ignorant, en est très éloigné; c'est un simple morceau de durée ayant en réalité du passé, du présent et du futur, morceau divisible en une infinité de *présents* mathématiques auxquels ne songe ni l'animal, ni l'enfant, ni l'homme vulgaire. Le vrai point de départ de l'évolution n'est donc pas plus l'idée du présent que celle du passé ou du futur. C'est l'*agir* et le *pâtir*, c'est le *mouvement* succédant à une *sensation*.

L'idée des trois parties du temps est une scission de la conscience. Quand les cellules de certains animaux sont parvenues à tout leur **[31]** accroissement possible, elles se divisent en deux par scissiparité; il y a quelque chose d'analogue dans la génération du temps.

Comment se fait cette division des moments du temps dans la conscience primitive? – Selon nous, elle a lieu par la division même du pâtir et de l'agir. Quand nous éprouvons une douleur et réagissons pour l'écarter, nous commençons à couper le temps en deux, en présent et en futur. Cette réaction à l'égard des plaisirs et des peines, quand elle devient consciente, est l'*intention*; et, selon nous, c'est l'intention, spontanée ou réfléchie, qui engendre à la fois les notions de l'espace et du temps. En ce qui concerne l'espace, on a reproché aux Anglais d'avoir fait une pétition de principe en prétendant en expliquer l'idée par une simple série d'efforts musculaires et de sensations musculaires, dont nous apprécions l'intensité, la vitesse et la *direction*; postuler la 'direction', en effet, n'est-ce pas déjà présupposer et postuler l'espace même qu'ils'agissait d'engendrer dans notre esprit? Mais, si le mot de direction est effectivement assez malheureux, on peut y substituer celui d'*intention*. L'intention ne présuppose pas l'idée de l'espace; elle ne suppose que des images de sensations agréables ou pénibles, avec des **[32]** efforts moteurs pour réaliser les premières ou se dérober aux secondes. L'animal qui se représente sa proie, ou même qui la voit, n'a pas besoin de penser l'espace ni la direction pour avoir l'intention de l'avaler et pour commencer les efforts moteurs nécessaires. Direction, à l'origine, c'est simplement intention, c'est-à-dire image d'un plaisir ou d'une peine et des circonstances concomitantes, puis innervation motrice. De l'*intention*, peu à peu consciente de soi et de ses effets, sortira la *direction* proprement dite et avec elle l'*étendue*.

Il en est de même pour le temps. Le futur, à l'origine, c'est le *devant être*, c'est ce que je n'ai pas et ce dont j'ai désir ou besoin, c'est ce que je travaille à posséder; comme le présent se ramène à l'activité consciente et jouissant de soi, le futur se ramène à l'activité tendant vers autre chose, cherchant ce qui lui manque. Quand l'enfant a faim, il pleure et tend les bras vers sa nourrice: voilà le germe de l'idée d'avenir. Tout besoin implique la possibilité de le satisfaire; l'ensemble de ces possibilités, c'est ce que nous désignons sous le nom du futur. Un être qui ne désirerait rien, qui n'aspirerait à rien, verrait se fermer devant lui le temps. Nous étendons la main, **[33]** et l'espace s'ouvre devant nous, l'espace que des yeux immobiles ne pourraient saisir avec la succession de ses plans et la multiplicité de ses dimensions. De même pour le temps: il faut désirer, il faut vouloir, il faut étendre la main et marcher pour créer l'avenir. L'*avenir* n'est pas *ce qui vient vers nous*, mais *ce vers quoi nous allons*.

A l'origine, le cours du temps n'est donc que la distinction du voulu et du possédé, qui elle-même se réduit à l'intention suivie d'un sentiment de satisfaction. L'intention, avec l'effort qui l'accompagne, est le premier germe des idées vulgaires de cause efficiente et de cause finale. C'est par une série d'abstractions scientifiques qu'on arrive à leur substituer les idées de succession constante, d'antécédent et de conséquent invariable, de déterminisme et de mécanisme régulier. A l'origine, les idées de cause et de fin ont un caractère d'anthropomorphisme ou, si l'on veut, de fétichisme: elles sont le transport hors de nous de la

force musculaire (cause efficiente) et de l'intention (cause finale). Ces notions métaphysiques ont à l'origine une signification non seulement tout humaine, mais tout animale, car le besoin à satisfaire et l'innervation motrice sont les expressions de la vie dans tout animal. C'est **[34]** le rapport de ces deux termes qui, selon nous, a engendré tout d'abord la conscience du temps; ce dernier ne fut à l'origine, en quelque sorte, que l'intervalle conscient entre le besoin et sa satisfaction, la distance entre 'la coupe et les lèvres'.

Aujourd'hui les psychologues sont tentés d'intervertir l'ordre de la genèse du temps. Remplis de leurs idées toutes scientifiques et toutes modernes sur la causalité, ils nous disent: la cause efficiente se réduit pour l'entendement à une simple succession d'antécédent et de conséquent selon un ordre invariable ou même nécessaire; la cause finale se réduit de même à un rapport d'antécédent et de conséquent, à une succession. Puis, quand les psychologues arrivent à la question du temps, ils continuent de placer l'idée de succession à la racine même de la conscience: ils font consister cette dernière dans un rythme d'antécédents et de conséquents saisi sur le fait; dès lors le *prius* et le *posterius*, le *non simul*, deviennent un rapport constitutif de la 'représentation' même, une 'forme de la représentation', et une forme *a priori*. Selon nous, cette théorie met des idées scientifiques, venues fort tard, à la place des fétiches primitifs de la conscience, qui sont la force ou cause **[35]** efficiente et le but ou cause finale. L'animal ne pratique que la philosophie de Maine de Biran: il sent et il fait effort, il n'est pas encore assez mathématicien pour songer à la *succession*, encore moins à la *succession constante*, encore bien moins à la *succession nécessaire*. Le rapport d'antécédent à conséquent, de *prius* à *posterius*, ne se dégagera que dans la suite par une analyse réfléchie.

Est-ce à dire que le temps ne soit pas déjà en germe dans la conscience primitive? – Il y est sous la forme de la force, de l'effort, et, quand l'être commence à se rendre compte de ce qu'il veut, de l'*intention*; mais alors, le temps est tout englobé dans la sensibilité et dans l'activité motrice, et par cela même il ne fait qu'un avec l'espace; le futur, c'est ce qui est *devant* l'animal et qu'il *cherche* à prendre; le passé, c'est ce qui est *derrière* et qu'il ne voit plus; au lieu de fabriquer savamment de l'espace avec le temps, comme fait Spencer, il fabrique grossièrement le temps avec l'espace; il ne connaît que le *prius* et le *posterius* de l'étendue. Mon chien, de sa niche, aperçoit devant lui l'écuelle pleine que je lui apporte: voilà le futur; il sort, se rapproche, et, à mesure qu'il avance, les sensations de la niche s'éloignent, disparaissent presque, parce que **[36]** la niche est maintenant derrière lui et qu'il ne la voit plus; voilà le passé.

En somme, la *succession* est un abstrait de l'*effort moteur* exercé dans l'*espace*; effort qui, devenu conscient, est l'*intention*.

Dans la conscience adulte, l'idée d'intention, de fin, de but, reste l'élément essentiel pour classer les souvenirs. Si nous avions simplement conscience de chaque action en particulier, sans grouper ces diverses actions autour de plusieurs

fins distinctes, combien la mémoire nous serait difficile! Au contraire, l'idée de fin étant donnée, nos diverses actions deviennent une série de moyens, se rangent, s'organisent par rapport à la fin poursuivie, de façon à satisfaire un Aristote ou un Leibnitz. Si je veux aller en Amérique, il s'ensuit que je veux d'abord passer la mer, et pour cela que je veux m'embarquer au Havre ou à Bordeaux. Toutes ces volontés s'enchaînent l'une à l'autre dans un ordre logique, et tous les souvenirs auxquels elles donneront naissance se trouveront du même coup enchaînés. Il y a dans la vie une certaine logique, et c'est cette logique qui permet le souvenir. Là où règnent l'illogique et l'imprévu, la mémoire perd beaucoup de prise. La vie absolument sans logique ressemblerait à ces mauvais drames où les divers **[37]** événements ne sont pas rattachés et d'où l'on ne retire que des images confuses, qui se fondent l'une dans l'autre.

L'*intention*, la fin poursuivie, aboutit toujours à une *direction* dans l'espace et conséquemment à un mouvement; on peut donc dire que le temps est une abstraction du mouvement, de la kinèsis, une formule par laquelle nous résumons un ensemble de sensations ou d'efforts distincts les uns des autres. Quand nous disons: 'ce village est à deux heures d'ici', le temps n'est qu'une simple mesure de la *quantité d'efforts* nécessaire pour atteindre à travers l'espace le village en question. Cette formule ne contient rien de plus que cette autre: ce village est à tant de milliers de pas, ou que cette autre plus abstraite: il est à tant de kilomètres, ou enfin que cette autre plus psychologique: il est à tant d'efforts musculaires. L'idée même du mouvement se ramène, pour la conscience, à la conception d'un certain nombre de sensations d'effort musculaire et de résistance disposées selon une ligne entre un point de l'espace où l'on est et un autre point où l'on *veut* être. Pourquoi cette idée, à l'origine, présupposerait-elle l'idée de temps? Je fais plusieurs pas dans une direction donnée: pour cela il a fallu des efforts musculaires **[38]** analogues avec des sensations différentes tout le long du chemin. Voilà la notion primitive du mouvement. Ajoutez que, les divers pas étant faits dans une *intention* déterminée, vers les fruits d'un arbre par exemple, les groupes de sensations que j'ai éprouvées se disposent dans mon imagination selon une ligne, les uns apparaissant à tel point par rapport à l'arbre, les autres à tel autre point. Voilà à la fois le germe de l'idée de temps et de l'idée de mouvement dans l'espace.

Si je vais du point A au point B et que je revienne du point B au point A, j'obtiens ainsi deux séries de sensations dont chaque terme correspond à un des termes de l'autre série. Seulement, ces termes correspondants se trouvent rangés dans mon esprit tantôt par rapport au point B pris comme but, tantôt par rapport au point A. Je n'ai alors qu'à appliquer les deux séries l'une sur l'autre en les retournant pour qu'elles coïncident parfaitement d'un bout à l'autre. Cette entière coïncidence de deux groupes de sensations, comme on sait, est ce qui distingue le mieux l'espace du temps. Quand je ne considère pas cette coïncidence possible ou réelle, je n'ai dans la mémoire qu'une série de sensations, rangées selon un ordre de netteté. L'idée du temps **[39]** est produite par une accumulation de

sensations, d'efforts musculaires, de désirs péniblement rangés. Les mêmes sensations répétées, les efforts répétés dans le même sens, dans la même intention, forment une série dont les premiers termes sont moins distincts et les derniers davantage; ainsi s'établit une perspective intérieure qui va en avant, vers l'avenir.

Le passé n'est que cette perspective retournée: c'est de l'actif devenu passif, c'est un résidu au lieu d'être une anticipation et une conquête. A mesure que nous dépensons notre vie, il se produit au fond de nous-mêmes, comme dans ces bassins d'où l'on fait évaporer l'eau de la mer, une sorte de depôt par couches régulières de tout ce que tenait en suspens notre pensée et notre sensibilité. Cette cristallisation intérieure est le passé. Si l'onde est trop agitée, le dépôt se fait irrégulièrement par masses confuses; si elle est suffisamment calme, il prend des formes régulières.

Le temps passé est un fragment de l'espace transporté en nous; il se figure par l'espace. Il est impossible de modifier la disposition des parties de l'espace: on ne peut mettre à droite ce qui est à gauche, devant ce qui est **[40]** derrière; or, toutes les images que le souvenir nous donne, s'attachant à quelque sensation dans l'espace, s'immobilisent ainsi, forment une série dont nous ne pouvons substituer l'un à l'autre les divers termes.

Aussi toute image fournie par le souvenir ne peut-elle être bien localisée, placée dans le passé, qu'à condition de pouvoir se localiser dans tel ou tel point de l'espace, ou encore d'être associée à quelque autre image qui s'y localisé.[a] Sans l'association à de petites circonstances, tout souvenir nous apparaîtrait comme une création. Est-ce moi qui ai imaginé et écrit quelque part: 'La feuillée chante,' expression pittoresque que je trouve en ce moment dans ma mémoire? A cette interrogation, une foule de souvenirs surgissent: des mots latins s'associent aux mots français; à ces mots s'associe un nom, celui de Lucrèce. Enfin, si j'ai bonne mémoire, j'irai jusqu'à revoir le vieux petit volume déchiré sur lequel j'ai lu autrefois l'expression de Lucrèce: *frons canit*.

En somme, c'est le jeu des sentiments, des plaisirs et des douleurs qui a organisé la mémoire en représentation *présente* du *passé*, et **[41]** divisé ainsi le temps en parties distinctes. J'ai soif, je bois à un ruisseau. Un quart d'heure après, je revois le ruisseau qui, par association, me rappelle ma soif, mais, en réalité, je n'ai pas soif et l'eau fraîche ne me tente plus du tout. Et pourtant ma représentation est distincte, elle a un témoin: le ruisseau qui m'a désaltéré. Ainsi s'affirme le souvenir en face de la réalité actuelle, le passé en face du présent. L'animal même qui a bu au ruisseau commence à avoir dans la tête des cases distinctes pour le passé et pour la sensation présente.

Ce sentiment du passé n'a tout d'abord rien d'abstrait ni de scientifique; il est associé au sentiment de plaisir que nous éprouvons à retrouver des choses déjà connues. Après avoir fait voyager un chien, ramenez-le à sa maison, il bondira

[40]a. Nous reviendrons plus loin sur le mécanisme de sa localisation.

de plaisir. De même un visage connu fera sourire un enfant, tandis qu'un visage inconnu lui fera peur. Il y a une différence appréciable pour la sensibilité entre voir et revoir, entre découvrir et reconnaître. L'habitude produit toujours une certaine facilité dans la perception, et cette facilité engendre un plaisir. L'habitude suffit déjà à elle seule pour créer un certain ordre: on pourrait peut-être dire que tout sentiment de désordre vient de l'inaccoutumance.

[42] La masse confuse et obscure de nos souvenirs accumulés ressemble à ces grandes forêts qu'on aperçoit de loin comme une seule masse d'ombre; quand on y pénètre, on distingue de longues percées sous les arbres, des halliers, des clairières, des perspectives où les yeux se perdent. Bientôt on y remarque des points de repère qui servent à se reconnaître: on s'habitue à y marcher sans crainte et sans hésitation. Tous ces grands arbres en désordre s'arrangent dans l'esprit et s'y disposent selon des associations fixes. Au début, rien que des souvenirs passivement conservés, d'où suit la confusion dont nous avons parlé; partant, point d'idée claire du passé en opposition avec le présent et l'avenir. Puis vient l'imagination, avec l'intelligence, qui jouent avec les images et les idées, les mettent ici ou là, à leur gré, rêvent un monde selon nos désirs. Alors se produit un contraste de l'imagination active avec le souvenir présent, qu'on ne peut modifier si aisément, qui reste ancré dans une masse d'associations dont on ne peut le détacher. La scission se produit alors en nous: l'imagination passive ou mémoire se distingue de l'imagination active.

Nous avons vu que le sentiment du temps vient en partie du sentiment de la différence, **[43]** mais il n'y a pas autant de différence qu'on pourrait le croire entre nos sensations, ou plutôt la différence de degré n'exclut pas une certaine unité de forme. Les sensations rentrent dans un certain nombre d'espèces, selon qu'elles proviennent de mon bras, de ma jambe, de ma tête, etc. Dans une journée ou même dans une époque entière de la vie, il y a, le plus souvent, une ou plusieurs espèces de sensations dominantes; de là l'unité dans la variété. Tout à l'heure, pendant que j'écrivais, ma mémoire me représenta soudain l'image d'un petit ravin ombragé de pins et de tuyas. Quand donc m'y suis-je promené? me demandai-je. Et sans hésitation, quoique après un temps mathématiquement appréciable, cette réponse intérieure m'arrive: hier. A quoi donc ai-je reconnu immédiatement que c'était hier? En y réfléchissant, je remarque qu'au souvenir de cette promenade est associée la sensation du mal de tête; or je souffre encore de la tête en ce moment même: c'est pour cela que la localisation dans le temps a été très prompte. Sous les divers événements de ma journée se retrouve ainsi une sensation continue qui les relie entre eux. D'autres fois, c'est une groupe de sensations qui adhèrent l'une à l'autre. Mais le souvenir exact, pour **[44]** être possible, demande toujours que les sensations les plus hétérogènes soient reliées entre elles par d'autres qui le sont moins.

La distinction du passé et du présent est tellement relative, que toute image lointaine donnée par la mémoire, lorsqu'on la fixe par l'attention, ne tarde par à

se rapprocher, à apparaître comme récente: elle prend sa place dans le présent. Je suis un petit chemin que je n'avais pas suivi depuis deux ans; le chemin serpente sous les oliviers, aux flancs d'une montagne, avec la mer dans le fond. A mesure que j'avance, je reconnais tout ce que je vois; chaque arbre, chaque rocher, chaque maisonnette me dit quelque chose; ce grand pic là-bas me rappelle des pensées oubliées; en moi s'élève tout un bruit confus de voix qui me chantent le passé déjà lointain. Mais ce passé est-il donc aussi lointain que je le crois? Ce long espace de deux ans, si rempli d'événements de toute sorte et qui s'interposait entre mes souvenirs et mes sensations, je le sens qui se raccourcit à vue d'oeil. Il me semble que tout cela, c'était hier ou avant-hier; je suis porté à dire: l'autre jour. Pourquoi, si ce n'est parce que le sentiment du passé nous est donné par l'effacement des souvenirs? Or, tous mes souvenirs, en s'éveillant sous **[45]** l'influence de ce milieu nouveau, en rentrant pour ainsi dire dans le monde des sensations qui les ont produits, acquièrent une force considérable: ils me deviennent *présents*, comme on dit. Si j'avais avec moi le chien de montagne qui m'accompagnait autrefois dans mes promenades, il reconnaîtrait évidemment ce chemin comme moi, il éprouverait du plaisir à s'y retrouver, il remuerait la queue et gambaderait. Et comme il ne mesure pas le temps mathématiquement d'après le cours des astres, mais empiriquement d'après la force de ses souvenirs, il lui semblerait peut-être qu'il est venu tout récemment dans ce chemin.

Il y a des rêves dont on se souvient un jour tout à coup sans pouvoir les rattacher à rien. On est prêt alors à les confondre avec une réalité, si toutefois ils ne sont pas invraisemblables et n'offrent pas la confusion habituelle des rêves. Mais on ne sait pas où les placer, on cherche en vain à les rattacher à l'image de tel ou tel objet. Impossible. Il y a de telles images produites en rêve et quelquefois pendant la veille, dans le vague d'une pensée indifférente, dont on ne peut en aucune façon déterminer l'époque. Si on les projette encore dans le passé, c'est par une simple habitude, et **[46]** aussi à cause de l'effacement de leurs contours.

Nous avons tracé dans son ensemble, la genèse de l'idée de temps, nous avons montré son origine tout empirique et dérivée. L'idée de temps comme celle d'espace, est empiriquement le résultat de l'adaptation de notre activité et de nos désirs à un même milieu inconnu, peut-être inconnaissable. Qu'est-ce qui correspond en dehors de nous à ce que nous appelons le temps, l'espace? nous n'en savons rien; mais le temps et l'espace ne sont pas des catégories toutes faites et préexistantes en quelque sorte à notre activité, à notre intelligence. En désirant et en agissant dans la direction de nos désirs, nous créons à la fois l'espace et le temps; nous vivons, et le monde, ou ce que nous appelons tel, se fait sous nos yeux. Aussi est-ce surtout l'énergie de la volonté qui produit la ténacité de la mémoire, au moins en ce qui concerne les événements. Là où notre moi est intéressé, soit qu'il prenne les devants et agisse sur les choses, soit que les choses, en agissant violemment sur lui, excitent une réaction proportionnelle, le souvenir

se fixe, se creuse, se donne à lui-même une énergie qui persiste à travers la durée.

[47] Le désir enveloppe en germe l'idée de possibilité, et cette idée de possibilité, en s'opposant à celle de réalité, devient un 'antécédent', c'est-à-dire quelque chose d'idéal et d'imaginé qui précède l'apparition vive du réel. Le désir, d'ailleurs, est un mouvement commencé, et le mouvement commencé, c'est le défilé d'images qui se déroule, le défilé de scènes dans l'espace et de positions successives.

Les conditions de la mémoire et de l'idée du temps sont donc:

1. Variété des images;

2. Association de chacune à un lieu plus ou moins défini;

3. Association de chacune à quelque intention et action, à quelque fait intérieur plus ou moins *émotif* et d'une *tonalité* agréable ou pénible, comme disent les Allemands. Il résulte de tout cela un rangement spontané des images en forme sérielle et *temporelle*.

C'est le mouvement dans l'espace qui crée le temps dans la conscience humaine. Sans mouvement, point de temps. L'idée de mouvement se ramène à deux choses: force et espace; l'idée de force se ramène à l'idée d'activité, l'idée d'espace à une exclusion mutuelle des activités, qui fait qu'elles se résistent et se rangent d'une certaine manière. Ce mode de **[48]** distribution, dans lequel les choses sont non seulement distinctes mais, *distantes*, est l'espace. Le temps (objectivement) se ramène à des changements nécessaires dans l'espace, changements que nous figurons tantôt par des lignes sans fin, tantôt par des lignes fermées (*périodes*).

[49]

CHAPITRE IV

Le Temps et la Mémoire, Le Souvenir et le Phonographe. L'Espace comme Moyen de Représentation du Temps

I

Le raisonnement par analogie a une importance considérable dans la science; peut-être même, si l'analogie est le principe de l'induction, fait-elle le fond de toutes les sciences physiques et psycho-physiques. Bien souvent une découverte a commencé par une métaphore. La lumière de la pensée ne peut guère se projeter dans une direction nouvelle et éclairer des angles obscurs qu'à condition d'y être renvoyée par des surfaces déjà lumineuses. On n'est frappé que de ce qui vous rappelle quelque chose tout en en différant. Comprendre, c'est, du moins en partie, se souvenir.

[50] Pour essayer de comprendre les facultés ou mieux les fonctions psychiques, on a usé de bien des comparaisons, de bien des métaphores. Ici en effet, dans l'état encore imparfait de la science, la métaphore est d'une nécessité absolue: avant de *savoir*, il faut commencer par nous *figurer*. Aussi le cerveau humain a-t-il été comparé à beaucoup d'objets divers. Selon Spencer, il a quelque analogie avec ces pianos mécaniques qui peuvent reproduire un nombre d'airs indéfini. M. Taine en fait une sorte d'imprimerie fabriquant sans cesse et mettant en réserve des clichés innombrables. Mais tous ces termes de comparaison ont paru encore un peu grossiers. On prend en général le cerveau à l'état de repos; on y considère les images comme fixées, *clichées*; ce n'est pas exact. Il n'y a rien de tout fait dans le cerveau, pas d'images réelles, mais seulement des images virtuelles, potentielles, qui n'attendent qu'un signe pour passer à l'acte. Reste à savoir comment se produit ce passage à la réalité. C'est ce qu'il y a de plus mystérieux, c'est, dans le mécanisme cérébral, la part réservée à la dynamique par opposition à la statique. Il faudrait donc un terme de comparaison où l'on

vît non seulement un objet recevoir et garder une empreinte, **[51]** mais cette empreinte même revivre à un moment donné du temps et reproduire dans l'objet une vibration nouvelle. Peut-être, après réflexion, l'instrument le plus délicat, réceptacle et moteur tout ensemble, auquel on pourrait comparer le cerveau humain, serait le phonographe récemment inventé par Edison. Depuis quelque temps déjà nous pensions à indiquer cette comparaison possible, quand nous avons trouvé, dans un article de M. Delboeuf sur la mémoire, cette phrase jetée en passant qui nous confirme dans notre intention: L'âme est un cahier de feuilles phonographiques.'

Quand on parle devant le phonographe, les vibrations de la voix se transmettent à un style qui creuse sur une plaque de métal des lignes correspondantes au son émis, des sillons inégaux, plus ou moins profonds suivant la nature des sons. C'est probablement d'une manière analogue que sont tracées sans cesse dans les cellules du cerveau d'invisibles lignes, qui forment les lits des courants nerveux. Quand, après un certain temps, le courant vient à rencontrer l'un de ces lits tout faits, où il a déjà passé, il s'y engage de nouveau. Alors les cellules vibrent comme elles ont vibré une première fois, et à cette vibration similaire **[52]** correspond psychologiquement une sensation ou une pensée qui est analogue à la sensation ou à la pensée oubliée.

Ce serait alors la phénomène qui se produit dans le phonographe lorsque, sous l'action du style parcourant les traces creusées précédemment par lui-même, la petite plaque de cuivre se met à reproduire les vibrations qu'elle a déjà exécutées: ces vibrations redeviennent pour nous une voix, des paroles, des airs, des mélodies.

Si la plaque phonographique avait conscience d'elle-même, elle pourrait dire, quand on lui fait reproduire un air, qu'elle se souvient de cet air; et ce qui nous paraît l'effet d'un mécanisme lui semblerait peut-être une faculté merveilleuse.

Ajoutons qu'elle distinguerait les airs nouveaux de ceux qu'elle a déjà dits, les sensations fraîches des simples souvenirs, le présent du passé. Les premières impressions, en effet, se creusent avec effort un lit dans le métal ou dans le cerveau; elles recontrent plus de résistance et ont conséquemment besoin de déployer plus de force: quand elles passent, elles font tout vibrer plus profondément. Au contraire, si le style, au lieu de se frayer sur la plaque une voie nouvelle, **[53]** suit des voies déjà tracées, il le fera avec plus de facilité: il glissera sans appuyer. On a dit: la *pente* du souvenir, la *pente* de la rêverie; suivre un souvenir, en effet, c'est se laisser doucement aller comme le long d'une pente, c'est attendre un certain nombre d'images toutes faites qui se présentent l'une après l'autre, en file, sans secousse. De là, entre la sensation présente et le souvenir du passé, une différence profonde. Toutes nos impressions se rangent par l'habitude en deux classes: les unes ont une intensité plus grande, une netteté de contours, une fermeté de lignes qui leur est propre; les autres sont plus effacées, plus indistinctes, plus faibles, et cependant se trouvent disposées dans un certain ordre qui s'impose à nous. *Reconnaître* une image, c'est la ranger dans la seconde des deux classes,

qui est celle du temps. On *sent* alors d'une façon plus faible, et on a conscience de sentir de cette façon. C'est dans cette conscience: 1. de l'intensité moindre d'une sensation, 2. de sa facilité plus grande, et 3. du lien qui la rattache d'avance à d'autres sensations, que consiste le souvenir, et c'est aussi par là que se produit la perspective du temps. Comme un oeil exercé distingue une copie d'un tableau de maître, de **[54]** même nous apprenons à distinguer un souvenir d'une sensation présente, et nous savons discerner le souvenir avant même qu'il soit localisé dans un temps ou un lieu précis. Nous projetons telle ou telle impression dans le passé avant de savoir à quelle période du passé elle appartient. C'est que le souvenir garde toujours un caractère propre et distinctif, comme une sensation venue de l'estomac diffère d'une sensation de la vue ou de l'ouïe. De même, le phonographe est incapable de rendre la voix humaine avec toute sa puissance et sa chaleur: la voix de l'instrument reste toujours grêle et froide; elle a quelque chose d'incomplet, d'abstrait, qui la fait distinguer. Si le phonographe s'entendait lui-même, il apprendait à reconnaître la différence entre la voix venue du dehors, qui s'imprimait de force en lui, et la voix qu'il émet lui-même, simple écho de la première qui trouve un chemin déjà ouvert.

Il existe encore cette analogie entre le phonographe et notre cerveau, que la rapidité des vibrations imprimées à l'instrument peut modifier notablement le caractère des sons reproduits ou des images évoquées. Dans le phonographe, vous faites passer une mélodie d'une octave à une autre selon que vous communiquez **[55]** à la plaque des vibrations plus ou moins rapides: en tournant plus vite la manivelle, vous voyez s'élever un même air des notes les plus graves et les plus indistinctes aux notes les plus aiguës et les plus pénétrantes. Ne pourrait-on dire qu'un effet analogue se produit dans le cerveau lorsque, fixant notre attention sur un souvenir d'abord confus, nous le rendons peu à peu plus net et le faisons, pour ainsi dire, monter d'un ou plusieurs tons? Ce phénomène ne pourrait-il pas, lui aussi, s'expliquer par la rapidité et la force plus ou moins grandes des vibrations de nos cellules? Il y a en nous une sorte de gamme des souvenirs; sans cesse le long de cette échelle les images montent et descendent, évoquées ou chassées par nous, tantôt vibrant dans les profondeurs de notre être et formant comme une 'pédale' confuse, tantôt éclatant avec sonorité par-dessus toutes les autres. Selon qu'elles dominent ainsi ou qu'elles s'effacent, elles semblent se rapprocher ou s'éloigner de nous, et nous voyons parfois la durée qui les sépare de l'instant présent s'allonger ou se raccourcir. Il est telle impression que j'ai éprouvée il y a dix ans et qui, renaissant en moi avec une nouvelle force sous l'influence d'une association d'idées ou simplement de **[56]** l'attention et de l'émotion, ne me semble plus dater que d'hier: ainsi les chanteurs produisent des effets de lointain en baissant la voix, et ils n'ont qu'à l'élever paraître se rapprocher.

On pourrait multiplier sans fin ces analogies. La différence essentielle entre le cerveau et le phonographe, c'est que, dans la machine encore grossière d'Edison,

la plaque de métal reste sourde pour elle-même, la traduction du mouvement en conscience ne s'accomplit pas; cette traduction est précisément la chose merveilleuse, et c'est ce qui se produit sans cesse dans le cerveau. Il reste ainsi toujours un mystère, mais ce mystère est, sous un rapport, moins étonnant qu'il ne le semble. Si le phonographe s'entendait lui-même, ce serait peut-être moins étrange que de penser que nous l'entendons; or, en fait, nous l'entendons; en fait, ses vibrations se traduisent en nous par des sensations et des pensées. Il faut donc admettre une transformation toujours possible du *réel* du mouvement en pensée,[a] transformation bien plus vraisemblable quand il s'agit d'un mouvement **[57]** intérieur au cerveau, même que d'un mouvement venu de dehors. A ce point de vue, il ne serait ni trop inexact ni trop étrange de définir le cerveau un phonographe infiniment perfectionné, un phonographe conscient.

[56]a. Nous ne disons pas du mouvement même, conçu comme changement de rapports.

[59]

II

Si maintenant nous passons du point de vue mécanique au point de vue psychologique, nous répéterons d'abord que comprendre, selon l'école anglaise, c'est distinguer; on ramène ainsi l'intelligence à la *discrimination*; et c'est à la même faculté que peut se ramener psychologiquement la mémoire. Se souvenir, c'est distinguer une sensation passée (image affaiblie) d'une autre sensation passée (image affaiblie), et les distinguer toutes ensemble des sensations présentes. Cherchons donc l'opposition qui peut exister entre la sensation et la représentation ou conception mnémonique.

On a soutenu que 'la conception actuelle' d'un objet par l'imagination et la mémoire **[60]** n'est pas possible 'aussi longtemps que cet objet agit sur notre sensibilité'; 'la perception et la conception d'un même objet ne peuvent exister simultanément dans la conscience: la perception éteindrait complètement la conception. La réalité est absorbante et jalouse: toute idéalité disparaît devant elle, à la façon des étoiles devant le soleil.' M. Delboeuf, à l'appui de cette thèse, invoque l'expérience. Essayez de vous représenter vivement un tableau qui vous est familier. La chose vous sera aisée si vous fermez les yeux, et l'image pourra même acquérir un état d'intensité capable de vous faire presque illusion. Un peintre peut tracer un portrait de mémoire. Si vous tenez les yeux grands ouverts, déjà l'effort à faire est plus pénible; vous devez, pour ainsi dire, par la puissance de votre volonté, annuler leur pouvoir visuel, les 'frapper de cécité' à l'égard des choses qui pourraient attirer leur attention. Si vous fixez vos regards sur un objet déterminé, une gravure par exemple, il vous sera presque impossible de voir votre tableau en idée. 'Vous n'y parviendrez en aucune façon, dit M. Delboeuf, si vous

avez ce tableau même devant vous et si vous le regardez.' – Il y a là, selon nous, une très grande exagération. Il **[61]** est vrai que la perception et la conception d'un même objet se gênent en ce qu'elles ont de différent, et tendent à se confondre ou même se confondent en ce qu'elles ont d'identique; mais il n'en est pas moins vrai qu'il y a superposition d'une image à une perception et qu'on a conscience de la coïncidence, de l'adaptation.

M. Delboeuf cite encore l'exemple de celui qui chante mentalement un air connu. Le bruit y met une certaine entrave; mais un air différent, qui se fait entendre dans le voisinage, le contrarie bien davantage, et cela à mesure que, par le mouvement et le rythme, il se rapproche de celui qu'on a choisi. Enfin, 's'il a identité entre les deux chants, les tentatives que l'on fait pour entendre les notes intérieures sont complètement vaines'. – Oui, les tentatives pour séparer et distinguer la représentation de la perception au moment même où elles se superposent; mais la difficulté de se représenter la sensation d'un objet présentement senti n'est pas une impossibilité.

M. Delboeuf, par les considérations précédentes, est amené à rejeter la loi dite de ressemblance, en vertu de laquelle le semblable rappellerait le souvenir du semblable. Il ne nie pas qu'un portrait rappelle l'original; **[62]** seulement, de l'original le portrait rappelle non les traits qu'il retrace, mais précisément ceux qu'il ne retrace pas. Par exemple, comme le portrait est immobile et muet, l'on dira 'qu'on s'attend à le voir gesticuler, à l'entendre parler', il arrive tous les jours que, mis en présence d'une personne pour la seconde fois, vous vous souvenez de l'avoir vue une première fois. 'A parler exactement, vous vous souvenez de la première fois que vous l'avez vue.' En effet, l'objet propre du souvenir, ce sont les circonstances où vous l'avez jadis rencontrée, en tant que différentes de celles où vous la rencontrez aujourd'hui. Vous vous rappellerez le salon où elle était, les personnes avec qui elle causait, la toilette qu'elle avait; vous remarquerez qu'elle était plus jeune, ou plus maigre, ou mieux portante. Bref, 'vous ne vous remémorerez en aucune façon les traits ou les circonstances identiquement semblables. Comment d'ailleurs le pourriez-vous, puisque vous les avez devant les yeux?' De là M. Delboeuf tire cette conclusion, que la perception d'une chose perçue antérieurement met en branle un ou plusieurs états périphériques antérieurs qui, dans les points où ils se distinguent de l'état périphérique **[63]** actuel, donnent lieu à des conceptions. L'esprit juge que les objets de ces conceptions sont absents, parce que les images en sont ternes, comparées avec celles des objets présents dont est entourée la chose qui provoque le souvenir. Telle est, selon lui, l'exacte signification des lois de ressemblance et de contraste que certains psychologues font à tort figurer parmi les lois d'association. La ressemblance suscite le souvenir des différences. L'image présente, en tant qu'identique à l'image passée, fait reparaître l'ancien cadre en tant que différent du nouveau.

Sans rejeter ainsi l'association par ressemblance, nous pensons avec M.

Delboeuf que c'est en effet le cadre qui est important dans le souvenir; et ce cadre, c'est avant tout un lieu, qui provoque le souvenir d'une date. Se souvenir, c'est en effet replacer une image présente dans un temps et dans un milieu. C'est 'rétrouver dans l'atlas le feuillet et l'endroit exacts où elle est gravée'. Cet atlas du temps, selon nous, a pour feuillets des espaces, des lieux et des scènes locales. L'image d'un objet passé, reflétée par un objet semblable et présent, fait reparaître, sous une forme affaiblie, telle page de l'atlas, c'est-à-dire tel lieu avec telle scène, et nous disons alors que nous **[64]** *reconnaissons* l'objet. De plus, les pages étant, plus ou moins vaguement numérotées selon leur éloignement et leurs rapports mutuels, nous changeons les scènes locales en scènes temporelles et leur assignons une date, si nous pouvons. L'espace, ici, est toujours le premier initiateur.

MM. Taine et Ribot ont très bien montré comment nous finissons par localiser d'une manière précise les images dans le temps. Théoriquement, disent-ils, nous n'avons qu'une manière de procéder: déterminer les positions dans le temps comme on détermine les positions dans l'espace, c'est-à-dire par rapport à un *point fixe*, qui, pour le temps, est notre état présent. MM. Taine et Ribot insistent avec raison sur ce que le présent, – nous l'avons dit nous-même tout à l'heure, – est un état *réel*, qui a déjà sa *quantité de durée*. Si bref qu'il soit, le présent n'est pas un éclair, un rien, une abstraction analogue au point mathématique: il a un commencement et une fin, de plus, son commencement ne nous apparaît pas comme un commencement absolu: il touche à quelque chose, avec quoi il forme continuité. C'est ce que M. Taine appelle les 'deux bouts d'une image'. Quand nous lisons ou entendons **[65]** une phrase, dit aussi M. Ribot, au cinquième mot, par exemple, il reste quelque chose du quatrième. Chaque état de conscience ne s'efface que progressivement: il laisse un prolongement analogue à ce que l'optique physiologique appelle une image consécutive (et mieux encore dans d'autres langues: *after-sensation, Nachempfindung*). Par ce fait, le quatrième et le cinquième mot sont en continuité, la fin de l'un touche le commencement de l'autre. C'est là, pour M. Ribot comme pour M. Taine, le point capital. Il y a une contiguïté, non pas indéterminée, consistant en ce que deux bouts *quelconques* se touchent, mais en ce que 'le bout *initial*' de l'état actuel touche 'le bout *final* de l'état antérieur'. Si ce simple fait est bien compris, le mécanisme *théorique* de la localisation dans le temps l'est du même coup, selon M. Ribot, car le passage régressif peut se faire également du quatrième mot au troisième et ainsi de suite, et chaque état de conscience ayant sa quantité de durée, 'le nombre des états de conscience ainsi parcourus régressivement et leur quantité de durée donnent la position d'un état quelconque par rapport au présent, son éloignement dans le temps'. Tel est le mécanisme théorique de la localisation: 'une marche régressive qui, **[66]** partant du présent, parcourt une série de termes plus ou moins longue'.

Pratiquement, tous les psychologues l'ont remarqué, nous avons recours à des procédés plus simples et plus expéditifs. Nous faisons bien rarement cette course

régressive à travers tous les intermédiaires, rarement à travers la plupart. Notre simplification consiste d'abord dans l'emploi de *points de repère*. M. Ribot en donne un exemple: 'Le 30 novembre j'attends un livre dont j'ai grand besoin. Il doit venir de loin, et l'expédition demande au moins vingt jours. L'ai-je demandé en temps utile? Après quelques hésitations, je me souviens que ma demande a été faite la veille d'un petit voyage dont je peux fixer la date d'une manière précise au dimanche 9 novembre. Dès lors, le souvenir est complet.' L'état de conscience principal – la demande du livre – est d'abord rejeté dans le passé d'une manière indéterminée. Il éveille des états secondaires: comparé à eux, il se place tantôt avant, tantôt après. 'L'image voyage, comme dit M. Taine, avec divers glissements en avant, en arrière, sur la ligne du passé; chacune des phrases prononcées mentalement a été un coup de bascule.' A la suite d'oscillations plus ou moins longues, l'image **[67]** trouve enfin sa place; elle est fixée, elle est reconnue. Dans cet exemple, le souvenir du voyage est ce que M. Ribot appelle son 'point de repère'. Le point de repère est un événement, un état de conscience dont nous connaissons bien la position dans le temps, c'est-à-dire l'éloignement par rapport au moment actuel, et qui nous sert à mesurer les autres éloignements. 'C'est un état de conscience qui, par son intensité, lutte mieux que d'autres contre l'oubli, ou qui, par sa complexité, est de nature à susciter beaucoup de rapports, à augmenter les chances de réviviscence. Ces points de repère ne sont pas choisis arbitrairement, ils s'imposent à nous.' Ajoutons, pour notre part, qu'ils sont toujours pris dans l'étendue ou liés à l'étendue. Ainsi le voyage dont parle M. Ribot était une série de scènes dans l'espace. Même si on prend pour point de repère quelque grande douleur morale ou quelque grande joie, cette douleur, cette joie est inévitablement localisée dans l'espace, et c'est seulement par là qu'elle peut être localisée dans le temps, puis servir elle-même de point de repère à de nouvelles localisations dans le temps. C'est donc bien tout d'abord par l'espace que nous fixons et mesurons le temps.

[68] M. Ribot compare les points de repère aux bornes kilométriques, aux poteaux indicateurs placés sur des routes, qui, partant d'un même point, divergent dans différentes directions. 'Il y a toutefois, ajoute-t-il, cette particularité que ces séries peuvent en quelque sorte se juxtaposer pour se comparer entre elles.' – Mais, demanderons-nous, d'où vient cette possibilité de juxtaposer des durées, alors que la juxtaposition véritable est possible seulement pour l'espace? De ce qu'en réalité, en croyant juxtaposer directement des durées, nous juxtaposons réellement des images spatiales, des perspectives spatiales. Nous prenons des années de notre vie, des périodes d'années, et chaque année est représentée par une révolution visible du soleil subdivisée en parties, où nous intercalons les principales scènes visibles de notre vie de l'année.

Les points de repère permettent de simplifier le mécanisme de la localisation dans le temps. L'événement qui sert comme point de repère revient très souvent dans la conscience; il est très souvent comparé au présent quant à sa position

dans le temps, c'est-à-dire que les états intermédiaires qui l'en séparent sont éveillés plus ou moins nettement. Il en résulte, selon MM. Taine et Ribot, que la **[69]** position du point de repère est ou semble de mieux en mieux connue. Par la répétition, cette localisation devient immédiate, instantanée, automatique. C'est un cas analogue à la formation d'une habitude. Les intermédiaires disparaissent, parce qu'ils sont inutiles. La série est réduite à deux termes, et ces deux termes suffisent, parce que leur éloignement dans le temps est suffisamment connu. 'Sans ce *procédé abréviatif*, sans la disparition d'un nombre prodigieux de termes, la localisation dans le temps serait très longue, très pénible, restreinte à d'étroites limites. Grâce à lui, au contraire, dès que l'image surgit, elle comporte une première localisation tout instantanée, elle est posée entre deux jalons, le présent et un point de repère quelconque. L'opération s'achève après quelques tâtonnements, souvent laborieuse, infructueuse et peut-être jamais précise.'

Tout le monde remarque combien ce mécanisme ressemble à celui par lequel nous localisons dans l'espace. Là aussi, nous avons des points de repère, des procédés abréviatifs, des distances parfaitement connues que nous employons comme unités de mesure. Mais M. Ribot aurait pu ajouter qu'il y a ici plus qu'une analogie: il y a une identité. A **[70]** vrai dire, pour localiser dans le temps, nous attachons des points de repère à l'espace, et les procédés abréviatifs, si bien décrits par MM. Taine et Ribot, sont en réalité des abréviatifs d'espace, des représentations de tableaux visibles, avec des distances vaguement imaginées auxquelles on donne de la précision au moyen du *nombre*. Le moment présent est évidemment le point de départ dans toute représentation du temps. Nous ne pouvons concevoir le temps que d'un point de vue présent, duquel nous nous représentons le passé en arrière et l'avenir en avant. Mais ce point de vue est toujours quelque scène dans l'espace, quelque événement qui s'est passé dans un milieu matériel et *étendu*. Notre *représentation* même du temps, notre figuration du temps, est à forme spatiale.

L'espace que nous voyons est *devant nous*; l'espace que nous nous *représentons* simplement sans le voir est derrière nous. Nous ne pouvons même nous représenter l'espace qui est derrière notre dos qu'en imaginant que nous l'avons en face et de front. Eh bien, il en est de même du temps; nous ne pouvons nous figurer le passé que comme une perspective *derrière nous*, et le futur sortant du présent que comme une perspective **[71]** *devant nous*. La primitive figuration du temps pour l'animal et l'enfant doit être une simple file d'images de plus en plus effacées. Le temps est, à l'origine, comme une quatrième dimension des choses qui occupent l'espace. Il y a des lignes, des surfaces, des distances qu'on ne franchit qu'avec du mouvement, et enfin il y a une distance d'un genre particulier qu'on ne franchit aussi qu'en traversant des intermédiaires, celle entre l'objet désiré et l'objet possédé, celle du temps. Les heures, les jours, les années, autant de casiers vides où nous distribuons à mesure toutes les sensations qui nous arrivent. Quand les casiers sont pleins et que nous pouvons en parcourir toute

la série sans rencontrer d'hiatus ils forment ce que nous appelons le temps. Auparavant, ce n'étaient que des divisions de l'espace; maintenant l'entassement et la distribution régulière des sensations dans l'espace a créé cette apparence que nous appelons le temps.

Non seulement nous répartissons ainsi et nous étiquetons pour ainsi dire nos événements intérieurs, mais nous classons de la même manière les événements arrivés avant notre existence; bien plus, nous imposons d'avance les mêmes subdivisions au temps futur. Nous tirons du passé à l'avenir une **[72]** longue ligne chargée de divisions et qui représente au fond la ligne suivie par le soleil et les astres dans leur perpétuelle évolution. Les divisions commodes de cette ligne nous permettent d'y ranger toutes choses.

Spencer dit que, dans les premiers âges et dans les pays non civilisés, on a exprimé l'espace au moyen du temps, et que, plus tard, par suite du progrès, on a exprimé le temps au moyen de l'espace. Ainsi le sauvage, comme les anciens Hébreux, connaît la position d'une place par le nombre de journées dont elle est distante. En Suisse, on répond aux touristes que tel endroit est à tant d'heures. Cette théorie est artificielle. Il est tout simple que, de bonne heure, à défaut des mesures rigoureuses de superposition pour l'espace et quand il s'agit d'apprécier des distances de *marche*, on réponde en termes de marche et de temps. Mais la journée même et les heures, marquées par les positions visibles du soleil, sont en réalité une série régulière de scènes spatiales, d'étendues visibles. De tout cela on ne saurait donc conclure que la notion du temps ait vraiment *précédé* celle de l'espace. Le temps est un artifice de mesure indirecte pour les grands espaces, mais il n'en résulte pas qu'il y ait besoin de compter **[73]** le temps pour percevoir les premières étendues visibles ou tangibles.

Au point de vue scientifique, l'unité de mesure la plus primitive et fondamentale doit être, évidemment, une quantité qu'on puisse mesurer 1. directement, 2. par comparaison avec elle-même. Or, l'étendue remplit ces deux conditions. On la mesure en superposant directement une étendue à une étendue et en comparant l'étendue avec de l'étendue. On n'a besoin ni du temps ni du mouvement comme éléments de cette comparaison. Au contraire, le temps et le mouvement ne peuvent se mesurer directement et par eux-mêmes. Je ne puis pas superposer *directement* un temps-étalon à un autre temps, puisque le temps va toujours et ne se superpose jamais. Je puis, il est vrai, prendre un souvenir de temps et le comparer avec un temps réel, mais l'étalon, ici, n'a rien de fixe et la comparaison rien de scientifique. On est même sûr de se tromper. En outre, si vous y regardez de plus près, vous voyez que, même dans cet essai intérieur de mesure *grosso modo*, pour pouvoir comparer deux durées, vous êtes obligé de vous *représenter* la durée prise pour mesure; or, comment vous la représenterez-vous? Ce sera, si vous y faites attention, en termes d'espace. **[74]** Vous vous rappellerez ce que vous avez fait pendant un certain temps dans tel milieu, et vous comparerez ce souvenir à vos impressions présentes, pour dire: 'C'est de longueur à peu près égale ou inégale.'

Réduit à une durée sans espace, vous ne pourriez arriver à aucune mesure. Voilà pourquoi, pour mettre quelque chose de fixe dans ce perpétuel écoulement du temps, on est obligé de le représenter sous forme spatiale.

Le sens externe qui a le plus servi, après les sens internes, à tirer le temps de l'espace, à lui donner une dimension à part, c'est l'ouïe, précisément parce que l'ouïe ne localise que très vaguement dans l'espace, tandis qu'elle localise admirablement dans la durée. Un animal est couché immobile au milieu d'un paysage immobile: un son se fait entendre une fois, puis deux fois, puis trois fois: il y a là une série en contraste avec l'immuable tableau de l'espace: c'est comme l'incarnation du temps dans le son. L'ouïe s'est développée en raison de son utilité pour avertir l'animal de la proximité d'un ennemi. De là à distinguer le premier tableau extérieur sans le son, puis le second tableau avec le son, puis le troisième tableau avec l'ennemi apparaissant, il n'y a pas loin. Cette chose invisible et intangible, le son, **[75]** a dû tendre à se projeter dans un milieu différent de l'espace même, plus ou moins analogue au milieu intérieur de l'appétit vital, qui n'est autre que le temps. L'ouïe, dégagée progressivement des formes spatiales, en est devenue une sorte de numérateur rythmique; elle est, par excellence, le sens appréciateur du temps, de la succession, du rythme et de la mesure.

Un autre moyen de séparer le temps de l'espace, c'est l'imagination. Nous ne faisons pas des mouvements avec nos jambes seules, nous en faisons avec nos représentations, en passant de l'une à l'autre par la pensée, et nous ne tardons pas à distinguer ces espèces de promenades intérieures de la locomotion extérieure. Étant donné un état de conscience actuelle, nous enfilons une serie d'autres états de conscience représentés et qui aboutit toujours à l'état actuel comme à son terme. Nous allons ainsi en arrière pour revenir au point de départ. Cette sorte d'espace idéal s'oppose à l'espace réel, et nous permet de concevoir un milieu où les choses *se succèdent* au lieu d'avoir la coexistence des choses dans l'espace.

Comme l'espace nous sert à former et à mesurer le temps, le temps nous sert aussi, nous en avons vu des exemples, à calculer **[76]** l'étendue. Il se produit donc ici une action et une réaction mutuelles. Un aveugle, dira qu'une canne est longue ou courte selon qu'il mettra plus ou moins de temps à la parcourir de la main. Si la canne, au lieu d'être immobile, se mouvait dans le sens de sa main sans qu'il s'en aperçût au frottement, elle lui paraîtrait extrêmement longue, et si elle se mouvait en sens contraire, extrêmement courte. C'est ce qu'ont montré certaines observations sur Laura Bridgmann. Il ne s'ensuit pourtant pas que l'idée de *durée* proprement dite intervienne ici. L'idée de nombre suffit peut-être à expliquer le fait: un espace parcouru nous paraît plus long lorsqu'il donne lieu à des sensations plus nombreuses, moins long lorsqu'il nous fournit un moindre nombre de sensations. Je ne veux pas dire que nous comptions une à à une nos sensations; nous ne comptons pas davantage les mètres cubes de terre contenus dans deux montagnes inégales, et cependant nous déclarons à première vue que

l'une des deux est plus grande que l'autre et contient plus de terre. Il peut y avoir nombre sans qu'il y ait numération; on peut calculer en gros sans entrer dans le détail. Les animaux ne connaissent pas l'arithmétique, et cependant une chienne s'apercevra très bien si le **[77]** nombre de ses petits a diminué ou augmenté. Certaines peuplades humaines sont incapables de compter au delà de deux. Les Damaras sont de ce genre; cependant ils mènent d'immenses troupeaux de boeufs, et remarquent fort bien quand l'une des têtes de leur bétail vient à manquer. Pour évaluer le nombre de nos sensations, nous procédons à la manière des animaux et des sauvages, – à vue d'oeil et par approximation. Le résultat de cette évaluation, c'est à la fois la longueur apparente du temps et l'étendue de l'espace parcouru pendant ce temps.

Ce qui prouve bien que nous mesurons le temps au nombre des sensations et nullement à leur durée véritable, c'est la façon dont nous évaluons approximativement la longueur d'un rêve. Là, plus de mesure artificielle du temps: le tic-tac d'une montre ne donne plus les heures. Eh bien, dans cette appréciation où n'entre plus d'autre élément que la conscience, c'est uniquement au nombre des images passées devant nos yeux que nous nous en référons pour juger du temps écoulé, et de là les erreurs les plus singulières. Tel rêve paraît avoir duré plusieurs heures qui n'a duré en réalité que quelques secondes. On connaît l'exemple d'un **[78]** étudiant qui, s'affaissant tout à coup en proie à une sorte de sommeil léthargique et relevé aussitôt par ses camarades, entrevit avec netteté, dans ce court instant, les péripéties innombrables d'un long voyage en Italie. Si on eût dire à cet homme d'évaluer lui-même le temps de son sommeil, il l'eût sans aucun doute évalué à plusieurs heures; il ne pouvait pas se figurer que cette foule de villes, de monuments, de gens, d'événements de toute sorte, avait en deux ou trois secondes passé devant ses yeux. La chose, en effet, était extraordinaire et ne pouvait se produire que dans un rêve, où les images, n'étant attachées à aucun lien fixe de l'espace, peuvent se succéder avec une rapidité sans pareille. Il n'en saurait être ainsi pendant la veille, car l'homme se meut relativement dans l'espace avec une lenteur assez grande. Quoi qu'il en soit, ce qui ressort de ces exemples, c'est que nous n'avons véritablement pas conscience de la *durée* de nos sensations et perceptions par l'application d'une forme *a priori*, mais que nous évaluons *a posteriori* cette durée d'après leur nombre et leur variété.

Sous les villes englouties par le Vésuve on trouve encore, si on fouille plus avant, les traces de villes plus anciennes, précédemment **[79]** englouties et disparues. Les hommes ont dû élever l'une sur l'autre leurs constructions, que recouvrait périodiquement la cendre montante: il s'est formé comme des couches de villes; sous les rues il y a des rues souterraines, sous les carrefours des carrefours, et la cité vivante s'appuie sur les cités endormies. La même chose s'est produite dans notre cerveau; notre vie actuelle recouvre sans pouvoir l'effacer notre vie passée, qui lui sert de soutien et de secrète assise. Quand nous descendons en nous-mêmes, nous nous perdons au milieu de tous ces débris. Pour les

restaurer, pour les reconstruire, pour les ramener enfin à la pleine lumière, c'est la classification dans l'espace qui est le moyen principal et presque unique.

La mémoire formée, le *moi* est formé. Le temps et le mouvement sont dérivés de deux facteurs essentiels: au dehors l'inconnu, et au dedans une certaine activité, une certaine énergie se déployant. Nous ne pouvons ni nous connaître nous-mêmes en notre fond, ni connaître ce quelque chose qui existe au dehors de nous et dont notre moi lui-même est en grande partie dérivé. Quelles sont les **[80]** puissances que nous renfermons en nous-mêmes, et jusqu'où peut aller en son développement cette activité qui s'agite en nous; et d'autre part, quel est le secret de cette nature muette qui nous enveloppe? Voilà les deux inconnaissables auxquels se ramènent, croyons-nous, tous les autres, y compris le temps.

Nous avons vu que la mémoire est le sentiment du même opposé à l'idée du différent et du contraire, or, selon les physiologistes, ce qui produit la sympathie, c'est de découvrir une ressemblance, une harmonie entre nous et autrui; nous nous retrouvons dans autrui par la sympathie; de même nous nous retrouvons dans le passé par la mémoire.[a] La mémoire et la sympathie ont donc au fond la même origine.

Ajoutons que la mémoire produit, elle aussi, l'attachement aux objets qui provoquent le mieux ce sentiment du même et nous font mieux revivre à nos propres yeux. Des liens secrets nous rattachent par le plus profond de notre être à une foule de choses qui nous entourent, qui semblent insignifiantes à tout **[81]** autre et qui n'ont une voix et un langage que pour nous. Mais cet amour confus que produisent la mémoire et l'habitude n'est jamais exempt de tristesse; il est même une des plus vives sources de nos peines, car son objet varie toujours à la longue et s'associe inévitablement au souvenir de choses qui ne sont plus, de choses perdues. La conscience est une représentation d'objets changeants; mais elle ne change pas aussi vite qu'eux; pendant qu'un milieu nouveau se fait auquel il faut que nous nous accommodions, nous gardons encore dans les profondeurs de notre pensée le pli et la forme de l'ancien milieu; de là une opposition au sein même de la conscience, deux tendances qui nous portent, l'une vers le passé auquel nous tenons encore par tant d'attaches, l'autre vers l'avenir qui s'ouvre et auquel déjà nous nous accommodons. Le sentiment de ce déchirement intérieur est une des causes qui produisent la tristesse du souvenir réfléchi, tristesse qui succède, chez l'homme, au charme de la mémoire spontanée. Il y a dans la méditation d'un événement passé, quel qu'il soit, un germe de tristesse qui va s'augmentant par le retour sur soi. Se rappeler, pour l'être qui réfléchit, c'est être souvent bien près de souffrir. L'idée de passé et d'avenir **[82]** n'est pas seulement la condition nécessaire de toute souffrance morale; elle en est aussi, à

[80]a. Nous remarquons la même idée éloquemment exprimée dans la *Psychologie* de M. Rabier.

un certain point de vue, le principe. Ce qui fait la grandeur de l'homme, – pouvoir se retrouver dans le passé et se projeter dans l'avenir, – peut devenir à la fin une source perpétuelle d'amertume. L'idée du temps, à elle seule, est le commencement du regret. Le regret, le remords, c'est la solidarité du présent avec le passé: cette solidarité a toujours sa tristesse pour la pensée réfléchie, parce qu'elle est le sentiment de l'irréparable. Aussi y a-t'-il dans le simple souvenir, dans la simple conscience du passé, une image du regret et même du remords, et c'est ce que le poète a exprimé avec profondeur dans ce vers:

Comme le souvenir est voisin du remords!

Le souvenir est toujours la conscience de quelque chose à quoi nous ne pouvons rien changer, – et cependant ce quelque chose se trouve être attaché à nous pour toujours. Le remords aussi est le sentiment d'une impuissance intérieure, et ce sentiment même est déjà contenu vaguement dans le souvenir par lequel nous évoquons une vie qui nous échappe, **[83]** un monde où nous ne pouvons plus rentrer. La légende sacrée raconte que nos premiers pères se prirent à pleurer lorsque, sortis du paradis perdu, ils le virent reculer derrière eux et disparaître: c'est là le symbole du premier remords, mais c'est aussi le symbole du premier souvenir. Chacun de nous, si peu qu'il ait vécu, a son passé, son paradis perdu, rempli de joies ou de tristesses, et où il ne pourra plus jamais revenir, ni lui ni ses descendants.

S'il y a quelque amertume au fond de tout souvenir, même de celui qui est d'abord agréable, que sera-ce dans celui des douleurs, surtout des douleurs morales, les seules qu'on puisse se figurer et ressusciter entièrement? Le souvenir douloureux s'impose parfois à l'homme mûr avec une force qui s'augmente de l'effort même qu'il fait pour s'en débarrasser. Plus on se débat pour y échapper, plus on s'y enfonce. C'est un phénomène analogue à celui de l'enlisement sur les grèves. Nous nous apercevons alors que le fond même de notre être est mouvant, que chaque pensée et chaque sensation y produisent des remous et des ondulations sans fin, qu'il n'y a pas de terrain solide sur lequel nous marchions et où nous puissions nous retenir. Le *moi* échappe **[84]** à nos prises comme une illusion, un rêve; il se disperse, il se résout dans une multitude de sensations fuyantes, et nous le sentons avec une sorte de vertige s'engloutir dans l'abîme mouvant du temps.

[85]

CHAPITRE V

Les Illusions du Temps Normales et Pathologiques

I

L'estimation de la durée n'étant qu'un phénomène d'optique intérieure, une perspective d'images, ne peut pas ne pas offrir un caractère d'essentielle relativité. Elle est relative, en effet; 1. à l'*intensité* des images représentées; 2. à l'intensité des *différences* entre ces images; 3. au *nombre* de ces images et au nombre de leur différences; 4. à la *vitesse* de succession de ces images; 5. aux relations mutuelles entre ces images, entre leurs intensités, entre leurs ressemblances ou leurs différences, entre leurs durées diverses, et enfin entre leurs *positions* dans le temps; 6. au temps nécessaire pour la conception de ces **[86]** images et de leurs rapports; 7. à l'intensité de notre attention à ces images ou aux émotions de plaisir et de peine qui accompagnent ces images; 9. aux appétits, désirs ou affections, qui accompagnent ces images; 10. au rapport de ces images avec notre *attente*, avec notre prévision.

On voit combien sont nombreux les rapports de représentation, d'émotion et de volition qui influent sur le sentiment de la durée.

Nous ne saurions donc admettre les lois trop simples qui ont été proposées et qui, selon nous, expriment seulement un des aspects de la question. Ainsi Romanes, dans ses recherches sur la conscience du temps, dit que, outre le *nombre* des états de conscience, le facteur additionnel qui agit pour allonger ou raccourcir le temps est 'le rapport des états de conscience à leur propre succession'. Dans les expériences où il faut noter la seconde, le temps paraît relativement long: c'est, selon Romanes, que, dans ce cas, l'attention est concentrée tout entière sur la production d'une seule et unique série de changements, telle que les battements du chronomètre; ces changements forment donc, à ce moment, le

contenu total de la conscience; dès lors, tous leurs rapports de succession sont imprimés **[87]** nettement dans la mémoire, qu'ils replissent. Il résulte de ce grand nombre d'impressions nettes que la série donne l'impression d'une plus grande longueur.

Tout le monde a remarqué la déformation des objets dans le souvenir. On les voit généralement plus grands ou plus petits, plus agréables ou plus douloureux, plus beaux ou plus laids, etc. D'ordinaire, le temps est la grande estompe des choses, qui efface on adoucit les contours. Cette déformation s'explique par la lutte pour la vie; parmi les traces restantes, celles qui sont les plus profondes sont les plus vivaces. Aussi le caractère qui, dans un objet, nous a le plus frappé tend à effacer tous les autres: l'ombre se fait autour de lui, et lui seul apparaît dans la lumière intérieure. Quand je revois la rue où j'ai joué dans mon enfance, et qui me paraissait alors si large, si longue, je la trouve toute petite, et j'en suis étonné. C'est que, dans mon enfance, toutes mes impressions étaient intenses, étaient neuves et fraîches. L'impression causée par les dimensions de la rue était donc vive. Quand je revois plus tard la rue par le souvenir, l'intensité de mes impressions subjectives se transporte à l'objet même et se transforme en grandeur spatiale, précisément parce que, dans **[88]** la mémoire, tout tend à prendre la forme spatiale, même la durée.

Les exemples les plus frappants d'erreurs qu'engendre la vivacité de l'image, laquelle a pour effet de détacher l'événement de la série des points de repère dont nous avons jalonné le passé, nous sont fournis, selon James Sully, par les événements publics qui dépassent le cercle étroit de notre vie personnelle et qui ne se rattachent pas, selon le cours naturel des choses, à des points localisés d'une façon bien définie dans le temps. Ces événements peuvent nous émouvoir et nous absorber sur le moment même; mais, dans bien des cas, ils quittent l'esprit aussi vite qu'ils y sont entrés. Nous n'avons aucune occasion d'y revenir; et si par hasard on nous les rappelle ensuite, on peut être à peu près sûr qu'ils nous paraîtront trop rapprochés, dans le temps, justement parce que l'intérêt qu'ils ont excité a donné à leurs images une vivacité particulière. James Sully cite un exemple curieux d'illusion de ce genre fourni, il n'y a pas longtemps, par le cas des *détectives* dont les journaux rappelèrent le procès et la condamnation à propos de l'expiration de leur peine (trois ans de travaux forcés). 'La nouvelle que trois années entières s'étaient écoulées depuis **[89]** ce procès bien connu m'étonna beaucoup et produisit le même effet sur beaucoup de mes amis; nous fûmes tous d'avis que l'événement ne nous paraissait pas éloigné de plus d'un tiers de sa distance réelle. Plus d'un journal parla alors de cette brièveté apparente du temps écoulé, et ceci montre clairement qu'il y avait à l'oevre une certaine cause qui produisait une illusion générale.' La distance apparente d'un événement qui n'est pas nettement localisé dans le passé varie en raison inverse de la vivacité de l'image mnémonique; toute concentration consciente de l'esprit sur un souvenir tendra donc à le rapprocher. C'est, dit James Sully, comme lorsqu'on regarde un

objet éloigné à travers une lorgnette: la brume disparaît, des détails nouveaux surgissent, jusqu'à ce que nous en venions presque à nous figurer que l'objet est à notre portée.

Dans les cas où l'esprit, sous l'influence d'une disposition maladive à nourrir une passion, s'habitue à revenir sans cesse sur quelque circonstance pénible, cette illusion momentanée peut devenir périodique et conduire à une confusion partielle des expériences lointaines et des expériences toutes voisines. Une offense dont on a longtemps entretenu le **[90]** souvenir fait à la fin l'effet de quelque chose qui avancerait à mesure que nous avançons; elle se présente toujours à notre mémoire comme un événement tout récent. Dans les états d'aliénation mentale amenés par quelque grande secousse, nous voyons cette tendance à ressusciter le passé enseveli se développer librement: 'les événements éloignés, les circonstances lointaines viendront se confondre avec les faits présents'.[a]

Une autre cause d'erreur dans notre appréciation de la durée, c'est que nous sommes portés à combiner le temps exigé par la représentation d'un événement avec le temps réel qu'a duré l'événement. Dans les expériences psychophysiques, si on me demande la durée de battements courts du métronome, je la fais trop grande. C'est que j'ajoute inconsciemment le temps qu'il me faut pour me représenter et apprécier le battement à la durée objective du battement même, qui ainsi me paraît accrue. Au contraire, si les battements sont très lents, je tends à les faire plus courts qu'ils ne sont: la représentation est alors plus rapide que le battement même, et je tends à confondre la vitesse subjective avec la vitesse objective, **[91]** comme je tendais, tout à l'heure, à confondre la lenteur subjective avec une lenteur objective. Le danseur à qui ont veut faire suivre un rythme trop rapide est haletant et reste en arrière; celui qu'on veut faire aller trop lentement demeure le pied en l'air, porté à presser le mouvement. L'effort, plus ou moins bref et rapide, joue donc un rôle considérable dans notre idée du temps. C'est par l'effort et le désir que nous avons fait connaissance avec le temps; nous gardons l'habitude d'estimer le temps selon nos désirs, nos efforts, notre volonté propre. Nous altérons sa longueur par notre impatience et notre précipitation, comme nous altérons sa rapidité par notre lent effort pour nous la représenter.

L'estimation de la durée dans le passé dépend de la durée que nous paraît avoir l'opération reproductive elle-même, l'effort pour se souvenir des divers événements. Ainsi, quand tous les événements se tiennent et se ressemblent, l'effort d'attention nécessaire au rappel des souvenirs s'*adapte* immédiatement à chacune des images successives, comme le remarque Wundt, et la série, facilement parcourue, semble moins longue; au contraire, si les événements sont discontinus, sans lien, ou très divers et dissemblables, l'effort de **[92]** reproduction demande plus de temps et la série des événements paraît elle-même plus longue. Il en est ici comme dans le cas de deux lignes horizontales également longues, mais dont

[90]a. James Sully, *Ibid.*

la seconde est hachée de traits verticaux qui la coupent: la seconde paraît plus longue; c'est que l'oeil en la parcourant est arrêté par les divers traits et, le mouvement du regard étant ainsi ralenti, la ligne acquiert un surplus illusoire de longueur. Des phénomènes d'optique analogues se produisent pour le temps. Mais c'est là un des éléments d'explication, non le tout.

Dans les expériences psycho-physiques sur l'appréciation de la durée des battements chronométriques, on remarque que le point où l'intervalle de temps apprécié est, en moyenne, égal à l'intervalle de temps réel et le reproduit fidèlement, est autour de 0,72 de seconde; or, c'est aussi la valeur moyenne de la durée nécessaire en général pour la reproduction par la mémoire ou représentation. Une vitesse de 3/4 de seconde environ est donc celle où les processus de reproduction et d'association s'accomplissent le plus facilement. De là Wundt conclut que, quand nous avons à nous représenter des temps objectifs plus longs ou plus courts, nous essayons **[93]** involontairement de les rendre égaux à cette vitesse normale de notre représentation, tout au moins à les en rapprocher. C'est une des raisons qui expliquent que nous raccourcissons les battements plus lents que trois quarts de seconde, et que nous rallongeons les battements plus courts. Là encore, c'est une raison de désir et de bien-être qui domine notre représentation du temps. Mais il y a un fait plus curieux encore, que Wundt remarque. C'est que ce même chiffre de 3/4 de seconde est aussi celui qu'emploie la jambe pour faire un pas dans une marche rapide. C'est donc, au fond, ajouterons-nous, à la durée du *pas dans l'espace* que nous mesurons le temps. Il est probable que c'est le pas qui a été notre première mesure pour l'espace et, par cela même, pour le temps. A l'origine, la forme la plus générale du temps était la série d'images que l'on a quand on fait une série de mouvements de locomotion, une série de pas. On voit alors les objets se déplacer à droite et à gauche, et si on revient en arrière, on les retrouve. Les trois dimensions de l'espace et la dimension unique du temps s'organisent ainsi d'elles-mêmes dans l'imagination. Aujourd'hui encore nous rythmons sur notre pas la vitesse de notre représentation, et, par une tendance naturelle, **[94]** nous voulons adapter le pas du temps au pas de notre pensée et au pas de nos jambes.[a]

Stevens a trouvé des résultats opposés à ceux de Vierord,[b] de Mach,[c] de Kollert,[d] d'Estel,[e] de Mehner.[f] Selon Stevens, nous raccourcissons encore les temps courts

[94]a. Ajoutons qu'en musique un mouvement de 0.72 constitue un bon *andante* qui ne va ni trop lentement ni trop vite, mais d'une marche naturelle.

[94]b. Der Zeitsinn, 1868.

[94]c. Voir Wundt, Physiol. Psych. 1. Aufl. s. 785.

[94]d. *Philosophische Studien*, Bd. 1 Heft 1, s. 88.

[94]e. *Ibid.*, Bd. II, 1, 37.

[94]f. *Ibid.*, Bd. II, Heft 4, s. 546.

et nous rallongeons encore les temps longs. Dans les expériences de Stevens le 'point d'exactitude', c'est-à-dire de reproduction fidèle, est d'ailleurs le même que pour les autres expérimentateurs. Mais il faut remarquer que les conditions de l'expérimentation ne sont pas les mêmes. Vierord et ses successeurs faisaient une comparaison de deux intervalles de temps, et le processus était purement *mental*. Stevens s'attache à un intervalle de temps et fait reproduire le même intervalle. Il en résulte l'intervention d'éléments tout nouveaux et de causes perturbatrices, comme Stevens lui-même le reconnaît: exercice de la volonté, impulsion motrice, transmission le long des nerfs efférents, enfin période latente de la contraction **[95]** musculaire. Stevens ne propose lui-même aucune explication des résultats qu'il a consignés. Peut-être, la volonté de reproduire et le mouvement reproducteur étant les choses les plus importantes dans ses expériences, arrivera-t-on à ce résultat: quand l'intervalle à reproduire est au-dessous du point d'indifférence, on a beau se le *répresenter* d'abord plus long qu'il n'est, on s'aperçoit qu'il est rapide et on s'imprime à soi-même, dans la reproduction motrice, une vitesse ayant pour but de ne pas rester au-dessous du type. Cette vitesse aboutit à raccourcir encore les intervalles déjà courts. Au contraire, quand l'intervalle de temps est au-dessus du point d'indifférence, il paraît long malgré le raccourcissement que l'imagination en fait malgré elle, et la volonté imprime un mouvement lent, un mouvement contenu, par peur de trop précipiter. Il en résulte un ralentissement final des intervalles déjà lents. Le musicien auquel le métronome indique un mouvement rapide tend à le presser encore par peur de rester au-dessous; si le métronome lui indique un mouvement lent, il le ralentit encore par crainte d'aller trop vite. Telle est l'explication que nous proposerions des divergences signalées entre les expérimentateurs.

[96] Selon Estel, nos représentations de temps, comme les autres sensations et représentations, sont influencées par les impressions passées appartenant au domaine d'un même sens. Un temps qui a été court, par exemple, dans le domaine de l'ouïe, fait paraître le suivant plus court.[a]

L'influence de l'attente sur la durée apparente est bien connue. Si l'attente paraît *longue*, c'est qu'elle est une série de déceptions, de *pas encore*. Notre désir, en se joignant à la représentation de l'objet attendu, – l'arrivée de celle qu'on aime, par exemple, – tend à nous figurer le futur comme présent, et comme nous voudrions qu'il se réalisât tout de suite, nous sautons à pieds joints sur les intermédiaires, nous nous figurons la distance franchie; conséquemment, nous la voulons et nous la concevons plus courte qu'elle ne peut l'être on ne doit l'être. De là les interminables *quand?* Par comparaison avec le temps idéal et idéalement précipité, le temps réel nous paraît se traîner d'une façon désespérante.

Quand l'attente a pris fin, les uns disent (avec Wundt) que le temps qui leur avait paru si long se raccourcit tout d'un coup par **[97]** l'oubli de leur ennui; les

[96]a. *Philosophische Studien*, II, fascicule 1.

autres disent (avec James Sully) qu'ils n'oublient nullement leur ennui et que le temps de l'attente reste marqué dans leur mémoire d'un caractère de lenteur. Tout dépend, ici encore, du point de comparaison et de la présence ou de l'absence du souvenir d'ennui.

Maintenant, pourquoi le temps du bonheur, – du jeu pour l'enfant, de l'entretien amoureux pour le jeune homme, – paraît-il avoir *fui* avec une si désolante rapidité? C'est que, par l'anticipation idéale, nous nous étions promis et avions désiré un long bonheur, – un bonheur même qui ne dût point finir: par comparaison avec l'origine de notre désir et de notre attente combien la réalité paraît brève! Quoi! déjà? Nous avions projeté devant nous, par l'imagination, un chemin long à parcourir, un vrai chemin des amoureux, et quand il est parcouru, il nous paraît nécessairement trop court. Dans les jours de bonheur, nous nous arrachons à regret à chaque heure qui passe: elle laisse en nous un lumineux sillon et nous restons encore longtemps à suivre cette trace, qui pâlit sans s'éteindre, en fascinant nos yeux.

Wundt explique la plupart des erreurs relatives à la durée par les variations de **[98]** l'*aperception*, c'est-à-dire de l'*attention aux représentations*, qui est en un état de tension plus ou moins grande. Mais le degré d'attention n'est ici qu'un élément secondaire. La vraie tension est dans le désir, dans l'appétition, dans cette espèce de poussée intérieure qui va du présent, tantôt à un terme futur désiré, tantôt à un terme futur redouté. Dans le premier cas, le temps va trop lentement; dans l'autre. il va trop vite; c'est à notre désir que nous mesurons malgré nous sa longueur: le *temps apparent* varie donc en fonction de l'appétit ou du désir.

James Sully remarque que le raccourcissement du temps apprécié *à distance* ne se fait suivant aucune loi. On ne peut pas dire qu'il soit proportionnel à l'éloignement; on doit même dire qu'il ne l'est pas. 'Si je me représente mes dix dernières années par une ligne longue d'un mètre, la dernière année s'étend sur trois ou quatre décimètres; la cinquième, riche en événements, s'étend sur deux décimètres; les huit autres se resserrent sur ce qui reste.' En histoire, la même illusion a lieu. Certains siècles paraissent plus longs: 'la période qui va de nos jours à la prise de Constantinople paraît plus longue que celle qui va de cet événement à la **[99]** première croisade, quoique les deux soient à peu près égales chronologiquement. Cela vient problablement de ce que la première période nous est mieux connue et que nous y mêlons nos souvenirs personnels.'

Selon nous, la longueur apparente du temps apprécié à distance croît en raison du nombre de *différences* tranchées et *intenses* aperçues dans les événements remémorés. Une année remplie d'événements marquants et divers paraît plus longue. Une année vide et monotone paraît plus courte: les impressions se superposent et les intervalles de temps, se fondant l'un dans l'autre, semblent se contracter. Or, c'est encore là un phénomène analogue à ce qui se passe dans l'espace. La distance d'un objet paraît plus grande pour les yeux quand il y a un

certain nombre d'objets intercalés qui sont autant de points de repère. De même encore que, dans l'espace, les objets très nets paraissent plus rapprochés, nous avons vu que les choses très nettes dans le temps semblent d'hier.

L'erreur dans l'appréciation du temps est plus grande pour les périodes reculées que pour des périodes récentes de même longueur: ainsi l'estimation rétrospective d'une durée fort éloignée du moment présent, par exemple **[100]** du temps qu'on a passé à l'école, est bien plus superficielle et bien plus fragmentaire que celle d'une période égale, mais récente. La perspective dans le temps passé correspond donc à une perspective dans l'espace où la quantité d'erreur apparente due au raccourci croîtrait avec la distance.[a]

C'est d'une manière analogue que s'explique, selon nous, le fait souvent cité des années qui paraissent si longues dans la jeunesse et si courtes dans la vieillesse. La jeunesse est impatiente en ses désirs; elle voudrait dévorer le temps, et le *temps se traîne*. De plus, les impressions de la jeunesse sont vives, neuves et nombreuses; les années sont donc remplies, différenciées de mille manières, et le jeune homme revoit l'année écoulée sous la forme d'une longue série de scènes dans l'espace. Le fond du théâtre recule alors dans le lointain, derrière tous les décors changeants qui se succèdent comme des changements à vue: on sait que, dans les théâtres, une file de décors est au-dessous de la scène, prête à monter devant le spectateur. Ces décors, ce sont les tableaux de notre passé qui reparaissent; il y en a de plus effacés, de plus estompés **[101]** et brumeux, qui font un effet de lointain, d'autres qui font un effet de coulisses. Nous les classons selon leur degré d'intensité et selon leur ordre d'apparition. Le machiniste, c'est la mémoire. C'est ainsi que, pour l'enfant, le premier janvier passé recule indéfiniment derrière tous les événements qui l'ont suivi, et le premier janvier futur paraît aussi fort loin, tant l'enfant a hâte de grandir; au contraire, la vieillesse, c'est le décor du théâtre classique toujours le même, un endroit banal; tantôt une véritable unité de temps, de lieu et d'action, qui concentre tout autour d'une occupation dominante en effaçant le reste; tantôt une nullité d'action, de lieu et de temps. Les semaines se ressemblent, les mois se ressemblent; c'est le train monotone de la vie. Toutes ces images se superposent et n'en font plus qu'une. L'imagination voit le temps en raccourci. Le désir aussi le voit de même; à mesure qu'on approche du terme de la vie, après chaque année, on dit: encore une de moins! qu'ai-je eu le temps de faire? qu'ai-je senti, vu, accompli de nouveau? Comment peut-il s'être écoulé trois cent soixante-cinq jours qui font l'effet de quelques mois?

Voulez-vous rallonger la perspective du temps, remplissez-le, si vous pouvez, de mille **[102]** choses nouvelles. Faites un voyage qui vous passionne, qui vous fasse redevenir jeune en rajeunissant le monde autour de vous. Les événements accumulés, les espaces parcourus s'ajouteront, bout à bout, dans votre imagination

[100]a. James Sully. *Les Illusions*, p. 179.

rétrospective: vous aurez des fragments du monde visible en grand nombre et disposés en série, et ce sera, comme on dit avec tant de justesse, un long *espace* de temps.

Selon M. Janet, la durée apparente d'une certaine portion de temps, dans la vie de chaque homme, serait 'proportionnelle à la durée totale de cette vie'.[a] Une année, dit-il, pour un enfant de dix ans, représente le dixième de son existence; pour un homme de cinquante ans, cette même année ne sera plus qu'un cinquantième; elle paraîtra ainsi cinq fois plus courte. D'autre part, pour l'enfant, l'âge de cinquante ans paraît prodigieusement avancé, mais non pour le cinquantenaire. Cette loi ne s'appliquerait d'ailleurs qu'aux périodes assez longues, comme les années, non aux jours ou aux mois, que nous se songeons point à comparer avec toute une vie. La loi de M. Janet nous semble exprimer une tendance réelle de l'imagination, qui consiste à juger les **[103]** grandeurs relativement à ce qu'elle peut se représenter de plus grand ou de plus petit: pour celui qui n'a point parcouru beaucoup de pays, le village paraît grand; pour qui a vu Paris, la ville de province semble petite. Mais la loi proposée par M. Janet est beaucoup trop mathématique et trop simple pour expliquer, à elle seule, le raccourcissement apparent des années aux yeux du vieillard. La fusion des impressions semblables et des périodes similaires qui se recouvrent l'une l'autre nous paraît jouer ici un bien plus grand rôle.

M. Janet donne encore pour exemple de notre appréciation de la durée par comparaison de la partie au tout que, dans un voyage en chemin de fer, si vous n'allez que de Paris à Orléans, vous serez déjà fatigué à Choisy; si vous allez de Paris à Bordeaux, vous n'éprouverez le même sentiment de fatigue et d'ennui qu'à Orléans. Selon nous, ce fait s'explique par la différence entre les *attentes*. Quand vous allez de Paris à Bordeaux, vous vous attendez à un long trajet, vous vous résignez d'avance et vous n'éprouvez la révolte de l'ennui que plus tard. Si vous vous embarquez pour Orléans, vous dites d'avance: ce n'est pas très long, je serai bientôt arrivé; et **[104]** à Choisy, vous vous écriez: c'est plus long que je ne croyais. Ce serait donc, ici encore, l'élément d'attention, d'attente et d'appétition qui serait la chose importante.

Nous nous représentons et estimons objectivement une durée par la série des états de conscience représentables et effectivement représentés que nous plaçons dans cette durée. En d'autres termes, nous jugeons la longueur du temps écoulé par la série de *souvenirs* que nous y intercalons. Ce dont nous ne nous souvenons pas ne peut naturellement entrer dans la série. Il en résulte cette conséquence que, plus nous aurons des souvenirs nombreux, intenses et distincts à intercaler entre deux extrèmes, plus l'intervalle nous paraîtra grand. Or, l'enfant a beaucoup de représentations nombreuses et distinctes à loger dans une année. Au contraire, pour l'homme mûr, les souvenirs se fondent et se recouvrent, et il ne reste que

[102]a. *Revue philosophique*, 1877, I, 497.

quelques points saillants. C'est là la principale explication du raccourcissement apparent des années. Inversement, si un songe d'une nuit paraît durer un siècle, c'est qu'il y a eu une succession très rapide d'images vives et distinctes: la série en se remplissant paraît s'allonger.

Maintenant, quelles sont les représentations **[105]** les plus facilement représentables à la mémoire, conséquemment les plus faciles à loger dans la perspective du temps? Ce sont, outre les grandes émotions, les représentations spatiales. Nos plaisirs et nos peines physiques ne se représentent que vaguement et en gros à la mémoire, nos peines et plaisirs moraux empruntent leur netteté aux idées, qui elles-mêmes empruntent leur précision aux lieux, au milieu visible. De là vient que, comme on l'a vu, pour imaginer le temps, nous imaginons surtout des espaces, et nous apprécions la longueur des temps par la quantité d'espaces ou de scènes spatiales que nous intercalons entre les deux limites.

James Sully compare donc avec raison certaines illusions sur la distance dans le temps à des illusions parallèles sur la distance dans l'espace. Regardez la Jungfrau de la Wengernalp: il semble que vous allez, en lançant une pierre, franchir la vallée profonde et atteindre le glacier éblouissant de blancheur. C'est que rien ne s'interpose, dans la transparence de l'air, entre vous et cette vision si nette: les points de repère vous manquent, et vous dites: c'est tout près. De même, s'il est des événements frappants qui nous semblent d'hier, c'est que nous ne pouvons parcourir tous les **[106]** intermédiaires: ils se détachent devant nous tout comme la montagne, et tout le reste a disparu. Si on vous rappelle alors le nombre d'années qui se sont écoulées, vous dites: est-ce possible? Au fond, ce que vous revoyez encore ici, par les yeux de l'imagination, c'est un certain coin de l'espace où quelque chose s'est passé, quelque chose d'heureux peut-être pour vous, et de regretté; – tous les autres espaces parcourus disparaissent alors: vous voyez votre bonheur passé se dresser devant vous comme un sommet dans la pleine lumière; il semble tout près dans le temps, parce que votre imagination le voit tout près dans l'espace où elle situe les choses.

Ainsi la mesure du temps, comme le temps lui-même, est un effet de perspective, et même, en grande partie, de perspective spatiale représentée à l'imagination. Selon le centre de perspective et selon la mesure dont on se sert, la perspective s'allonge ou se raccourcit: c'est simplement un effet d'*optique* imaginative. Pour mettre de la fixité dans ces visions de tableaux, nous sommes obligés d'emprunter à l'espace extérieur de quoi contrôler l'espace intérieur: nous faisons appel au retour du jour et de la nuit, à celui des **[107]** saisons, ou, artificiellement, aux battements isochrones du pendule.

La poésie du temps, avec ses illusions, vient d'abord de ce que nous *idéalisons* les choses passées. Un *idéal* est une forme qui ne conserve que ce qu'il y a de caractéristique et de typique, avec élimination des détails défavorables et augmentation d'intensité pour les détails favorables; or le temps, par lui-même et

par lui seul, est un artiste qui idéalise les choses. En effet, nous ne nous rappelons des choses passées que les traits saillants et caractéristiques; les menus détails, qui se font opposition les uns aux autres, disparaissant par cela même, il ne surgit que ce qui eut de la force, de l'intensité, de l'intérêt. C'est l'équivalent de la vision dans l'espace pour les effets de lointain. Les représentations vives et grandes subsistent seules. Si l'oeil apercevait à la fois tous les petits détails d'un paysage il n'y aurait plus de vrai paysage, mais un pêle-mêle de sensations toutes sur le même plan. L'oeil est un peintre, et un peintre habile. De même pour l'oeil intérieur, qui voit les choses à distance dans le temps.

En outre, cet effet d'idéalisation s'accumule et s'accroît avec le temps même, comme par **[108]** une vitesse acquise dans un certain sens. Nous tendons à embellir ce qui nous a plu, à enlaidir ce qui nous a déplu, et cette tendance, ajoutant sans cesse ses effets à eux-mêmes, finit par atteindre un point maximum de beauté ou de laideur, qui est l'adaptation du souvenir à notre disposition personnelle. Le tableau est fait, le paysage est terminé. Maintenant il sera 'acquis à l'histoire' que les choses se sont passées de telle manière, ou superbe ou affreuse, que telle personne avait une beauté admirable, que telle autre avait une laideur non moins prodigieuse, etc.

Nous avons montré ailleurs[a] que le temps devient une classification spontanée des choses selon leur rapport à nous, et que cette classification est nécessairement esthétique. Le temps est donc un jugement porté sur la force et sur la valeur esthétique des choses et des événements.

[108]a. *L'art au point de vue sociologique.*

[109]

II

Dans la folie, les faits passés peuvent être ou bien effacés complètement de la mémoire (ce qui est rare), ou bien reportés à une très grande distance dans le temps; c'est le cas le plus fréquent. Ils sont alors devenus si vagues et si étrangers à l'individu que c'est à peine s'il peut les reconnaître pour des faits qui lui sont arrivés à lui-même. La folie supprime donc ou altère la perspective du temps.

Parmi les illusions pathologiques relatives au temps, une des plus curieuses est la 'fausse mémoire', qui consiste à croire qu'un état présent, nouveau en réalité, a été antérieurement éprouvé quoiqu'il se produise réellement pour la première fois; il paraît **[110]** alors être une répétition, un *passé*. Wigan, dans son livre sur la 'Dualité de l'esprit', rapporte que, 'pendant qu'il assistait au service funèbre de la princesse Charlotte, dans la chapelle de Windsor, il eut tout d'un coup le sentiment d'avoir été autrefois témoin du même spectacle'? Lewes rapproche ce phénomène de quelques autres plus fréquents. En pays étranger, le détour brusque d'un sentier ou d'une rivière peut nous mettre en face de quelque paysage qu'il nous semble avoir autrefois contemplé. 'Introduit pour la première fois auprès d'une personne, on *sent* qu'on l'a déjà vue. En lisant dans un livre des pensées nouvelles, on sent qu'elles ont été présentes à l'esprit antérieurement.' [a]

Selon M. Ribot, cette illusion s'explique assez facilement. L'impression reçue évoque dans notre passé des impressions analogues, vagues, confuses, à peine entrevues, mais qui suffisent à faire croire que l'état nouveau en est la répétition. Il y a un fond de ressemblance rapidement senti entre deux états de conscience,

[110]a. Lewes, *Problems of life and mind.* 3e série, 129.

qui pousse à les identifier. C'est une erreur; mais elle n'est que partielle, parce qu'il y a en effet dans notre passé **[111]** quelque chose qui ressemble à une première expérience.

Si cette explication peut suffire pour des cas très simples, en voici d'autres où M. Ribot reconnaît qu'elle n'est guère admissible. Un malade, dit Sander, apprenant la mort d'une personne qu'il connaissait, fut saisi d'une terreur indéfinissable, parce qu'il lui sembla qu'il avait déjà ressenti cette impression. 'Je sentais que déjà auparavant, étant couché ici, dans ce même lit, X. était venu et m'avait dit: 'Müller est mort'. Je répondis: 'Ce Müller est mort il y a quelque temps, il n'a pu mourir deux fois'.' Le Dr. Arnold Pick rapporte un cas de fausse mémoire complet présenté sous une forme presque chronique. Un homme instruit, raisonnant assez bien sur sa maladie, et qui en a donné une description écrite, fut pris, vers l'âge de trente-deux ans, d'un état mental particulier. S'il assistait à une fête, s'il visitait quelque endroit, s'il faisait quelque rencontre, cet événement, avec toutes ses circonstances, lui paraissait si familier qu'il se sentait sûr d'avoir déjà éprouvé les mêmes impressions, étant entouré précisément des mêmes personnes ou des mêmes objets, avec le même ciel, le même temps, etc. Faisait-il quelque nouveau travail, il lui **[112]** semblait l'avoir déjà fait et dans les mêmes conditions. Ce sentiment se produisait parfois le jour même, au bout de quelques minutes ou de quelques heures, parfois le jour suivant, mais avec une parfaite clarté. La difficulté, dit M. Ribot, est de savoir pourquoi cette image qui naît une minute, une heure, un jour après l'état réel, donne à celui-ci le caractère d'une répétition. Il y a bien, en effet, une inversion du temps, M. Ribot propose l'explication suivante: l'image ainsi formée est très intense, de *nature hallucinatoire*; elle s'impose comme une réalité, parce que rien ne rectifie cette illusion. Par suite, l'impression réelle se trouve rejetée au second plan, avec le caractère effacé des souvenirs; elle est localisée dans le passé, à tort, si l'on considère les faits objectivement; avec raison, si on les considère subjectivement. Cet état hallucinatoire, en effet, quoique très vif, n'efface pas l'impression réelle; mais comme il s'en détache, comme il a été produit par elle après coup, il doit apparaître comme une seconde expérience. Il prend la place de l'impression réelle, il paraît le plus récent, et il l'est en fait. Pour nous qui jugeons du dehors et d'après ce qui s'est passé extérieurement, il est faux que l'impression ait été reçue **[113]** deux fois. Pour le malade, qui juge d'après les données de sa conscience, il est vrai que l'impression a été reçue deux fois, et, dans ces limites, son affirmation est incontestable.

En d'autres termes, selon M. Ribot, le mécanisme de la mémoire 'fonctionne à rebours': on prend l'image vive du souvenir pour la sensation réelle, et la sensation réelle, déjà affaiblie, pour un souvenir. Nous croyons plutôt, avec M. Fouillée,[a] qu'il y a là 'un phénomène maladif d'écho et de répétition intérieure',

[113]a. Études sur la mémoire publiées par la *Revue des deux mondes*.

analogue à celui qui a lieu dans le souvenir véritable: 'Toutes les sensations nouvelles se trouvent avoir un retentissement et sont ainsi associées à des images consécutives qui les répètent; par une sorte de mirage, ces représentations consécutives sont projetées dans le passé. C'est une diplopie dans le temps. Quand on voit double dans l'espace, c'est que les deux images ne se superposent pas; de même, quand on voit double dans le temps, c'est qu'il y a dans les centres cérébraux un manque de synergie et de simultanéité, grâce auquel les ondulations similaires ne se fondent pas entièrement; il en résulte dans la conscience une image double; l'une **[114]** vive, l'autre ayant l'affaiblissement du souvenir; le stéréoscope intérieur se trouvant dérangé, les deux images ne se confondent plus, de manière à ne former qu'un objet. Au reste, toute explication complète est impossible dans l'état actuel de la science, mais ces cas maladifs nous font comprendre que l'apparence du familier et du connu tient à un certain *sentiment* aussi indéfinissable que l'impression du bleu ou du rouge, et qu'on peut considérer comme un sentiment de répétition ou de duplication.' M. James Sully dit qu'il possède lui-même le pouvoir, quand il considère un objet nouveau, de se le représenter comme familier. C'est sans doute qu'il y a dans son esprit répétition, résurrection vague d'objets *semblables* à celui qui est actuellement perçu. Ce mécanisme même explique, selon M. Fouillée, pourquoi on peut se souvenir sans reconnaître qu'on se souvient et en éprouvant le sentiment de la nouveauté; 'c'est qu'alors la duplicité normale des images est abolie et on n'en voit qu'une quand il en faudrait voir deux. C'est l'inverse des cas de fausse mémoire, où l'unité normale des images est abolie au profit d'une duplicité anormale. Parfois enfin le sentiment de familiarité et de reconnaissance produit par une impression **[115]** nouvelle vient de ce que nous avons *rêvé* des choses analogues.' [a]

Dernièr problème. Notre représentation du temps demeure-t-elle *discrète*, ou devient-elle tout à fait *continue*? – Kant nous gratifie du premier coup de la notion du temps continu et même infini, qu'il appelle une 'quantité infinie donnée'. C'est trop de générosité. L'esprit, dans sa représentation du temps comme dans toutes les autres et notamment dans celle de l'espace, va d'abord par bonds, sautant à cloche-pied sur les intermédiaires, qu'il n'aperçoit pas. Ce sont des fragments de temps comme des fragments d'espace, avec des interruptions apparentes, des lacunes. C'est seulement à la fin, par la répétition des expériences, que ces lacunes vont diminuant et parviennent à un point d'*évanouissement*, conséquemment de fusion entre les divers morceaux de durée perçue. On a comparé ce phénomène à ce qui se passe dans la roue de Savart, lorsque les battements d'abord séparés finissent par se rejoindre avec la vitesse croissante de la roue et donnent ainsi **[116]** l'impression d'un son continu. De même encore que, dans l'espace, nous finissons par prolonger la vision idéale sur ce que nous

[115]a. *Ibid.*

ne voyons pas, en vertu d'une sorte de conservation de vitesse acquise, de même nous comblons idéalement les lacunes du temps et nous finissons par le concevoir avec sa continuité mathématique.

[117]

CONCLUSION

De tout ce qui précède nous conclurons que le temps n'est pas une condition, mais un simple effet de la conscience; il ne la constitue pas, il en provient. Ce n'est pas une forme *a priori* que nous imposerions aux phénomènes, c'est un ensemble de rapports que l'expérience établit entre eux. Ce n'est pas un moule tout fait dans lequel rentreraient nos sensations et nos désirs, c'est un *lit* qu'ils se tracent à eux-mêmes, et un *cours* qu'ils prennent spontanément dans ce lit.

Le temps n'est autre chose pour nous qu'une certaine disposition régulière, une organisation d'images. La mémoire n'est que l'art d'évoquer et d'organiser ces images.

[118] Point de temps hors des désirs et des souvenirs, c'est-à-dire de certaines images qui, se juxtaposant comme se juxtaposent les objets qui les ont produites, engendrent tout à la fois l'apparence du temps et de l'espace.

Le temps, à l'origine, n'existe pas plus dans notre conscience même que dans un sablier. Nos sensations et nos pensées ressemblent aux grains de sable qui s'échappent par l'étroite ouverture. Comme ces grains de sable, elles s'excluent et se repoussent l'une l'autre en leur diversité, au lieu de se fondre absolument l'une dans l'autre; ce filet qui tombe peu à peu, c'est le temps.

Maintenant, au dehors de la conscience, y a-t-il une réalité correspondant à l'idée que nous nous faisons de la durée? Y a-t-il, pour ainsi dire, un temps objectif? On a fait souvent du temps une sorte de réalité mystérieuse, destinée à remplacer la conception vieillie de la providence. On lui a donné presque la toute-puissance, on l'a déclaré le facteur essentiel de l'évolution et du progrès. Mais le temps ne constitue ni un *facteur*, ni un *milieu* pouvant à lui seul modifier

l'action et ses effets. Si je cueille une pomme dans un arbre, puis plus tard une pomme absolument semblable, occupant exactement la **[119]** même position dans le même arbre; si, de plus, je suis dans le même courant d'idées et de sensations et que je ne me rappelle pas mon action antécédente, les deux actes seront absolument identiques, produiront les mêmes effets et se fondront dans le même tout. Ainsi, le temps ne suffit pas à lui seul à introduire de différence réelle entre les choses.

Selon nous, le temps n'est qu'une des formes de l'évolution; au lieu de la produire, il en sort. Le temps, en effet, est une conséquence du passage de l'homogène à l'hétérogène; c'est une différenciation introduite dans les choses; c'est la reproduction d'effets analogues dans un milieu différent ou d'effets différents dans un milieu analogue.

Au lieu de dire que le temps est le facteur essentiel du changement et conséquemment du progrès, il serait plus vrai de dire que le temps *a pour facteur* et élément fondamental le progrès même, l'évolution: le temps est la formule abstraite des changements de l'univers. Dans la masse absolument homogène que, par une fiction logique, on a supposée quelquefois à l'origine des choses, le temps n'existe pas encore. Imaginez un rocher battu par la mer: le temps existe pour lui, car les siècles l'entament et le rongent; maintenant, supposez **[120]** que la vague qui le frappe s'arrête tout à coup sans revenir en arrière et sans être remplacée par une vague nouvelle; supposez que chaque particule de la pierre reste à jamais la même en présence de la même goutte d'eau immobile; le temps cessera d'exister pour le rocher et la mer; ils seront transportés dans l'éternité. Mais l'éternité semble une notion contradictoire avec celles de la vie et de la conscience telles que nous les connaissons. Vie et conscience supposent variété, et la variété engendre la durée. L'éternité, pour nous, c'est ou le néant ou le chaos; avec l'introduction de l'*ordre* dans les sensations et les pensées commence le temps.

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The Origin of the Idea of Time
by
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[i]

Preface by the Author

< 'Modern psychology has clearly established that everything in us is present, even the past. When I recall having played with hoops in my childhood, the image that I bring to mind is as present as the paper on which at this moment I am expressing these abstract thoughts. The mere thought of bowling a hoop already evokes an internal preparation for the movements that are involved in this game. Similarly, thinking of an absent person is like calling him softly by name **[ii]** and almost like starting to speak to him. Something is really a part of the past only when we have lost all conscious access to it; in order to come back to consciousness, it must become present once again. But if, ultimately, everything is present in consciousness, if the image of the past is a sort of illusion, and if the future, in turn, is only a projection of our present activity, how then do we form and organize the idea of time with its distinctive parts, and how does this idea evolve in the human mind?

The idea of time, in my view, is basically a matter of perspective. I shall first demonstrate that this perspective is not present at birth and that it is not an a priori, necessary condition for the activity of thinking during its primordial period of confusion and vagueness. I shall then try to explain how this perspective evolves, and to follow the work of nature in its various developmental stages, in the same vein as one might trace **[iii]** in a painting the effort of the artist, noticing how, on an empty canvas, he has been able to render the murky depths of a forest or how, in contrast, he has made a sunray enter and joyfully light a room. Perspective in a painting is a matter of art, an artifact. Memory is an art too: I shall demonstrate how, in the process of conceptualizing time, this art follows a

natural and inevitable course. For this purpose I shall attempt to outline the respective roles of (1) passive, purely reproductive, imagination which provides the static framework of time, its form, and (2) the motor activity and the will which, in my view, provides the living and moving basis for the notion of time. These two elements together constitute the experience of time.>

[5]

CHAPTER ONE

The Stage of Primordial Confusion

< It is difficult to deny that the idea of time as it exists in the modern adult mind is the outcome of a long evolution. In animals and children initially nothing can be found resembling the exact sense of time as it prevails in the human adult. It requires a period of formation. In Indo-European languages the distinction between past, present, and future is clearly anchored in the verb; the notion of time is therefore impressed upon us by language itself. We cannot speak without evoking and ordering, in time, a profusion of images. The quite subtle distinctions that **[6]** we experience between various aspects of time, such as the future, the future perfect, the perfect, the imperfect, or the pluperfect, gradually penetrate children's minds; yet it is far from easy to make them comprehend these distinctions. We give them a thousand ways to distinguish the various moments of time: the orbit of the sun, chiming clocks, minutes, hours, days. All these sensory images find their way into the child's head and help to organize the chaotic mass of its recollections. But animals, and children before they can speak, must indeed have great difficulties in establishing a representation of time. It is likely that for them everything is experienced on a single level. All primitive languages express the idea of action by means of verbs, but not all make a clear distinction between the various tenses. The verb, in its most elementary form, may equally well denote the past, the present, and the future. The study of language, therefore, does reveal an evolution of the idea of time.

The same applies to comparative psychology. Do animals, or even children, really have a past, that is, an ordered ensemble of memories, organized in such a way that it produces the perspective of passing days? **[7]** It seems not. It is often said that a child or an adult has a good memory when he possesses a set of very

vivid images. In this sense an animal may have a memory that is as good as or perhaps even better than human memory. But it is completely mechanical: it depends entirely on the intensity of the initial impression, compared with the strength of other impressions that were perceived later. However, from the psychological point of view the distinctive property of human memory is the exact sensation of duration, the order of our recollections, and the precision that this order imparts upon each of them: things that we owe to a large extent to the sun and other celestial bodies, to the hands that turn on the face of our clocks, and to the rhythmical regularities of the physiological processes in the clockwork of our organism. The animal and the young child, not having the means for measuring time, live day by day. An elephant attacks the person who maltreated him many years earlier; does this mean that the elephant has a clear idea of duration and a memory organization that resembles ours? No, it is primarily a mechanical association of present images. The image of this person is associated with another, still vivid and accessible image of being beaten, and these two images **[8]** act together like two interlocking cogwheels; one could almost say that the animal represents this person as hitting him now, and its rage is commensurate. For the animal there is no forgiveness because it has no clear sense of duration.

Similarly, all the sensations impinging on a child continue to resound internally, they co-exist with present sensations and compete with them; this is an ineffable chaos in which time has not yet been introduced. Time will only emerge when events can be positioned in linear fashion along a single dimension, length. But initially this is not the case: this long line, originating in our remote past and vanishing into the distant future, remains to be drawn.> Since children have not yet developed the art of remembering, for them everything is in the present. They have no clear distinction of times, places or people. Young children's imagination originates from a confusion of images produced by their mutual attraction.[2] Children confound what has been with what is or what will be; they do not live – as we do – in the real world, a permanent environment, and they do not consolidate any sensation or image. In other **[9]** words, by not distinguishing or perceiving clearly, it is as though they are dreaming. The child stores and reproduces images, much more than he invents or thinks, and that is precisely why he does not have a clear idea of time: as long as this is the only available process, reproductive imagination cannot be distinguished from, or contrasted with constructive imagination which, nevertheless, is nothing other than its later and higher developmental stage. The child and the animal, therefore, do not have a past that is neatly differentiated from the present, or from a future that is imagined or constructed according to one's fancies. The child is constantly confusing what it actually did, what it wanted to do, what it saw happening, what it said it did, and what others said it did.[a] <For the child the past is only

[9]a. On this matter see *Éducation et hérédité*. (Op. posth., 1889).

a dominant image in a jumble of incoherent images, indistinct, unordered and uncategorized; it resembles the way objects look in the twilight, or at early dawn before the sun has brought order and light and arranged everything on different planes. Later I shall examine the successive steps in the ordering process.>

[10] Investigators tend to agree that space perception takes precedence in animal development. The acuity of this perception is related to the movements the animal must perform to satisfy its needs, and it seems likely that it is precisely these movements – in every direction – which provide the representation of space. The investigators also agree, however, that animals, even the closest relatives of man, have a confused perception of temporal relationships and everything connected with these. In fact, animals only need senses and primitive imagination for spatial orientation, for coming and going, for eating, drinking, etc. Animal memory is entirely spatial: it is based on visual, tactile, olfactory and other images which are automatically activated and associated. While objects are certainly ordered in space there is no indication whatever of a true ordering in time, since the animal treats the past as if it were the present. Even instinct, seemingly future-oriented, is a complex of drives that have become automatic and in which the temporal is only implied by the spatial without the animal being capable of separating the future from the present. In short, the animal is totally involved in its images. Adaptation **[11]** to a future conceived as such, and in virtue of being future, is typical for man.

That the idea of time in adults, and more specifically in children, remains highly obscure compared with that of space, is a natural consequence of the course of evolution which developed the sense of space before the sense of time. We can easily imagine space; we have an inner eye for it, an intuition. Try, on the other hand, to represent time as such; you will only succeed by means of a representation of space. You will have to align successive events, placing one at some point along the line, and the other at a second point. In other words, you must evoke a sequence of spatial images in order to represent time.

It would violate the fundamental laws of evolution to derive space from time – as Herbert Spencer has done – when, in fact, humans arrive at a representation of time by means of space. As we have seen, the representation of events in their temporal order is acquired later than the representation of objects in their spatial order. The reasons are the following. First, the spatial array is associated **[12]** with the perceptions themselves, that is, with presentations, whereas temporal order is associated with reproductive imagination, that is, with representations. Secondly, time is not only connected with representations – the derived phenomena – but, as a matter of fact time can only be perceived if these representations are indeed recognized as representations rather than immediate sensations. This requires the ability to apprehend the difference between representations and presentations. On the other hand, spatial expanse and its more or less distinct regions are laid out in front of our eyes and can be perceived at a glance through

a large number of present sensations each having specific differences (the so-called local signs). To perceive space, children as well as animals only need to open their eyes: it is there, present and intense. Time, in contrast, is a 'faded dream.'

Young children may even attain a high level of understanding concerning the position of objects in space, the relationships near and far, inside and outside, etc., long before they have any definite ideas of order and duration of events. James Sully describes a $3\frac{1}{2}$ year old boy, who had very precise knowledge of the topographical relationships between the various places he had visited on walks, but who, **[13]** nevertheless, mixed up all temporal relationships. He had no definite representations corresponding to such terms as 'this week', or 'last week.' Even yesterday was a totally indefinite past, indistinguishable from any other period. Sully, in spite of this observation, still believes, as does almost the entire school of British associationists and evolutionists, that we acquire the idea of space through that of time. I, on the other hand, believe, with several German psychologists such as Hering and Stumpf, but also with William James and Ward, and with Alfred Fouillée that this is an artifact of a psychological analysis that confounds its own methods for decomposing complicated ideas with the spontaneous and synthetic processes that occur in children and animals.[a]

Spencer assumes that the congenitally blind do not have an awareness of space other than 'in the form of successively perceived stages that derive from movement.' Apart from some 'restricted perceptions of co-existence' evoked by simultaneous stimuli the congenitally blind person **[14]** would supposedly think he is moving in 'number, order, and time,' rather than in space as the rest of us do.[a] Riehl too maintains that space is an exclusive attribute of visual sensations. This presumption strikes me as highly implausible, as I cannot believe in this precedence of temporal over spatial organization. Moreover, how can we represent order if not in a figurative manner, which is always more or less spatial? A congenitally blind person will represent the sensation of his hand grasping a piece of bread and feeling the contact with it, the contact of the bread with his mouth, and finally the contact of the mouthful going down the esophagus. These are representations of tactile space, and not only of tactile time, since they involve contacts localized at various points of the organism. The blind person knows where his right and left hands, his mouth, his throat, etc., are located as well as we do. He does not need to see them; he does better than that: he feels and

[13]a. In this matter Mr. E. Morselli, in his psychological studies on the perception of time and space (*Rivista di filosofia scientifica*, 1886) agrees with me; he supports the conclusions of my study on time recently published in the *Revue philosophique*, 1885, *19*, 353–368.

[14]a. H. Spencer (1885). *Principles of psychology*, Volume 2. London: Longman Green; p. 209.

touches. With the psychologists mentioned earlier, I am convinced that every sensation, internal or external, has a more or less **[15]** vague extension. For example, the immersion of one's hand in cold water will yield a sensation of cold that is less extended than the immersion of one's whole arm. One does not have to see or even touch one's body in order to feel that one is completely submersed in water or that only one's little finger is getting wet. Space, in Fouillée's words, is 'the natural mode of representing simultaneous sensations arising from the various parts of the organism.' I think, in fact, that it is not necessary to measure times and distances between the different organs of the body in order to be able to visualize objects in space. Spencer, on the other hand, refers to the more obscure idea of the two, the idea of time, to clarify the less obscure idea which is the most directly intuitive or imaginative, the idea of space.

[17]

CHAPTER TWO

The Static Form of Time. Its Derivation from the Notions of Difference, Similarity, Plurality, Degree, and Order

<The onset of mental development, as I argued in Chapter One, is characterized by a diffuse multiplicity of sensations and feelings, a multiplicity that we can still recapture introspectively at a later age. In fact, there are no really simple and sharply defined states of consciousness at all; multiplicity is at the core of consciousness and above all of immediate consciousness. Any sensation is a mixture of a thousand elements. When I say: I am cold, I refer, in a single word, to a multitude of impressions that come from all over my body. In the same way that **[18]** each particular sensation is already compound, a general state of awareness consists, at any given moment, of a tremendous multiplicity of sensations. Right at this moment I have a toothache, my feet are cold and I am hungry, all of these quite uncomfortable sensations; at the same time I see the sun smiling at me, I breathe the pure morning air, while I think of having breakfast, sensations or images of a more enjoyable kind. And all this is combined with philosophical reflection, a vague feeling of being mentally alert, etc. The more one thinks of it, the more overwhelming becomes the complexity of what is called a state of mind (in the singular) and of the countless number of simultaneous sensations underlying such a state. It requires a tremendous effort to impose a temporal order on that mass in the way patient Psyche of the myth once put in order all the little bits and pieces she was obliged to sort.[3]

The starting point of this analytic effort is what the British have termed *discrimination*, that is, the perception of differences. Suppress the perception of differences and you suppress time. A remarkable feature of dreams is their constant metamorphosis of images which, when **[19]** *continuous* and without

clear transition, eliminates all feeling of duration. The other day I dreamt that I was patting a Newfoundland dog; gradually the dog changed into a bear, very slowly, without provoking any surprise on my part. Similarly the locations may change on occasion, not by a sudden *coup de théâtre* but through a series of transitions which will make the change go unnoticed: a while ago I was in a small cottage and here I find myself in an Italian *palazzo* admiring some paintings by Correggio; a while ago I was myself and now I am someone else. And all this happens as it would onstage, where one would see trees and homes vanish, gradually being replaced by different decors, with this difference that in the dream, because attention is put to sleep, every image that disappears is lost completely. Thus the comparison between a past state and the present state becomes impossible; each new entrant has the whole stage to himself and makes us totally forget the other actors or the other decors. Because of this absence of contrast, of differences, even the most dramatic changes may take place without being noticed and without being organized in time. This proves that we do not have an *a priori* frame of reference in which to position **[20]** objects, and that our perceptions provide their own frames of reference when they are properly distributed. In an absolutely homogeneous mass of impressions nothing could possibly give rise to the idea of time: the beginnings of duration lie in a certain variability of effects.

On the other hand, too great a heterogeneity, if it were at all possible, would also eliminate the idea of time, one of whose important characteristics is continuity, that is, unity in variety. If our life is subject to too many different situations, if too many heterogeneous scenes impinge on our eyes, memory gets confused, putting first what came later and mixing up everything. This is what easily happens when we are traveling, when a host of unrelated impressions follow each other in rapid succession. Pascal has pointed to the fact that a journey is similar to a dream: if we were constantly traveling, without stopping and especially without having planned the trip ourselves, we would have great difficulty in distinguishing a waking state from a dream state. A certain continuity in the flow of sensations, a certain natural logic is indispensible; one event must derive from the other and they all must chain together. *Memoria non facit saltus.* In order to notice change, one needs a reference point.[4]> **[21]** When we search our inner selves, we find behind every present image, behind every object or ensemble of objects we encounter, behind each of our present thoughts or feelings, an analogous feeling, thought, or image that we recognize as our own. The accumulation of experience makes part of the outside world gradually penetrate into our minds, and we have only to look deeply into ourselves in order to recover it from under the mobile surface of present sensations and ideas. Similarly, nothing is really new for us; and that is precisely the secret of our intelligence, because we are unable to comprehend what has no analogue in our past, what awakes nothing in us. Plato was correct in maintaining that knowing is half

remembering, and that there is always something in us that corresponds to the knowledge we obtain from the outside world.

An animal cannot *know*, precisely because it cannot, in the strict sense, *remember*. In its inner world, as I argued earlier, there is a confusion that renders its outer world equally confusing. In fact, to know is to match a recollection with a sensation. Well-defined knowledge must depend on **[22]** a distinct, circumscribed, and spatially localized recollection. If everything flowed in us like the water of a stream, our thinking would flow similarly and vanish together with the fleeting sensations. The principal function of thinking is to maintain itself through memory; cognition is re-cognition, at least in part. This is why animals live in a dream; we at least can recover some of our dreams and reconstruct them by confronting them with reality. But if we dreamed perpetually, we would only have the vaguest idea of our dreams: and such is essentially the case with animals. <The perception of differences and similarities, principal condition for the notion of time, leads to the idea of duality and from duality emerges the concept of number. Initially, the idea of number is nothing more than the perception of differences behind similarities. The various sensations, first the extremes such as pleasure and pain, then those from different senses such as touch and vision, are more or less clearly differentiated.

Thus discrimination, the primordial attribute of intelligence, does not require the idea of time to operate; on the contrary, the idea of time presupposes discrimination. Even the notion of **[23]** *sequence* which for Spencer actually constitutes the basis of time, is a derivation. At the most primitive level everything co-exists, and tactile as well as visual sensations tend spontaneously to assume a vague spatial form with no clear perspective and with no definite dimensions. When we say that everything co-exists, we are still borrowing too precise a term from the language of time, a term which expresses a conscious and reflective relation of simultaneity: initially we have no more a notion of co-existence than of succession, only a confused and diffuse image of a multiplicity of objects scattered around us, and for that chaotic state of affairs the term expanse is actually too accurate a term. Only movement will, later on, create divisions and distinctions as a result of the effort it requires; voluntary movement creates the third dimension of space in our mind, and without movement everything would remain on the same plane. What is more, the notions of plane and surface can only arise if this surface can be explored by movements of the hand or the eyes. We shall shortly see that this applies to time as well.

Apart from the first three elements underlying the notion of time: differences, similarities, and number, consciousness soon puts us in possession of **[24]** a fourth and extremely important one: intensity or degree.[5] In my view there exists an intimate connection between intensity and the moment. Between related sensations and between motor actions of the same type there are gradations which

form a kind of continuous scale. Initially I have an appetite, then I feel distinctly hungry, and I end up with a stomach ache mixed with acute hunger pangs and a general feeling of faintness: this is an example of a sensation going through a gamut of degrees. This is the case for the majority of familiar experiences of everyday life: qualitatively they can be reduced to a small number, but they are subject to continual variations, decrements and increments, almost without limit. Life evolves slowly; every moment presupposes a degree of activity and sensitivity, an increment or a decrement, some kind of variation... in other words, a relation involving both quantity and quality. If there were no division, no change and no gradation in activity or sensitivity, there would be no time. The primitive pendulum that serves to measure and even create time for us, is the beating, now more now less intense, now more now less emotional, of our heart.>

[25] Bain argues with good reason that we cannot lift a weight one, then two feet, without having a particular experience of duration; in the feeling of continuity, for instance in continuous movement, or in sustained effort, there is an 'apperception of gradation'. But Bain adds that 'this apperception of gradation is in fact what is called time or duration'. This conclusion is unacceptable! Duration is more than just an apperception of degrees of intensity, even though the latter may facilitate our perception of succession, the principal characteristic of time.

<The aspects discussed so far simply provide what one might call the *bed* of time, without reference to its *streaming*, or if you prefer, the frame of reference with respect to which time appears to move, the way in which it orders the representations of our mind, in one word: the *form* of time. It is *an ordering of both similar and dissimilar representations forming a plurality of degrees*. Furthermore, memory itself has its gradations, depending on whether it is more or less remote: every change which registers itself in consciousness leaves as a residue, a series of representations arranged on a sort **[26]** of line, from which the more remote representations gradually fade, making room for other increasingly sharper representations. In this way every change produces a sort of luminous trail in the mind analogous to those left in the sky by shooting stars. In contrast, a permanent state would always have the same conspicuity against a constant background, much like the bright stars in the firmament. Let me finally add to the preceding determinants of the experience of time the residues of varying distinctness and intensity left in memory by change.> The proof that the representation of before and after is an interplay of images and residues is that we can easily confuse them. That is what happens in psychophysical experiments in which a subject may become aware of a tone before he has heard it, and especially in experiments where two flashes of light are given in close succession and the subject confuses the first with the second. In the case of close attention the subject may represent a tone so strongly that he can hear it before it has sounded. The inversion of the order of two flashes is undoubtedly caused by the

fact that the shifting of attention from one to the other enhances the flash on which it is focusing, giving the latter **[27]** an intensity that will make it subjectively appear more recent, although it may in fact be more remote in time.

< I have specified everything which, in time, is not change even if it is directly observed: this is what I have called the *bed* of time, in contrast to its *stream*. What remains is to make time stream and flow in consciousness; this requires that in this stream-bed, readily provided as it is by imagination, something active and dynamic must present itself to our consciousness. Up to this point I have considered thought as something strictly passive, reflecting, as it were, a manifold of objects that have different *levels* – or degrees – and that leave *traces* in an increasing or decreasing *order*, the whole being in some sense *static*. Let me now try to establish the role of action, of cerebral and mental reaction.>

[29]

CHAPTER THREE

The Dynamic Foundation of the Idea of Time; its Genesis. The Role of Volition, Intention, and Motor Activity. Present, Future, and Past. Space as a Means of Representing Time

<The course of time, in the adult human mind, consists of three mutually contrasting parts, the present, the future, and the past. First of all, behind the idea of *present* is that of *occurrence* or *action*, which in no way seems to be derived from the idea of time but rather to precede it. Action implies time and, more specifically, *occurrence* implies the present, but the awareness of occurrence and action does not arise from time. The present as such is not yet time or duration, **[30]** since duration – that is, all passage of time – can always be decomposed into present and past, and thus essentially consists of something that is added to the pure and static idea of the present. This idea of present in itself is a derived, abstract notion existing only by virtue of the fact that it is implicit in the notion of action, or current effort. The true present, in fact, would be an undivided instant, a moment of transition between future and past, a moment that can only be conceived of as infinitely small, dying and coming into existence at the same time. This logical present is a product of mathematical and metaphysical analysis. The experiential present of an animal, a child, and even a naive adult, is quite different; it is an elementary parcel of duration, that really possesses [the characteristics of] past, present, and future [at the same time], a parcel that can be divided into an infinite number of mathematical *presents* which animals and children, or even unsophisticated adults cannot even conceive of. The real point of departure for the evolution [of the idea of time] is, therefore, neither the concept of present, nor that of past or future. It is, instead, [the idea of][6] *acting* and *undergoing*, it is the *movement* following a *sensation*.

The conceptualization of time into three independent parts constitutes a

dissociation of awareness. When the cells of certain animals have reached their **[31]** maximum growth level, they divide by mitosis; something analogous happens in the process of generating time.

How is this division of moments of time achieved in primitive awareness? In my opinion, it occurs as a direct consequence of the division between undergoing and acting. When we feel pain and react to eliminate it, we begin bisecting time into present and future. This reaction to pleasure and pain, when it becomes conscious, is called *intention*, and I am convinced that it is intention – whether spontaneous or deliberate – which generates our notions of space and time. With respect to space, the British [philosophers] have been blamed for having invoked a *petitio principii* in their attempts to explain the idea of space as a simple sequence of muscular efforts and sensations whose intensity, speed and *direction* we assess. In fact, when we postulate 'direction' we seem already to presuppose and postulate the very space that, supposedly, had to be created by our minds. But then, if the word *direction* is indeed so unfortunate it can be replaced by the term *intention*. *Intention* does not presuppose the idea of space; it only supposes images of pleasant or painful sensations, together with **[32]** motor efforts to achieve the former or to avoid the latter. The animal representing or even actually seeing its prey does not have to think of space or direction in order to have the intention of swallowing it and of initiating the necessary motor efforts. Initially direction is straightforward intention, that is, an image of pleasure or pain occurring in a specific context, followed by an innervation of the motor system. From *intention*, gradually developing into awareness of the self and its effects, emerges the notion of *direction* in the strict sense of the word, and with it, that of *expanse*.

The same applies to time. The future, initially, is *what is to be*, it is what I do not have but wish or need to have, it is what I attempt to possess. Just as the present can be reduced to a conscious and intrinsically gratifying activity, the future can be reduced to the activity-directed outward search for what is missing. When a child is hungry, it cries and extends its arms towards its nurse: this is the seed of the idea of the future. Every need implies a possibility of satisfying it; the ensemble of these possibilities is what we mean by the term *future*. A being without desire and without aspiration, would see time close itself before him. We reach out **[33]** and space unfolds itself before us, space whose succession of planes and multiplicity of dimensions cannot be captured by a single point of view. The same is true of time: we must have desires, we must have needs, we must reach out and move in order to create the future. The *future* is not *what reaches us*, but *what we are reaching for*.

At the outset, therefore, the flow of time is nothing more than the distinction between what one needs and what one has, which itself comes down to intention followed by a feeling of satisfaction. Intention and the effort associated with it constitute the core of our common sense ideas of *final* and *efficient* causes.[7] Only

after a series of formal abstractions can they be substituted by ideas of uninterrupted succession, necessary order of cause and effect, determinism and mechanism. The original notions of cause and goal have an anthropomorphic or, if you prefer, animistic connotation: they are an outward projection of muscular force (efficient cause) and intention (final cause). Such metaphysical notions have a fundamental significance, in both the human and the animal context, because need satisfaction and motor innervation are the basic expression of life in every animal. It is **[34]** the relationship between these two terms which, in my view, first engendered the awareness of time; the latter initially only being, in a certain way, the conscious gap between a need and its satisfaction, the distance between 'the goblet and the lips.'

Nowadays psychologists have a tendency to reverse the order of the genesis of time. Full of their scientific, fashionable ideas about causality, they tell us that efficient cause amounts, conceptually, to a simple succession of antecedent and consequent, based on an invariant and even necessary order; similarly final cause reduces to a relationship between antecedent and consequent, that is, to a succession. Then, when these psychologists get to the question of time, they proceed to situate the idea of succession at the root of consciousness: they conceive of it as a regular series of antecedents and consequents caught *in midstream*; thus the *prius* and the *posterius*, the *non simul* become a constituent relation of 'representation', even a 'form of representation' and a form *a priori*. In my opinion this theory substitutes scientific ideas, belatedly, for such primitive, magical conceptions of consciousness as *force*, or **[35]** efficient cause, and *goal* or final cause. Animals simply apply the philosophy of Maine de Biran[8]: they feel and act, but they are not yet mathematician enough to think about *succession*, and even less about *constant succession*, let alone about *necessary succession*. The relation between antecedent and consequent, between before and after, only unfolds secondarily as a result of reflective analysis.

Does this mean that time is not already present in primitive consciousness? – It is there in the form of force, effort, and also as *intention*, at least when the organism begins to realize what it wants; but even then time is completely imbedded in sensibility and motor action, and consequently it merges with space. The future is what is in front of the animal and what it is looking for; the past is what is behind it and what it can no longer see. Instead of mentally constructing space from time in Spencer's fashion, the animal crudely builds time from space; it only knows the *prius* and *posterius* of the expanse. From his kennel my dog watches me approaching with a full trough: this is his future; he comes out, runs towards me and as he gets nearer, the impressions of the kennel become more remote and almost vanish because **[36]** the kennel is now behind him and he does not see it anymore: this is his past.

In sum, *succession* is an abstraction of *motor effort* produced in *space*; an effort which, when it becomes conscious, is *intention*.

In adult consciousness the idea of intention – end or goal – remains the essential element for ordering recollections. If we were only conscious of isolated actions and if we did not organize these actions in terms of a number of distinct goals or ends, remembering would be extremely difficult! Instead, given the idea of *end*, our actions become a series of *means*, arranging and organizing themselves with respect to the ends pursued in a way that would please an Aristotle or a Leibniz. If I wish to travel to America, it follows that I first need to cross the Atlantic Ocean, and therefore I first need to embark at Le Havre or Bordeaux. All these requirements are linked together in a certain logical order and all the recollections to which they will eventually give rise will find themselves connected too. There is a certain logic to life and it is this logic which makes it possible for memory to exist. Wherever the illogical and the unpredictable reign supreme, memory will lose its hold. Life absolutely devoid of logic would resemble those ghastly stage *dramas* in which the various **[37]** events are totally unrelated and from which one extracts only fuzzy images that blend into each other.

Intention – the desired goal – always generates a *direction* in space and consequently a movement; one might even say that time is an abstraction of movement or *kinesis*[9], a figure of speech under which we subsume a collection of sensations and actions that are neatly distinguished from one another. When we say: 'This village is two hours from here,' time serves only as a simple measure of the *amount of effort* needed to reach this particular village through space. This is equivalent to the expression: 'This village is at so many thousand strides' or, more abstractly: 'It is so many kilometers from here' or, finally, with the following more psychological expression: 'It requires so and so much muscular effort.' For our consciousness the very idea of movement boils down to the conception of a certain number of sensations of muscular effort and resistance, projected along a line connecting the point in space where one is and the point one wants to reach. But why should this idea initially presuppose the idea of time? I take a few steps in a certain direction: that requires a series of analogous muscular efforts which **[38]** coincide with a series of distinct sensations all along the way. This is the primitive notion of movement. In addition, if these steps are made with a specific *intention*, for instance in the direction of the fruits on a tree, then the ensembles of sensations that I have experienced will arrange themselves in my imagination along a line, some located at one point relative to the tree, and others at another point. Here we have the germ of the idea of time and that of the idea of spatial movement in one.

If I move from point A to point B and then return to point A, I am subject to two series of sensations. Every element in the first series corresponds to an element in the other series. The difference is that the corresponding elements are mentally organized with respect to point B in the first case, but with respect to point A in the second case. Consequently I have only to combine the two series, taking one in reverse order relative to the other, to make them coincide perfectly

from one end to the other. Such a perfect match between two sets of sensations is what best distinguishes space from time. If such a match is not accepted as possible or real, I find in my memory only a series of sensations that is ranked along a scale of clarity. The idea of time **[39]** is the product of an accumulation of sensations, muscular efforts, and motives put in order with some difficulty. The same repeated sensations, the recurring efforts towards the same end and with the same intention, constitute a series of which the first elements are much less distinct than the later ones; thus emerges an internal perspective, oriented toward the future.

The past is simply this perspective in reverse: it is the active turned passive, it is a residue rather than an anticipation and a conquest. As our days accumulate, a sort of regular, layered sediment of everything that once affected our thinking and our senses is deposited in our depths, as in those salt basins from which one lets the sea water evaporate. This internal crystallization is the past. If the waves are too strong the sediment will be deposited in irregular masses; if the waters are calm, it will assume more regular forms. The past is a fragment of space projected inwardly; it is fashioned after space. It is impossible to modify spatial relations: one cannot put on the right what is on the left, nor can one put in front **[40]** what is in back; consequently all the images provided by our memory, being attached to one spatial cue or another, become fixed and constitute a series whose terms are no longer interchangeable.

Thus any image produced by memory can only be correctly located or positioned in the past if it can be located at a particular point in space, or if it is at least associated with some other image that can.[a] Without association to trivial circumstances, every recollection would appear to be a creative act. Did I ever think and write anywhere '*La feuillée chante*,'[10] a picturesque expression that happens to come to my mind? This question releases a host of recollections: Latin words are associated with French words and to these words the name of Lucretius is attached. Ultimately, if I have a good memory, I will be able to recall the image of that old, torn little book in which I once read Lucretius' phrase '*frons canit*.'[11]

In summary, it is the interplay of feelings, the pleasures and the pains, which organizes our memory as a present representation of the past and thus **[41]** divides time into distinct parts. I am thirsty, I drink from a little stream. Half an hour later I find myself back at the same rivulet and by association it reminds me of my thirst, although I am not thirsty anymore and although the cool water has totally lost its appeal. Yet my representation is very distinct, it bears a special mark: this is the rivulet that quenched my thirst. In such a way a recollection is reinforced in the face of actual reality, the past in the face of the present. Similarly

[40]a. I will later return to a discussion of its mechanism of localization.

an animal that drank at the stream before begins to acquire separate mental slots for the past and for its current sensations.

Initially this feeling of pastness has nothing abstract or scientific about it; it is associated with the feeling of pleasure we have upon recognizing things we already know. Bring your dog home after a long voyage and it will jump for joy. Similarly a familiar face will make an infant smile while a strange face will cause distress. We are remarkably sensitive to the difference between seeing and seeing again, between discovery and recognition. Familiarity always instills a certain perceptual facilitation, and facilitation instills pleasure.> Familiarity as such is already sufficient to create a certain order: one might perhaps say that every feeling of disorder derives from lack of familiarity.

[42] The confusing and obscure bulk of our accumulated recollections resembles those large forests which, from a distance seem to be one dark mass; once we penetrate, however, we distinguish long alleys under the trees, undergrowths and open spaces, vistas as far as the eye can see. Soon one begins picking out landmarks that serve to orient oneself: one learns to tread without fear or hesitation. All these disarranged tall trees align themselves in our mind and arrange themselves by stable associations. Initially there are only passively retained recollections leading to the confusion I described above, thus resulting in the absence of a clear idea of the past in contrast to the present and the future. Then enter imagination and intelligence, to play with these images and ideas, putting them here or there at their whim, dreaming a world in keeping with our desires. At this point a distinction emerges between active imagination and the recollection present in our mind, over which we have little control because it is anchored in a mass of associations from which it cannot be detached. A split thus takes place in our mind: passive imagination – or memory proper – separates itself from active imagination.

We have already seen that the experience of time derives in part from the experience of difference. **[43]** The differences between our sensations, however, are smaller than one might expect or, rather, differences of degree do not necessarily exclude structural uniformity. Sensations come in a certain number of categories, depending on whether they originate in my arm, my leg, my head, etc. In the course of a day, or even throughout a whole period in our lives, one or more of these categories will usually dominate, establishing unity in diversity. Just now, while I was writing, my memory suddenly conjured up the image of a small gully with an overgrowth of pine trees and thuya shrubs. But when was it that I walked there, I ask myself. Without hesitation, albeit after an appreciable lapse of time, the inner reply comes to my mind: Yesterday! But how was I able to recall instantly that it was yesterday? Upon reflection I realize that my recollection of this walk is associated with a sensation of headache. I still have this headache, and that is why the temporal localization occurred so fast. Below the various events filling my day runs an undercurrent of continuous sensation

connecting them. At other times it may be a whole group of sensations that cling together. However, the prerequisite **[44]** for the existence of a precise recollection is that the most heterogeneous sensations be linked through sensations that are less heterogeneous.

<The distinction of past and present is so relative that when we pay close attention to a distant image in our memory, it soon begins to move closer and to appear more recent: it takes its place in the present. I follow a narrow road that I have not traveled for two years: the road winds among the olive trees, past a mountain ridge, with the sea in the background. As I go along, I recognize everything I see; every tree, every rock, every cottage tells me something; that high mountain peak in the distance brings back forgotten thoughts; deep inside me a diffuse choir strikes up the song of time long past. But is all this indeed as long past as I think it is? This two year-long interval, so full of multifarious events, which placed itself between my memories and my present sensations, appears to be shrinking quite noticeably. It seems as if everything happened yesterday or perhaps the day before yesterday, and I am tempted to say: 'The other day!' But why – unless the feeling of the past derives from the fading of my recollections? Indeed, all my recollections, aroused by the **[45]** influence of these new surroundings, and returning as it were to the world of sensations that once produced them, acquire considerable strength: they become literally *present* for me – here and now. If the dog who used to join me on my walks were here, he would evidently recognize this road too, he would feel happy to be here again, he would wag his tail and frolic. And since he would not measure time mathematically by applying celestial mechanics, but empirically on the basis of the strength of his memories, he too would perhaps feel as if he had been here only recently.>

There are dreams that one remembers suddenly one day, although one is unable to place them in a context. One is ready to confuse them with reality, at least if they are not too implausible and if they do not have the confusion characteristic of dreams. But one cannot place them, one searches in vain to connect them to the image of one object or another. Impossible! There are images, generated in our dreams (and occasionally in daydreams) in the vagueness of an undifferentiated thought, which resist attempts to determine when they occurred. We locate such images in the past because that is what we habitually do with images and **[46]** also because of their faded contours.

I have outlined the genesis of the idea of time in a general way, and I have shown its empirical and derived origin. The idea of time, like that of space, is empirically the result of the adaptation of our actions and our desires to an unknown – perhaps even unknowable – environment. What in the outside world is it that corresponds to what we call time and space? We do not know, but time and space are not ready-made categories that somehow independently precede

our behavior, our intelligence. Desiring, and acting toward our desires, we simultaneously create space and time. We live, and the world – or what we designate by that name – comes into being before our eyes. In particular it is the strength of our will which produces the persistence of memory, at least as far as events are concerned. When the Self is involved, either because it takes the initiative and acts upon the situation, or because the situation strongly imposes itself on the Self and thereby elicits an equally strong reaction, my recollection will establish and elaborate itself, and attain a strength that will persist in time.

[47] A desire contains the seed of the idea of possibility and this idea of possibility, in its opposition to the idea of reality, becomes an 'antecedent' – that is, something ideal and imaginary that precedes the true advent of the real. A desire, moreover, is a movement that has been initiated, and as such it is a parade of unfolding images, a sequence of scenes in space, in successive locations. The conditions for memory and for the idea of time are therefore:

(1) diversity of images;

(2) association of every image to a more or less well-defined location;

(3) association of every image to some intention and action, to some inner, more or less emotional event and – as the Germans say – a pleasant or unpleasant *tonality*. The result of all this is a spontaneous ordering of images into a sequential and *temporal* form.

Movement through space is what creates time in human consciousness. No movement, no time! The idea of movement rests on two concepts: force and space; the idea of force amounts to the idea of action, the idea of space to a mutual exclusion of actions, which causes them to counteract each other and to assume some kind of order. This mode of **[48]** organization where entities are not just distinct but *distantiated*, is what we know as space. Objectively, time can be reduced to necessary changes in space, changes that we sometimes represent as straight lines, and sometimes as closed curves or *cycles*.

[49]

CHAPTER FOUR

Time and Memory
Remembrance and the Phonograph
Space as a Representational Mode of Time

I [12]

Reasoning by analogy plays an important role in science; and to the extent that it is the principle behind induction, analogy may perhaps even be considered the basis of all physical and psychophysical sciences. Quite often a discovery has its origin in a metaphor. The light of reason cannot easily penetrate in a new direction and illuminate shadowy recesses unless it is reflected off surfaces that are already bright and clear.[13] We are only impressed by something that reminds us of something else and yet is different. To understand is, at least in part, to remember.

[50] In order to understand the faculties or, rather, the functions of the mind, a good many parallels have been drawn and metaphors evoked. And here, given the still imperfect state of science, metaphor is an absolute necessity: before we *know* we must *portray*. The human brain too has been compared to many different objects. According to Spencer, it has a certain analogy with those player-pianos that can reproduce an unlimited number of tunes. Taine makes it into a sort of printing press, incessantly making and storing imprints. But all these analogies appear somewhat crude. Generally the brain is taken to be in a resting state: images are conceived of as stills or engravings, but this is not correct. There is nothing fixed in the brain, there are no actual *pictures*, only virtual or potential images, waiting for a signal to become active. But the question remains how this transition to actuality takes place. And this is the greatest mystery of the cerebral mechanism; it is the part that is reserved for what is dynamic as opposed to what is static. This requires a criterion for distinguishing the state of an object while it receives and retains **[51]** an impression from the state in which that impression

comes back to life and induces a new resonance in that object at a later time. The most delicate instrument – receptacle and generator at the same time – that comes to mind, after due consideration, as an analogy for the human brain is perhaps the phonograph, recently invented by Edison.[14] I had been tempted for some time to point out that this is a suitable metaphor, when I happened to read, in an article on memory by Mr. Delboeuf, the following casual remark that strengthened this intention: 'the mind is an album of phonograph records.'

When someone speaks into the phonograph, the resonances of the voice are transferred to a needle which engraves into a metal sheet lines that correspond to the sounds uttered, irregular grooves that vary in depth, depending on the nature of the sounds. It may well be that in a similar way invisible lines are incessantly engraved into the cells of the brain, lines that constitute the beddings for the nervous currents. When, after some time, the current happens to encounter one of these previously formed beds, through which it has already passed before, it engages itself in them once again. Consequently the nervous cells resonate as they did the first time, and this comparable resonance **[52]** corresponds psychologically to a sensation or a thought that is similar to the forgotten sensation or thought.

This is actually what happens in the phonograph when, as a result of the action of the needle following the grooves which it cut before, the little copper membrane begins reproducing the vibrations that it did perform before. For us these vibrations once more become a voice, speech, songs, melodies.

If the phonograph membrane had a consciousness of its own, it would say, when we made it reproduce a tune, that it remembered this tune; and it would perhaps perceive as a marvelous ability what to us seems to be simply the output of a machine. Moreover, it would distinguish new tunes from those it had played before, novel sensations from mere remembrances, the present from the past. In fact, the first impressions forcibly make an incision into the metal sheet or into the brain. They meet with greater resistance and consequently require more force: when they occur they cause the heaviest resonance. If, on the other hand, the stylus finds a way through grooves that have already been traced, rather than cutting a **[53]** new path into the sheet, this will occur with much greater ease: it glides without pressure. The term *inclination* has been used: the *inclination* of memories, the *inclination* of reverie. And indeed, to pursue a memory is like letting oneself slide gently down a slope, it is like waiting for a certain number of pre-existing images to present themselves in a sequence, one after the other, without jarring. Hence the tremendous difference between present sensations and memories of the past. All our impressions naturally fall into one of these categories: the former have a greater intensity, sharp contours, and their characteristic bold outline; the latter are fuzzier, indistinct, weaker, although they still appear to impose themselves on us as orderly. *Recognizing* an image is to place it into the second of the two categories, which is that of time. Here one

senses more weakly and one is aware of sensing in this fashion. It is through this awareness of (1) the lesser intensity of sensation, (2) its greater facility, and (3) its pre-established links with other sensations, that memory is engendered and that the temporal perspective is produced. Just as the experienced eye distinguishes a replica from the original painting, **[54]** so we learn to distinguish a memory from an actual sensation, and we can distinguish a memory even before it has been localized exactly as to time or place. We project a particular impression in the past before we know to which part of the past it belongs . This is because a memory always retains its own distinctive character, in the same way a sensation coming from our stomach differs from a visual or an auditory sensation. Similarly, the phonograph cannot reproduce the human voice in all its strength and warmth: the voice of the instrument always remains shrill and cold; it is, somehow, incomplete and abstract, which is at the same time its revealing characteristic. If the phonograph could hear itself, it would learn to recognize the difference between the voice which, coming from outside, would be imprinted forcefully on it[s sheet] and the voice it is emitting, simple echo of the first, following a path already traced.

There is yet another analogy between the phonograph and our brain: the rate of the vibrations imparted on the instrument may profoundly alter the character of the reproduced sounds or evoked images. With a phonograph you may shift a melody from one octave to another by making the membrane vibrate **[55]** at a lower or a higher frequency: turning the crank more quickly will shift a tune of low and indistinct tones to one composed of very sharp and penetrating tones. Would it not be appropriate to say that an analogous effect occurs in the brain when, by directing our attention towards an initially vague recollection, we gradually turn it into a more distinct memory and, so to say, transpose it a few tones upward? Wouldn't it be appropriate to explain this phenomenon too by the greater or smaller rate and force of the activity of our [brain] cells? There is in us a kind of scale of recollections; images are constantly moving upward and downward along this scale that we evoke and dispel, at times vibrating in the depths of our being in a mute resonance, at others bursting out in vibrant sonority above all the other images. Depending on whether they dominate or fade away, they appear to approach or recede, and occasionally we observe how the duration separating them from the present moment expands or contracts. Consequently, an impression I had ten years ago may seem no older than yesterday, because it comes to life again with new strength under the influence of an association of ideas or simply because of **[56]** attention and emotion: similarly singers produce illusions of distance by lowering their voice, which they have only to raise in order to create the impression that they are coming closer.

One might easily add any number of analogies. The essential difference between the brain and the phonograph is that in Edison's – still rather primitive – contraption, the metal membrane is essentially deaf to itself: there is no

translation of its movements into consciousness; and such translation – a most marvelous achievement – is what goes on incessantly in the human brain. A mystery remains, therefore, but this mystery is, in one sense at least, less astounding than it may seem. To presume that a phonograph might be able to hear itself is perhaps less strange than to presume that we might hear it, and yet we do hear it. In fact its vibrations translate, in us, into feelings and thoughts. We must admit therefore that a transformation from *real* movement[a] to thought is always possible. This transformation is even more plausible when it concerns an inner movement **[57]** of the brain than when this movement comes from the outside. From this point of view it would seem neither too inexact nor too outlandish to describe the brain as a perfect phonograph, a conscious phonograph.

[56]a. As opposed to movement understood as a change of relations.

[59]

II

If I now turn from the mechanical to the psychological point of view, I should first state once more that, according to the British school, to understand is to differentiate. Thus intelligence is reduced to *discrimination*, and by the same token memory can be reduced psychologically to this faculty as well. To remember is to distinguish one past sensation (or faded image) from another past sensation (or faded image), and to distinguish these together from present sensations. Let me therefore consider what essential contrast I can establish between sensations on the one hand and representations or mnemonic conceptualizations on the other hand.

It has been maintained that the 'actual conceptualization' of an object by means of imagery and recall **[60]** is impossible 'so long as this object acts upon our senses (...) The percept and the concept of a single object cannot co-exist in consciousness; its perception would completely suppress its conceptualization. Reality is greedy and jealous: all ideation is obscured in its presence, much as the sun outshines the stars'. In support of this position, Mr. Delboeuf calls upon experience. Try to imagine a familiar painting as vividly as possible. It will help if you close your eyes, and the image may even attain such intensity that you would almost take it for real. A painter may indeed draw a portrait from memory. If you keep your eyes wide open, however, the required effort is much greater; you must, so to say, cancel their viewing power with your will-power, 'strike them with blindness' with respect to everything that might attract attention. If you look closely at a particular object, an engraving for instance, it will be almost impossible to mentally visualize your painting. 'You would not succeed in any

case, says Delboeuf, even if the real piece would be directly in front of you and you were looking at it intently.'

Now this, I think, is a considerable exaggeration. It **[61]** is true that perception and conceptualization of the same object are mutually exclusive insofar as they are different, and that they tend to merge – or even do merge – insofar as they are identical; but it is no less true that in the case of superimposition of an image and a percept, one is aware of this coincidence, this adaptation.

Mr.Delboeuf also mentions the example of someone who is mentally singing a familiar tune. Noise might be disturbing to some extent, but a different tune, played in the immediate vicinity, would be much more obstructive to the extent that its tempo and rhythm resemble the tune one had chosen. Ultimately, 'if the two songs are identical, any attempt to hear the internal notes will be totally in vain.' This is indeed so for attempts to separate and distinguish representation from perception at the time they coincide; but the difficulty involved in representing how an object feels while one is feeling it is not insurmountable.

The preceding considerations lead Mr. Delboeuf to reject the so called 'law of resemblance', according to which likes evoke the memory of likes. He does not deny that a portrait reminds us of the **[62]** original; only, what in the portrait reminds us of the original are not the features that it has in common with the original, but precisely those that it does not share. For example, because the portrait does not move or speak, one can say that 'one is expecting to see it gesticulating, to hear it talking.' And it is an everyday experience to remember having seen a person before when you meet him for the second time. 'To be exact, you recall the first occasion on which you met that person.' In fact, the true object of memory is the context in which you have met originally, in as far as this context differs from the circumstances under which you meet this time. You will remember the room where she was, the people with whom she chatted, the dress she was wearing; you will notice that she was younger, or thinner, or healthier. In short, 'you will not at all recall the features and circumstances that were exactly alike. How could it be otherwise, since you have them right before your eyes?' This leads Mr. Delboeuf to the conclusion that the perception of something that has been perceived before re-activates one or more earlier peripheral states that will then generate certain concepts, to the extent that they differ from the actual peripheral **[63]** state. The mind decides that the objects of these conceptualizations are absent because their images are faded in comparison with those of objects that are actually present and that constitute the setting for the thing which in fact elicits this memory. This is, in Mr. Delboeuf's opinion, the true significance of the laws of similarity and contrast, which some psychologists incorrectly place among the laws of association. Resemblance activates the recall of differences. The present image, in as far as it is identical with the past image, regenerates the old context in as far as that context differs from the present one.

Although I do not reject the principle of association through similarity, I agree with Mr. Delboeuf that the context is the decisive factor in remembering; and this context is, above all, a place which provokes the recall of a date. To remember means to re-place a current image in time and space. It is like 'finding the right page and location in an atlas where something has been engraved.' In my view the maps in this atlas of time are made of spaces, places, and local scenes. The image of a past object, reflected by a similar, present object, reproduces in a fainter form one of the pages from this atlas, that is, a particular place with a particular scene, and this is when we say we **[64]** *recognize* the object. Since, moreover, the pages are more or less vaguely numbered on the basis of their remoteness and their mutual connections, we sometimes, but not always, transform local scenes into temporal ones by assigning them a date. Here space is always the prime initiating factor.

Messrs. Taine and Ribot have shown quite clearly how we succeed in localizing images in time with considerable precision. Theoretically, they argue, we have only one way of proceeding: we determine positions in time exactly the way we determine positions in space, that is, relative to a *fixed point* which, in the case of time, is our present state. Messrs. Taine and Ribot maintain correctly, and in agreement with what I said earlier, that the present is a *real* state which already possesses a certain *amount of duration*. However short it may be, the present is not just a spark, a nullity, an abstraction analogous to the mathematical point: it has a beginning and an ending and, in addition, its onset does not strike us as an absolute beginning: it is always contiguous with something else that it fuses with to achieve continuity. This is what Mr. Taine has called the 'two extremes of an image.' When we read or hear **[65]** a sentence, adds Mr. Ribot, at the fifth word something will remain of the fourth word. Each state of consciousness fades in a gradual fashion: it leaves behind a trail similar to what in physiological optics is called an afterimage (*after-sensation, Nachempfindung*). As a result the fourth and fifth words are continuous, the endpoint of the former meeting the onset of the latter word. For Mr. Ribot as well as for Mr. Taine this is the capital point. There is contiguity, but not an undefined one, arising because two *arbitrary* extremes meet, but because the *initial point* of the current state touches the *endpoint* of the immediately preceding state. According to Mr. Ribot a correct understanding of this simple fact automatically entails an understanding of the theoretical process of temporal localization, because the retrograde influence may also affect the transition between the fourth word and the third, and so forth; and since every conscious state has its duration, 'the number of mental states traversed regressively plus their duration determine the position of a given state relative to the present one, that is, its distance in time.' Such is theoretically the process of localization: 'a retrograde trajectory which, **[66]** starting from the present traverses a series of terms of variable duration.'

Psychologists have pointed out that in practice we may rely on simpler and

more expeditious procedures. We rarely take this regressive route through all the intermediate states of mind, and generally not even through a majority of them. We achieve simplification above all by the use of *reference points*. Mr. Ribot gives an example: 'On the 30th of November I am expecting a book that I urgently need. It is being sent from afar and shipping normally takes at least twenty days. Have I ordered the book in time? After some deliberations I remember that I made my request the night before a short trip which, I know with certainty, took place on Sunday, November 9. At this point recall is complete.' The principal state of consciousness – the request for the book – is initially projected into the past in an indeterminate way. It arouses secondary states and establishes its position relative to them – before or after. In Taine's words: 'a memory image travels along the line of the past, sliding forward and backward; every [relevant] mental proposition will affect its position.' After a few oscillations, large or small, the image will **[67]** settle in its final position; it is stabilized and recognized. In this example the recollection of the trip is what Mr. Ribot calls the 'reference point.' The reference point is an event, a state of consciousness, whose exact position in time we can identify – that is, its distance relative to the present – against which we measure other temporal distances. 'It is a state of consciousness which resists forgetting better than other states because of its intensity, or which, because of its complexity is capable of arousing many connections thereby increasing its chances of being revived. These reference points are not arbitrarily chosen, they impress themselves upon us.' I wish to add that they are always drawn from or related to spatial expanse. Thus the trip in Mr. Ribot's example consisted of a series of spatial scenes. Even if a pronounced pain or joy serves as a reference point, that pain or that joy is inevitably localized in space; only by that token can it be placed in time and, subsequently, serve as a reference point for further temporal localizations. Indeed, it is primarily by means of space that we determine and measure time.

[68] Mr. Ribot compares these reference points to milestones and signposts which, from a single point diverge in several directions. 'However, it is remarkable,' he adds, 'that these sequences can, in a sense, juxtapose and compare themselves against each other.' But, let me ask, how can we contrast durations if genuine juxtaposition is only possible in space? This is because we believe we are directly comparing durations whereas, in fact, we are comparing spatial images, spatial perspectives. We take the years of our life, periods of years, and each year is represented by an observable revolution of the sun, divided into smaller parts between which we interpolate the most prominent events of our lives during the year.

Reference points facilitate the mechanism of temporal positioning. The event that serves as a reference point is repeatedly recalled to consciousness; its temporal position is repeatedly re-established relative to the present, that is, the intervening states which separate it from the present are revived more or less clearly.

According to Messrs. Taine and Ribot the result is that the **[69]** position of the reference points is – or appears to be – established more and more accurately. Due to the effect of repetition, the localization becomes immediate, instantaneous, and automatic. This process is analogous to habit formation. Intermediate states vanish because they are no longer useful. The series is reduced to two terms, which suffice because their temporal separation is sufficiently established. 'Without this *abridgment procedure*, without the disappearance of an enormous number of elements, localization in time would be very time consuming, clumsy, and confined to narrow bounds. Thanks to this procedure, however, an image is provisionally and immediately positioned the moment it is aroused, it is located between two anchor points, the present and some other reference. The process is terminated after several, sometimes laborious, fruitless, and rarely precise attempts.'

Everybody will notice how closely this process resembles the way we localize in space. Here too we use reference points, shortcuts, and well-established distances that we use as our yardsticks. But Mr. Ribot might have added that there is more than an analogy in this case: there is an identity! **[70]** Actually, to localize in time we attach reference points to space and the abbreviating procedures so well described by Messrs. Taine and Ribot are, really, shortcuts in space, representations of visual scenes with vaguely defined distances that are subsequently given precision by means of *numbers*. The present moment is clearly the point of origin for any representation of time. We can only conceive of time from a present perspective, in which we represent the past behind us and the future in front of us. But this perspective is always a spatial scene, some event that occurred in a material and *extended* context. The form of our *representation* of time, the way we imagine it, is essentially spatial.

The space we perceive is *in front of us*; the space we simply *represent* without perceiving it is behind us. In fact, we can only represent the space behind our backs by imagining that we are frontally facing it. So it is with time; we can envision the past only as a perspective *behind us*, and the future emerging from the present as a perspective **[71]** *in front of us*. The primitive view of time in animals and young children must be a simple string of increasingly faint images. Time acts, initially, as a fourth dimension of the objects in space. It has lines, surfaces, distances that are impossible to traverse without moving and, finally, there is one kind of distance that can only be traversed by intermediate steps, namely the separation between the desired and the possessed object, that is, separation in time. Hours, days, years, they are just as many empty pigeonholes in which we deposit all the sensations as they come to us. When the pigeonholes are full and we can run through the whole series without hiatus, they constitute what we call time. Initially these were no more than divisions of space; now the accumulation and the regular distribution of sensations in space, generate this phenomenon that we call time.

Not only do we categorize and label our internal events, but in exactly the same way we classify events that took place before we were born; moreover we impose the same divisions on future time. We draw, from the past towards the future, **[72]** a long and heavily subdivided line that basically represents the line followed by sun and stars in their eternal course. The convenient subdivisions of this line provide us with an opportunity to put everything in order. Spencer states that in ancient times and in uncivilized parts of the world people define space in terms of time and that later, due to progress, time is defined in terms of space. Thus savages express the location of a place, like the ancient Hebrews, in terms of the number of days away. In Switzerland tourists are told that a village is so many hours away. Spencer's theory is artificial, though. It is quite natural that, in earlier times, when rigorous yardsticks for measuring space were lacking and the distances to be appreciated were *walking* distances, the answer would be in terms of walking time. But, in reality, the day and the hours, marked by the visible positions of the sun are a regular sequence of spatial scenes, of visual expanses. None of this implies that the notion of time actually *preceded* the notion of space. Time is an artifact arising from the indirect measurement of large distances, but from this it does not follow that one has to count **[73]** time in order to perceive the elementary visible and tangible expanses.

From a scientific point of view the most primitive and fundamental unit of measurement must evidently be a quantity that can be measured (1) directly, and (2) by comparison against itself. Expanse – spatial extension – indeed satisfies these two conditions. It is measured directly by superimposing one expanse on another and comparing them. Neither time nor movement are required as elements in this comparison. In contrast, neither time nor movement can be measured directly or by self-reference. I cannot *directly* superimpose a standard interval on another time interval because time is in constant flux and never repeats itself. I can certainly recall an interval and compare it with a real time interval, but in that case the standard is unreliable and the measurement unscientific: I will certainly be wrong! Moreover, if you look more closely, you will see that in the case of this *approximate* internal measurement, in order to compare two durations, you are forced to *represent* the standard interval: how will you represent it? If you come to think of it, this will turn out to be in terms of space. **[74]** You will remember what you did at a certain time in a certain place and you will compare this recollection with your present impressions, and you say: 'This is – or is not – roughly of the same length.' Reduced to duration without space you will not succeed in constructing a measure [of time]. This is why giving a certain permanence to this incessant flow of time requires its being represented in spatial form.

The ear is the peripheral sense which, in addition to the internal processes, has been important in detaching time from space and in giving it a dimensionality of its own. The reason is that the ear provides only vague spatial cues while its

localization in time is excellent. An animal is lying motionless somewhere in a quiescent landscape: a sound is heard once, twice, three times, which creates a series of events in contrast with the unchanging scene: it is as if time becomes alive in the sound. The ear evolved to help animals detect the proximity of an enemy. On that assumption it is easy to understand the distinction between the first, soundless scene, the second in which the sound is heard, and then the third in which the enemy appears. This invisible and intangible entity, sound, **[75]** has gradually projected itself into a non-spatial domain, more or less analogous to the internal domain of vital needs which essentially constitutes time. The sense of hearing, gradually detached from spatial forms, has developed into a sort of rhythmic counter; it is the principal sense for evaluating duration, order, rhythm and meter.

Another means of separating time and space is imagination. We do not only move with our legs, we also move by means of our representations, passing from one to the other in our thought, and we have no difficulty distinguishing our mental promenades from actual locomotion. Given a particular state of consciousness we attach to it a string of other representational states that naturally and always lead to the present state as its terminal point. Thus we proceed backward in order to finally return to the point of departure. Such an idealized space is quite unlike real space and it allows us to conceive of a[n abstract] setting in which things occur *in succession* instead of co-existing like objects in space.

While space enables us to generate and measure time, time allows us, as we have seen, to compute **[76]** spatial relations. Here we have a case of a mutual action and reaction. A blind person will declare that a stick is long or short, depending on the time it takes to explore the stick manually from end to end. If the stick, instead of remaining stationary, moved in the same direction as the person's hand – which would eliminate the feeling of friction – it would appear extremely long, while moving it in the opposite direction would make it appear very short. This has been confirmed in some experiments on Laura Bridgman.[15] It does not follow, however, that the idea of *duration proper* is implicated here. The idea of number is perhaps sufficient to account for this case: a distance traversed seems longer when it gives rise to more sensations, while it seems shorter when it generates fewer sensory impressions. I am not arguing that we actually count every individual sensation; neither do we have to measure the volume of two unequal mountains in cubic meters of earth, and yet we can tell at first sight that one is larger than the other and contains more earth. Numbers can exist in the absence of enumeration and one can estimate without detailed computations. Animals do not know arithmetic and yet a bitch knows very well if the number **[77]** of her puppies has decreased or increased. In some cultures people do not count beyond two, for example the Damara, but they nevertheless keep immense herds of cattle, and they immediately notice if one of their animals

is missing.[16] In evaluating the number of sensations during an interval we follow the example of animals and primitive tribesmen, that is, we cast a glance and guess. The result of this evaluation represents simultaneously the apparent length of time and the spatial expanse traversed during that time.

This clearly proves that we measure time on the basis of the number of sensations and in no way on the basis of their pure duration; this is the way we arrive at the approximate length of a dream. In this case there is no artificial measurement: no tick-tock of a watch is telling the time. Since this judgment is exclusively based on conscious deliberation, our only recourse for estimating how much time has elapsed is the number of images that passed before our eyes, which can lead to the most peculiar errors. A particular dream seems to have lasted several hours, even though in reality it has not lasted more than a few seconds. There is the example of **[78]** a student who unexpectedly fell into some state of lethargic sleep but who was instantly woken up by his friends. In that brief instant he had acquired a very clear impression of a tremendous number of adventures during, what seemed, like a long journey in Italy. If one would have asked this young man to estimate how long he had been asleep he would undoubtedly have guessed several hours. He just could not believe that all these towns, monuments, people, that all these kinds of events would have passed before his eyes in two or three seconds. Of course this extraordinary phenomenon will only occur in a dream where images, not being associated with any particular spatial location, can follow one another at a tremendous rate. This would be impossible in a state of wakefulness, because people move through space relatively slowly. However, what transpires from these examples is that we do not really become aware of the *duration* of our sensations and perceptions as a result of some predetermined form but that, instead, we evaluate duration *a posteriori* on the basis of their number and variety.

Excavations have shown that under the cities buried by Mount Vesuvius there are traces of even older cities **[79]** that were buried and disappeared in still earlier times. Their inhabitants erected one layer of buildings on top of the other whenever the latter had been covered again by the rising ashes; thus layer upon layer of city has been added; underneath the streets you will find subterranean streets, below intersections there are other intersections, [in other words,] the living city is founded on the sleeping cities. The same happens in our brain; our present life covers, without erasing it entirely, our past life which serves as support and hidden foundation, If we descend into our inner depths, we are lost among the debris. To restore and reconstruct them, to bring them into full daylight again, the most important and almost unique means available is spatial organization.

Once memory has been established, the *Self* is established too. Time and motion are derived from two essential sources: outside the unknown, and inside

a certain activity, a certain energy being released. We can neither know ourselves in depth, nor know that which exists outside us and from which the Self is to a large extent derived. What are our **[80]** inner strengths, and what are the limits to the development of this internal source of energy? And, on the other hand, what is the secret of this silent nature surrounding us? These two unknowns constitute, in my view, the fundament for all the other [epistemological mysteries], time included.

We have seen that <memory derives from the feeling of sameness contrasted with the idea of difference and opposition; physiologists agree that empathy derives from the discovery of a resemblance or a harmony between ourselves and others; I recognize myself in the other through empathy[17]; similarly I recognize myself in the past through memory.[a] Memory and empathy have basically the same origin.

I wish to add that memory produces attachment to objects that best provoke this feeling of similarity and that are the most instrumental in making us re-live our lives. Secret ties bind us to a host of things around us in our heart of hearts, things that appear insignificant to everyone **[81]** else and that only have a voice and a language for us. But this uncertain love invoked by memory and habit is never free of melancholy; it counts even as one of the most active sources of sorrow because its object is forever changing and inevitably associated with the remembrance of things past, things that are no more. Consciousness is a representation of changing objects, but consciousness itself does not change as rapidly. While we are adapting to a novel environment, we still retain the bent and shape of the earlier environment in the depth of our mind, which creates a polarity in our consciousness, two tendencies, one towards a past to which we are still attached in so many respects, the other towards a future, unfolding before us, to which we are already adapting ourselves. This feeling of being mentally torn apart is one of the causes of the melancholy created by reflective memory, a sad feeling which, at least in human beings, replaces the charms of spontaneous memory. In some way simply thinking of a past event, whatever it may be, already carries the seed of sadness which grows as we focus inwardly. Remembering, for a thinking being, is frequently very close to moral suffering. The idea of past and **[82]** future is not only a necessary condition for suffering, but in some sense it is also its sufficient ground. Human greatness – the ability to recognize oneself in one's past and to project oneself into the future – may eventually become a persistent source of bitterness. The idea of time itself is the incipience of regret. Regret and remorse constitute the solidarity of past and present; this solidarity always introduces sadness into reflective thought because it is the feeling of the irredeemable. Even in a simple recollection, in the

[80]a. I found an eloquent expression of the same idea in *Psychologie* by Mr. Rabier.

consciousness of past, there is what the poet has expressed with some profundity in this verse:

Comme le souvenir est voisin du remords![18]

Remembering is always being conscious of something we cannot change – and yet this something is forever attached to us. Remorse is also a feeling of inner impotence and precisely this feeling is in some vague fashion inherent to the way we recall a life that is constantly escaping us, a world **[83]** to which we no longer have access. The holy myth tells us that our forbears burst into tears when, banished from Eden, they saw their lost paradise recede and vanish behind them; this is the symbol of primal remorse but also the symbol of the first remembrance. Whatever range of our experiences, each of us has a past, a lost paradise filled with joy and melancholy, to which neither we nor our progeny can ever return.

If there is a bitterness at the bottom of every recollection, even of one which at first seems pleasant, how will it be with painful memories, especially the moral ones, the only memories that we can integrally revive and represent? The painful recollection may strike an adult with a force that swells with the effort he expends to overcome it. The harder one struggles to be rid of it, the deeper one sinks in. It is like being drawn into quicksand. We become aware of the fact that the depth of our Self is in constant motion, that every thought and every sensation permanently generate turbulence and undulations, that there is no solid ground on which to walk or stand. The Self escapes **[84]** our clutch like an illusion, a dream; it disperses and dissolves into a multitude of fleeting sensations, and with a certain vertigo we feel it sink into the moving abyss of time.>

[85]

CHAPTER FIVE

The Illusions of Time: Normal and Pathological

I

The estimation of duration, being purely a phenomenon of internal optics, a perspective of images, cannot but display a fundamentally relativistic character. It is indeed relative to:

(1) the *intensity* of the represented images;

(2) the intensity of the *differences* between these images;

(3) the *number* of images involved and the number of their differences;

(4) the *rate* of succession of these images;

(5) the mutual relations between these images, their intensities, their similarities and differences, their respective durations, and finally their temporal *positions* in time;

(6) the time required for conceiving these **[86]** images and their relations;

(7) the intensity of our attention to these images and to the feelings of pleasure and pain that are associated with them;

(8)[19]

(9) the appetites, the desires or emotions that accompany these images;

(10) the connection between these images and our state of *expectation* and anticipation.

This shows how a multiplicity of relationships between representation, emotion and will influences our sense of duration.

Consequently I have no idea how I could possibly accept the overly simplistic laws [of time judgment] that have been suggested; in my opinion each expresses only one aspect of the problem. Romanes, for instance, argues in his research on time consciousness that, apart from the *number* of states of consciousness, there is an additional factor which influences the lengthening or shortening of time, namely 'the relation of states of consciousness to their intrinsic succession.' In experiments in which subjects have to judge one-second intervals, time seems relatively long; this is, according to Romanes, because in this case attention is entirely focused on the production of a single, unique series of changes, much like the ticking of a chronometer; during the experiment these changes constitute, therefore, the total content of conscious awareness; consequently all their sequential relations are **[87]** clearly imprinted in memory, thereby filling it. Such a large number of clear impressions has the effect of making the series appear longer.

Everyone has noticed that objects are distorted in memory. We perceive them as larger or smaller, more pleasant or unpleasant, more beautiful or ugly, etc. Ordinarily, time is the great attenuator of reality, blurring out or rounding off its sharp contours. This distortion can be explained by the struggle for survival: among the persisting memory traces those which are the deepest are also the most vivid. Moreover, the attribute of an object which has struck us most tends to mask all the other characteristics: shadow prevails all around, and this attribute is the only one to appear in the limelight of the mind. When I return to the street where I used to play as a child and which always seemed so wide and so long, I find to my astonishment that it is just tiny. The reason is that in my childhood all my impressions were intense, new, and fresh. The impression created by the dimensions of the street was therefore a very vivid one. Later, when I recall the street to mind, the intensity of my subjective impressions is transferred upon the original object and translated into spatial terms, simply because **[88]** in memory everything tends to be spatialized, even duration.

The vividness of an image causes errors, since it separates the event [represented by the image] from the series of reference points we use to delineate the past. According to Sully the most striking examples of such errors are engendered by public events, which extend beyond the narrow bounds of our private lives, and which are not connected to specified points in time like ordinary events. Such events can move and engross us at a given moment; but, in most cases, they leave the mind as quickly as they came. We have no opportunity to return to them; and if someone reminds us of them later, they will almost certainly appear more recent than they are, simply because the interest they initially aroused has given their images a particular vividness. Sully mentions a curious example of this type of illusion, provided recently by the newspapers recalling the trial and conviction

of several police detectives, who were about to be released after having served their sentences (three years of hard labor). 'The news that three whole years had passed **[89]** since this sensational case astounded me as well as many of my friends; we agreed that the event did not seem to us longer ago than about one-third of its real distance in time. Several newspapers also mentioned the apparent brevity of the time that had passed, and this evidently shows that in this case a causal factor had been at play to create a widespread illusion.' The apparent distance of an event that is not clearly localized in the past is inversely proportional to the vividness of the mnemonic image; all consciously focused attention to a recollection tends to make it seem closer in time. It is, according to Sully, like observing a remote object through binoculars: the haze disappears, new details emerge, to such an extent that we may even come to think that the object is actually within our reach.

In cases where the mind, under the influence of an unhealthy tendency to nourish a passion, gets into the habit of returning incessantly to some painful circumstance, this momentary illusion can become periodical and even lead to a partial confusion of remote and recent experiences. An offense one has kept alive in one's **[90]** memory will, in the end, act like something that moves forward at the same pace as we; it constantly presents itself to our memory as something that happened very recently. In cases of insanity brought on by some terrible shock, we can observe the unrestrained development of this tendency to rake up the past: 'events long past, remote circumstances will merge with present facts'[a]

Another cause for error in our evaluation of duration is that we tend to combine the time required for representing an event with the actual duration of the event. In psychophysical experiments, when asked to judge the duration of the fast beating of a metronome, I overestimate. Unconsciously I add the time needed for representing and evaluating the beats to the objective duration of these beats which, as a result, seem to be lengthened. In contrast, when the beats are very slow, I tend to make them shorter than they are: in this case their representation is more rapid than the beats themselves, and I tend to confound the subjective rate with the objective rate, **[91]** just as, earlier, I confounded the subjective slowness with an objective slowness. The dancer who is required to follow too fast a rhythm will be short of breath and lag behind; if he is made to move too slowly, he will remain with one foot in the air trying to accelerate the movement. Thus, effort, more or less brief and fast, plays an important role in our notion of time. It is through effort or desire that we first encounter time; and we preserve this habit of estimating time on the basis of our desires, our efforts, our will. We affect its length by our impatience and our haste, just as we alter its rapidity by the sluggishness of our efforts to represent time. Estimation of past duration depends on the apparent duration of the process of reconstruction itself, that is,

[90]a. J. Sully (1881). *The illusions.*

on the effort spent in recalling various events. Thus, when all these events are related and resemble each other, the attentional effort required for retrieving them from memory will easily adapt itself to each of the successive images, as is argued by Wundt, and the whole series, easily processed, will appear shorter. On the other hand, if the events are discontinuous, unrelated, or too varied and dissimilar, the reproductive effort **[92]** requires more time and the series of events will seem longer. This is similar to the case of two equally long horizontal lines, one of which is hatched with vertical lines: this line will appear longer because the eye that is scanning it will be stopped by these cross-lines, and since the movement of the eye is slowed down, the line will take on an apparent additional length. Analogous optical phenomena exist for time as well. But this offers only part of the explanation, not all of it.

In psychophysical experiments on the judgment of duration of chronometer beats, one finds that the point where an estimated time interval is, on the average, equal to the real interval and is reproduced faithfully, is on the order of 0.72 seconds; in fact, this is also the mean value of the duration that is, on the whole, necessary for reproduction by remembering or representation. Therefore, the processes of reproduction and association are most readily accomplished at a rate of approximately 3/4 of a second. From this Wundt concludes that when we have to represent objective intervals that are longer or shorter, we try **[93]** – involuntarily – to make them equal or at least as similar as possible to this normal rate of representation. This is one reason why we accelerate taps that are slower than three quarters of a second and decelerate those that are shorter. Here again, is a matter of desire and satisfaction that dominates our representation of time. But Wundt mentions an even more remarkable fact. That same 3/4 of a second also happens to be the time it takes the leg to execute one step in a quick pace. And thus, I should add, it is ultimately the duration of *one step in space* from which derive our measure of time. It is likely that the stride was man's first measure of space, and consequently, his measure of time. Initially the most general form of time was the sequence of images that one has when making a series of movements, viz. a series of steps. One observes the displacement of objects to the left and to the right, and if one turns around one will find them again. In this way the three dimensions of space and the unique dimension of time organize themselves in our imagination. At a later age we still match the rate of our representational processes to our steps and, because of a natural tendency **[94]** we try to adapt the rate of time to the pace of our thoughts and our legs.[a]

[94]a. Let me add that in music a tempo of 0.72 constitutes an Andante giusto which proceeds neither too slow nor too fast, but at a natural pace.

Stevens has obtained results that differ from those of Vierord[t][b], Mach[c], Kollert[d], Estel[e] and Mehner[f]. Stevens found that brief intervals tend to be shortened even more, and similarly that the length of long intervals tends to be increased further. In Stevens' experiments the 'indifference point', that is the point of accurate reproduction, is essentially the same as for the other investigators. But it should be pointed out that his experimental conditions were not the same. Vierord[t] and his successors made a comparison between two time intervals, and this process was entirely *mental*. Stevens restricts himself to a single interval which he has the subject reproduce [repeatedly[20]]. This introduces completely new aspects and intervening factors, as Stevens himself recognizes: the use of the will, motor impulses, the transmission of impulses via the efferent nerves, as well as the latency introduced by **[95]** muscular contraction. Stevens himself does not propose an explanation for the results he obtained. But perhaps, since the will to reproduce and the reproducing movement are the most important factors in his experiments, the following result must obtain:[21] when the interval to be reproduced is below the point of indifference, one will initially judge it as being short even if one *imagines* it to be longer than it is, and one will adopt a rate of motor reproduction whose purpose is not to stay below the standard. This rate then induces a further shortening of intervals that are already short. In contrast, when the time interval is longer than the indifference interval it will seem long notwithstanding the spontaneous shortening imposed on it by imagination, and the will imparts a slow, restrained movement, for fear of too high a rate [of reproduction]. The result is a lengthening of intervals that are already long. The musician to whom the metronome indicates a rapid beat tends to play even faster in order not to lag behind; if the metronome indicates a slow tempo, he will perform even more slowly for fear of going too fast. This is the explanation that I would propose for the observed discrepancies between investigators.

[96] According to Estel, our representations of time, like other sensations and representations, are influenced by past impressions that occurred in the domain of a specific sensory system. A time interval that has been perceived as short by the auditory sense, will make the following sound appear even shorter.[a]

[94]b. K. Vierordt (1868). *Der Zeitsinn nach Versuchen*. Dissertation University of Tübingen. Tübingen: Verlag Laupp.

[94]c. Quoted in W. Wundt (1874). *Grundzüge der physiologischen Psychologie*. Leipzig: Engelmann; p. 785.

[94]d. J. Kollert (1883). Untersuchungen über den Zeitsinn. *Philosophische Studien*, *1*, 78–89.

[94]e. V. Estel (1885). Neue Untersuchungen über den Zeitsinn. *Philosophische Studien*, *2*, 37–65.

[94]f. M. Mehner (1885). Zur Lehre vom Zeitsinn. *Philosophische Studien*, *2*, 546–602.

[96]a. V. Estel, o.c.

The influence of waiting on apparent duration is well known. If a waiting period seems *long* this is because it contains a series of disappointments, of *not yets*. Our longing, combined with the representation of the awaited object – the arrival of one's beloved, for instance – tends to make us envision the future as already present, and because we would like to see this future happen instantly, we leap over the intermediate events, we imagine that the distance has been bridged; consequently we wish and conceive of it as shorter than it can or must be. This is the source of the interminable *when*? By comparison with the ideal time and its ideal tempo, real time seems to drag intolerably.

When the waiting is over, some authors say (with Wundt) that the time which had seemed so long suddenly contracts as soon as they **[97]** forget their *ennui*; others (following Sully) maintain that they do not at all forget their tedium and that the waiting period retains its characteristic slowness in their memory. Everything, in this case too, depends on the actual comparison made and on the presence or absence of a recollection of tedium.

Now, why does the time of happiness – play for the child, the amorous *rendez vous* for the young man – appear to have *flown by* with such distressing rapidity? This is because, as a result of the idealized anticipation, we were expecting and longing for an extended bliss – a never ending happiness: but how brief does reality seem in comparison with the reason for our longing and our waiting! 'What? Already?' We have projected before us, by force of imagination, a long way to go, a genuine 'lovers lane' and when we reach the end we inevitably find it has been too short. In happy times we desperately cling to every hour that passes; it leaves in us a luminous trail, and we continue to watch it growing dimmer and dimmer without altogether vanishing before our spellbound eyes.

Wundt explains most of the errors of judgment of duration by the fluctuations of **[98]** *apperception*, – that is, *attention to representations* – which is in a state of greater or lesser tension. In this case, however, the level of attention is only a secondary factor. True tension resides in desire, in motivation, the internal force which is pushing from the present to a future goal, sometimes desired and sometimes feared. In the first case, time is passing too slowly; in the other it goes too fast. We cannot help but measuring its length relative to our desires: *apparent time* varies with motivation or desire.

Sully argues that the shortening of time judged *in retrospect* does not obey any law. One cannot say that it is judged proportional to remotenes; one must even admit that it is not. 'If I represent the last ten years of my life by a straight line one meter long, then the past year will cover three or four decimeters; the fifth, full of events, covers as much as two decimeters; and the other eight years are squeezed into the remaining stretch.' In history the same illusion prevails. Certain centuries appear longer: 'the period between the present and the fall of Constantinople seems longer than that which connects the latter event with the first **[99]** crusade, although the two periods are chronologically of roughly the same

length.[22] It is likely that this is due to the fact that we know the former period better and perhaps also because we fill it in with personal memories.'

In my opinion, the apparent length of time, judged in retrospect, increases as a function of the number of well-delineated and *intense* differences perceived in the events we recall. A year, filled with notable and varied events will seem longer. An empty and monotonous year will seem shorter: the impressions are superimposed and the time intervals blend and seem to contract. Here again is a phenomenon that has an exact analogue in space. The distance of an object is visually perceived as greater if a number of objects is interposed which serve as landmarks. Just as in space sharply outlined objects appear closer, we have seen that in well-defined events in time seem to have taken place yesterday.

Errors in judging time are greater for remote periods than for recent intervals of equal length: thus the retrospective estimation of an interval far removed from the present moment, for example **[100]** the time one has spent in school, is much more superficial and much more fragmentary than the estimation of an equally extended, but more recent period. The perspective in past time corresponds therefore to a spatial perspective where the size of the relative error due to perspective diminution would increase with the distance.[a]

In a similar fashion we can, I think, explain the familiar phenomenon that the years appear so long in childhood and so short in old age. Youth is impatient to satisfy its longings; it would like to devour time, but *time is dragging*. Moreover, impressions in youth are vivid, novel and numerous; consequently the years are filled, differentiated in a thousand ways, and the young man perceives the past as a long series of spatial scenes. The back of the stage recedes into the distance, as it were, behind all the changing props that follow each other as if they take place by open curtain: one knows that in the theater a whole line of decors is waiting below stage ready to rise before the eyes of the spectator. These decors are like the images of our past that reappear; some are more faded, more indistinct and **[101]** hazy, creating an effect of distance, while others serve as coulisses. We classify them according to their degree of intensity and their order of appearance. And the stage-hand is our memory. Thus, for the child, last New Year's Eve recedes ever more behind all the events that occurred since then, and next New Year's Eve also seems very far away, so impatient is the child to grow up. In contrast, old age is like the unchanging decor of the classical theater, a simple, unassuming setting. Sometimes [it creates] a veritable unity of time, place and action which focuses everything on one dominant action to the exclusion of all others, at other times [it only leads to] a nullity of action, place, and time. The weeks resemble each other, the months resemble each other; that constitutes the monotonous rut of life. All these images become superimposed and in the end merge into one. Imagination abridges time. Desire does likewise; as the end of

[100]a. J. Sully, o.c., p. 179.

life approaches, one says: 'There goes another year! What have I done with it? What have I felt, seen, accomplished? How is it possible that three hundred and sixty-five days have passed in what appears to be no more than a few months? If you want to lengthen the perspective of time fill it, if you have the opportunity, with **[102]** a thousand new things. Go on an exciting trip, which would rejuvenate by rejuvenating the world around you. The host of events, the distances traveled will accumulate, bit by bit, in your retrospective imagination: you will have a large number of fragments of the visible world arranged serially, and this will, as has been said so aptly, occupy a long *space* of time. According to Mr. [Paul] Janet, the apparent duration of a certain period of time interval, in every person's life, is 'proportional to the total duration of that life.' [a] For a ten year-old child, he says, a year represents one tenth of its whole life; for a fifty year-old person the same year will not be more than one fiftieth, and accordingly it will appear five times as short. Moreover, the age of fifty seems extremely old for the child, but not for the middle-aged person. In fact, this law supposedly applies only to rather long time periods, of the order of years, not days or months, which we would never consider comparing with a whole life. In my opinion, Mr. Janet's law expresses a genuine tendency of the imagination to judge **[103]** quantities against what it can represent as larger or smaller: to those who have not traveled a great deal, the village seems large; to those who have seen Paris, a provincial town will appear small. But the law proposed by Mr. Janet is much too mathematical and too simple to be the sole explanation for the apparent shortening of the years in the old person's eyes. The fusion of similar impressions and similar periods that are superimposed upon each other plays, I think, a much more important role in this case.

Mr. Janet provides yet another example of the way we evaluate duration by comparing part and whole. If you only travel by train from Paris to Orleans, you will already feel tired at Choisy; if, on the other hand, you go from Paris as far as Bordeaux, you will only experience the same feeling of fatigue and boredom near Orleans. In my opinion this effect can be explained by the difference in *expectancies*. When going from Paris to Bordeaux, you prepare for a long journey, you adopt an attitude of resignation in advance and you feel upset by boredom only much later. But if you board the train for Orleans, you say to yourself beforehand: 'This will not take very long, I'll arrive soon.' And **[104]** when at Choisy, you exclaim: 'It is longer than I thought!' The important aspects in this case, once again, would seem to be attention, expectation and motivation.

We represent and estimate the duration of an interval objectively by means of the succession of states of consciousness that can be – and in fact are – represented, and that we place within the confines of that interval. In other words, we judge the length of an elapsed time interval by means of a series of

[102]a. Paul Janet (1877). Une illusion d'optique interne. *Revue philosophique*, 1, 497–502.

recollections that we insert into it. Nothing that we do not remember can, of course, ever enter into this series. The result is that the more numerous, intense and distinct recollections we have to insert between two endpoints, the longer the interval will appear. Thus, the child has many and varied representations to locate within the period of one year. In contrast, for the adult memories will fuse and overlap, and only a few salient points will stand out. This then is the principal explanation for the apparent shortening of the years. Conversely, if one night's dream seems to span a century, it is because there has been a rapid succession of vivid and distinct images: a series, by being densely filled, appears longer. Now, which representations **[105]** are most easily representable in memory, and consequently the easiest to place in the perspective of time? These are, besides our strong emotions, the spatial representations. Our physical pleasures and pains are represented in memory only vaguely and sketchily, our moral pains and satisfactions derive their distinctness from ideas which, in turn, derive their precision from places, from the visible environment. As we saw before this implies that in order to imagine time we imagine, above all, spaces, and that we estimate lengths of time by the amount of space or the spatial scenes that we interpose between two extremes.

Sully is right in comparing certain illusions of temporal distance with analogous illusions of spatial distance. Look at the Jungfrau from the Wengernalp[23]: it seems you could easily throw a stone across the deep valley in between and hit its radiantly white glacier. This is because nothing intervenes in the transparent air between you and this clear view: there are no anchor points whatever, and you say: 'How near it is!' Similarly, when there are striking events that seem to have happened yesterday, it is because we cannot pay attention to all the **[106]** intermediary states: striking events stand out just like the mountain, and everything else vanishes. If someone reminds you of the many years that have passed, you exclaim: 'How is it possible!' Basically, what you see through the eyes of your imagination is a certain part of space where something has happened, perhaps something that made you feel happy and that you then lost. All the rest of space you may have traversed will disappear. You see your past happiness take shape before you as if it were a mountain peak in radiant sunlight. It seems so close in time because your imagination observes it from nearby in the space where it has situated these things.

Thus the measurement of time, like time itself, is a matter of perspective, and mostly even *spatial* perspective, represented in imagination. Depending on the vantage point and on the measure we use, this perspective will expand or shrink: it is simply an effect of imaginary *optics*. In order to achieve a certain stability in these visions, we must borrow from external space what is required to control our internal space: we appeal to the succession of day and night, to the **[107]** seasons or, artificially, to the isochronous ticks of the pendulum clock.

The poetry of time, with its illusions, is first of all based on our tendency to *idealize* things past. An *ideal* is a form preserving only what is most characteristic and typical, eliminating all unfavorable details and augmenting the salience of favorable details. Time, in and of itself, is an artist idealizing the world. In fact, we remember only the prominent and characteristic aspects of past events; the tiny, contrasting details cancel each other for this very reason and only what has impact, intensity, and interest comes to the fore. This is the equivalent of the visually perceiving of spatial distance. Only the vivid and substantial representations will persist. If the eye could perceive all the little details of a landscape at the same time, there would no longer a real landscape but only a patchwork of sensations all on the same level. The eye is a painter, and a skillful one at that. The same is true for the inner eye looking at things from a temporal distance.

Moreover this process of idealization accumulates and grows with time, as if it **[108]** had picked up speed in a certain direction. We tend to embellish what has been pleasing to us and to deform what has displeased us, and this tendency, incessantly adding effect upon effect, finally reaches a point of maximum beauty or ugliness that constitutes the adaptation of a recollection to our personal inclinations. The painting is finished, the landscape completed. Henceforth it will be 'a historical fact' that the events have taken place in this way, splendid or gruesome, that this person possessed a stunning beauty and that this other one was equally exceptionally ugly, etc. I have argued elsewhere[a] that time constitutes a spontaneous classification of things according to the relations they entertain with us, and that this is necessarily an esthetic classification. Time is therefore a judgment based on the strength and the esthetic value of objects and events.

[108]a. La poésie du temps. In *L'art au point de vue sociologique*. (Op. posth. 1889).

[109]

II

Insanity may cause past events to be either totally blotted out from memory, which is rare, or pushed far back into the past, which is the more frequent case. In the latter condition events have become so vague and so foreign to the individual that he can hardly recognize them as having occurred to him personally. Insanity therefore suppresses or alters the perspective of time.

Among the pathological illusions of time perception, one of the most peculiar is that of 'false memory'[24] which is characterized by the belief that a present, and clearly novel situation has been experienced before, although it is actually occurring for the first time; it seems **[110]** therefore to be a repetition, a *bygone*. Wigan mentions in his book on the *Duality of the Mind* that, 'while at the funeral of Princess Charlotte in Windsor Chapel, he suddenly had the impression of having been witness to the same spectacle before.' Lewes compares this phenomenon to several other, more frequent ones. In a foreign country a sharp turn in a footpath or a river may present us with a view of the scenery that we seem to have seen before. 'Being introduced to someone for the first time, one may feel that one has seen him before. Reading a book with new ideas, one may *feel* that these ideas had already been present in one's mind for some time.' [a]

According to Mr. Ribot this illusion can be explained easily. The sensory impression arouses in our past analogous impressions, vague, confused, almost beyond awareness, but sufficient to make us believe that the new situation is their duplicate. There is an immediate feeling of resemblance between two states of consciousness that forces us to consider them as identical. This is an error, but

[110]a. G.H. Lewes (1879). *Problems of life and mind. Third series*. London: p. 129.

only a partial one, because there is in fact **[111]** always something in our past to resemble a first experience. While this explanation is adequate for very simple cases there are others to which it hardly applies at all, as Mr. Ribot is well aware. A patient by the name of Sander, when informed of the death of someone he knew, was caught up in unspeakable terror because he felt that he had already experienced this impression. 'I felt that already once before, while lying here in this same bed, X. had come in and had told me: 'Müller is dead.' I replied: 'But Müller has been dead for some time, he can't have died again!" Dr. Arnold Pick mentions a case of genuine false memory, manifested in almost chronic form. An educated man, with considerable insight into the nature of his own illness – about which he has produced a written account – fell victim to a remarkable state of mind at age thirty-two. When at a party, when visiting some place, or when meeting someone, the event with its entire context would appear so familiar to him that he would be absolutely convinced that he had experienced the same impressions in the presence of exactly the same people or objects, under the same sky, the same weather conditions, etc. Each time he engaged in a new activity, it seemed to him **[112]** as if he had already performed it before and in the same context. This feeling would sometimes occur the same day after a few minutes or hours, or sometimes a day later, but always with perfect clarity. The difficulty, says Mr. Ribot, is to find out why such an image, emerging a minute, an hour, or a day after the actual event, would qualify that event as a repetition. Here we observe, in fact, an inversion of time. Mr. Ribot has proposed the following explanation: the image formed in this condition is very intense and of a *hallucinatory nature*; it presents itself as real, because there is nothing to redress this illusion. Consequently, the original impression is pushed to a secondary plane and with the faded character that memories have; it is localized in the past, wrongly if one looks at the objective facts, but justifiably if one takes the subjective point of view. This hallucinatory state, however vivid it may be, does not totally suppress the actual impression; but, becoming detached from it after having been produced by it, this state necessarily appears to be a second experience. It replaces the actual impression, it seems to be more recent – and it is in fact! For us, judging from the outside and on the basis of what has happened externally it is not true that the same impression has been experienced **[113]** twice. For the patient, who judges on the basis of his mental contents, it is true that the same impression has been experienced twice, and within these limits his certainty is indisputable. In other words, according to Mr. Ribot, the mechanism of memory 'operates in reverse': the vivid image of a recollection is taken for the real sensation, and the latter, already waning, is taken for a recollection. However, I tend to believe – with Fouillée[a] – that we are dealing here with 'a morbid

[113]a. See A. Fouillée's two studies on memory, published in the *Revue des deux Mondes* (1885, *69*, 357–389 and 1885, *70*, 131–*162*).

manifestation of echo and internal replication', analogous to what takes place in true recall: 'All the new sensations reverberate and are associated with subsequent images that replicate them; by a sort of mirage these ensuing representations are projected into the past. We might well call this 'temporal diplopia.' Double vision, in space, means that the two images do not superimpose; similarly diplopia in time implies that our cerebral mechanisms are lacking synergy and co-incidence, as a result of which similar wave patterns do not fuse entirely; the result is a double image in consciousness, one **[114]** vivid, the other subject to memory decay; and with the mental stereoscope deranged, the two images no longer combine to form a single object. Although any attempt at a definitive explanation is fruitless given the present state of science, these clinical cases help us to understand that what appears to us as familiar and known, depends on a feeling that is just as difficult to describe as the sensory impression of blue or red, but that might perhaps best be thought of as a feeling of recurrence or duplication. Sully mentions that he himself is able to represent any new object as one that is already familiar to him. No doubt there must be some duplication in his mind, a vague resurrection of objects similar to the one he is actually perceiving. According to Fouillée it is precisely this mechanism which explains why it is possible to remember without realizing that one is indeed remembering and at the same time feeling a sense of novelty. 'In this case the normal doubling of images is destroyed and only one image is observed where there should have been two. This is the reverse of the phenomenon of false memory in which the normal unity of images is replaced by an abnormal doubling. Frequently too, the feelings of familiarity and of recognition aroused by a novel **[115]** impression stem from what we have dreamed about similar objects and circumstances.' [a]

One last problem. Does our representation of time remain essentially discrete, or does it ultimately become continuous? – Kant endows us outright with an *a priori* notion of continuous and even infinite time, which he calls 'a given, infinite quantity.' But he is really too generous. The mind, when representing time or any other dimension, in particular space, works predominantly in jumps, leaping over unseen intermediaries. There are fragments of time as well as of space, with clear interruptions and gaps. Only in the end, when impressions have been experienced repeatedly, do these gaps become smaller, finally reaching a vanishing point as a result of which a fusion between different intervals of perceived time can take place. This phenomenon has been compared with the effect demonstrated by the wheel of Savart[25] where the initially separate beats finally merge when the wheel spins faster and faster, producing the **[116]** impression of a continuous tone. Similarly, in space, we arrive at an uninterrupted, idealized view of things

[115]a. A. Fouillée, o.c.

we do not actually see, as a result of some acquired momentum; and similarly also, we smoothly fill in the temporal gaps to ultimately conceive of time as a mathematical continuum.

[117]

CONCLUSION

< From everything we have seen thus far, we may conclude that time is not a condition, but rather a simple product of consciousness; time does not constitute consciousness, it derives from it. Time is not an *a priori* form which we impose on phenomena, it is a set of relationships that experience establishes among them. It is not a pre-established template that accepts our perceptions and our feelings, but a *river bed* that they erode and [at the same time] it is their spontaneous *stream* through this bed.

Time as I see it, is nothing but a kind of systematic tendency, an organization of mental representations. And memory is nothing but the art of evoking and organizing these representations. **[118]** There is no time outside the bounds of desires or recollections, that is, without certain images which, by juxtaposing themselves in the same fashion as the objects that produced them, generate the appearance of both time and space.

Time, initially, is no more intrinsic to our mind than it is to an hourglass. Our sensations and our thoughts resemble the grains of sand that escape from the narrow opening. Like these grains they are mutually exclusive and they repel each other in their diversity instead of forming an integrated whole; time is like this tiny stream of falling particles. > But is there a reality outside our consciousness corresponding to the idea we have of time? Is there, in other words, an objective time? Time is frequently presented as a kind of mysterious reality meant to replace the antiquated ideas of Providence.[26] Time has been attributed near-omnipotence, <it has been declared the essential factor of evolution and progress.> But time is neither a *factor*, nor an *environment* that as such is

capable of influencing actions and their consequences. If I pick an apple from a tree, and later I pick another, absolutely identical one, growing in exactly **[119]** the same place on the same tree; and if, moreover, I am caught in the same stream of thoughts and impressions and I do not remember my first action, then the two acts will be absolutely indistinguishable, they will produce the same effects and merge into one overall experience. Time by itself is, therefore, not sufficient to establish real differences between entities.

In my opinion, time is only one of the forms evolution takes; instead of producing evolution, time emerges from it. Time is, in fact, a consequence of the transition from the homogeneous to the heterogeneous; it is a differentiation instilled in things; it is the reproduction of similar effects in a different setting or of different effects in a similar setting. Instead of saying that time is the essential factor of change and, consequently, of progress, <it would be more appropriate to say that progress (evolution) *constitutes a factor* and fundamental element of time: time is the abstract formula for describing change in the universe. In the completely homogeneous mass that, as a result of a logical fiction is sometimes thought to be at the origin of the present world, time does not yet exist. Imagine a rock, thrashed by the sea: time exists for this rock, because the centuries are breaking it and wearing it away. Now, **[120]** suppose that the wave beating it stops, without receding and without being replaced by a different wave, and suppose that every particle of this rock remains forever in the same place, in contact with the same drop of still water. Time will cease to exist for the rock and for the sea, they will have become part of eternity. But eternity seems to be a notion that is incompatible with the notions of life and consciousness as we know them. Life and consciousness presuppose change, and change generates duration. For us eternity is either nothingness or chaos; it is with the introduction of *order* in sensation and thought that time begins.>

NOTES

[1] Parts of *La genèse de l'idée de temps* appeared almost verbatim in *Revue philosophique*, 1885, *19*, 353–368, under the title *L'évolution de l'idée de temps dans la conscience*. In the present translation these parts are bracketed by < ... > ; see pp. [3–8, 9, 17–20, 22–24, 25–26, 27, 29–41, 44–45, 80–84, 117–120]. In some places a few words have been added to the text for clarification of the structure of the sentence. Such additions are marked by square brackets. Guyau's reference notes are very incomplete. In this translation we have extended these notes so as to conform more fully to modern conventions.

[2] It is not totally clear what Guyau intends to say here. He seems to suggest that the highly associative character of children's thinking prevents the consolidation of sensation or image, to which he refers in the next sentence.

[3] The myth is that Psyche married Amor against the will of Venus. As part of her punishment she was given a pile of objects to sort. In Apuleius' story of *The Golden Ass*

(Asinus aureus or *Metamorphoses)*, Venus mixes various grains and peas. The insects are called to help Psyche to complete her task in time.

[4] In the 1885 paper in *Revue philosophique* this passage is concluded with a semicolon and then continues: 'a water droplet does not feel itself flow even though it successfully reflects all the objects on the river bank: simply because it does not retain any image of them. We on the other hand retain the image of the bank and the streambed through which we pass: space.' (p. 357).

[5] Degrée will be translated either by degree or gradation, depending on whether the author seems to refer to a level of intensity, or to a scale of (levels of) intensity respectively. Occasionally the term transition (degrée = step) would seem to be appropriate as well.

[6] The 1885 text in *Revue philosophique* has indeed: 'C'est l'idée de l'agir et du pâtir ...'.

[7] According to the original text the order should be 'efficient and final causes,' but this does not fit with the beginning of the present sentence, nor with the rest of the argument below.

[8] Maine de Biran (1766–1824) saw the will as the fundament of existence and its experience (effort) as the proper starting point for philosophical analysis. One of his central issues concerns the way in which the will exercises its influence on the physical body of an organism. Another deals with the effort the body requires to overcome the resistance offered by the environment. Guyau's ideas clearly lean on these conceptions.

[9] Greek for motion or movement.

[10] The foliage sings.

[11] The foliage sings.

[12] Part I of this chapter originally appeared in *Revue philosophique*, 1880, *9*, 319–322 under the title: 'La mémoire et le phonographe'.

[13] Translating lumineux by luminous would suggest active production of light, which is not what the author intended.

[14] The phonograph was invented by T.A. Edison in 1877. The design with the flat, circular recording disk was invented by E. Berliner in 1887.

[15] Laura Bridgman was a woman in a similar predicament to Helen Keller: congenitally blind and deaf. She was educated by a Dr. Howe. Some details can be found in W. James' *Principles of Psychology* (vol. II, pp. 358 and 420).

[16] Refers to the Damara tribe in what is now Namibia.

[17] The term empathy = identification is preferred here over sympathy = responsiveness, concern.

[18] How close are memory and remorse.

[19] No 8th factor is listed in the original edition of 1890, nor in the second edition of 1902.

[20] This addition is necessary because most experiments use single-interval reproduction which always gives opposite results. Stevens, on the other hand, did indeed use the technique of serial reproduction.

[21] In the following passage Guyau has used the terms long and short vs. slow and rapid in an inconsistent way, speaking, for instance, of a rapid interval when he means an interval judged as short. To avoid confusion the translation has been made consistent with both Guyau's intentions and Stevens' results.

[22] The first Crusade began in 1096; Constantinople fell in 1453. *The Origin of the Idea of Time* was completed around 1888.

[23] Peaks in the Swiss Alps.

[24] Presently known as *déjà-vu*.

[25] Savart's (1831) wheel is a toothed wheel which, if rotated while keeping a piece of cardboard against it will produce either a rattle or a tone.

[26] Discussed at length in *L'irréligion de l'avenir*.

From Kant to Guyau[1]

Paul Ricoeur

For an appropriate understanding of Guyau it is useful to consider some fundamental premises of the school of thought to which he belongs. The content of *La genèse de l'idée de temps* is a compelling reason to do so against the background of the fierce struggle with the Kantian *idea a priori* as it was understood towards the end of the 19th century.

'How do we form and organize the idea of time with its distinctive parts, and how does this idea evolve in the human mind?' is what Guyau asks in the introduction to his magnificent little book (*OIT* p. [ii]). He shares this question with his closest adversaries, namely with Spencer's evolutionism and with what he calls English psychology, the school which accentuated sense impressions and the association of ideas. But he also shares it with his closest allies, William James and the German founders of psychology.

What is at stake in this struggle with Kant? One should realize that the Kant these thinkers hoped to refute is, in fact, an extraordinarily simplified Kant. It is important to stress this fact, since even though it was based on a misinterpretation of the *Critique of Pure Reason*, the anti-Kantian argument of the philosophical psychologists of the late 19th century did uncover, unwittingly, some of the most profound and enigmatic aspects of Kant's thought.

What did Kant want to say when he placed time among the a priori concepts? In essence what he had in mind was that the idea of time is already presupposed in every attempt at establishing its empirical origin or, in other words, in every attempt at deriving the idea from experience. To call the idea of time transcendental is to say that it is a 'condition of possibility' or precondition[2] for every

experience that involves, in any sense whatsoever, a temporal aspect. Kant's opponents have altogether failed to grasp the notion of precondition as different from a predisposition, that is, as independent of the content of experience. In an absolute sense there is, according to Kant, no experience of time. In order to understand the essentially transcendental nature of the notion of precondition, we must return to Kant's argument in the *Transcendental Aesthetic*.[3] This argument is consistently following the model of *reductio ad absurdum*: if we would *not* already possess the idea of time, *then* we could have *none* of the experiences we describe in temporal terms, that is, in terms of simultaneity and succession. In short: *if not ... then none.*

> If we abstract from our mode of inwardly intuiting ourselves the mode of intuition in terms of which we likewise take up into our faculty of representation all outer intuitions... then time is nothing. (*CPR* A 35).[4]

What did the evolutionistic and empiristic opponents of Kant make of this line of argument? They came to the conclusion that time is an *innate idea*, an experience that has no antecedent, no history. By reducing the transcendental to the innate, they conflated a presuppostion, a precondition, with an experiential content that would emerge with consciousness. On this view, moreover, consciousness is a fixed given. It is detached from any origin or development, and from any evolution, whether from animal to man, from child to adult, or from savage to civilized person. In short, in the age of evolutionism in biology and empiricism in psychology, one does no longer appreciate the difference between a transcendental argument and a nativist perspective on the contents of experience. Consequently, once the assimilation of the transcendental and the nativist position had taken place, it became inevitable, but – and this should be emphasized – at the same time entirely legitimate and proper, that the ideas of origin and evolution were put in opposition to what from then on could only be perceived as too simplistic and facile an argument. At the psychological level the notion of innate experiences indeed appears as facile and simplistic as the notion of fixed innate ideas at the biological level.

One may appreciate the attempts at explaining the origin of so-called 'ahistorical' ideas in the species or the individual, but the questions to be asked here are different. Could it be that these highly subtle attempts do, in fact, reinforce the Kantian argument? Could it be that, after all, they prove *ex absurdo* that genesis always presupposes what it claims to generate? The point is that any serious attempt at constituting an origin of the idea of time should lead us, so long after this heroic, perinatal phase in the history of psychology, on the necessary road to the re-establishment of the transcendental argument in its full distinction from facile and simplistic nativism. In this respect I consider Guyau's essay the most brilliant and subtle example of the involuntary homage paid to transcendental philosophy by genetic psychology.

The first fundamental disagreement with Kant, or at least with the conception of Kantian philosophy towards the end of the 19th century, concerns what Guyau calls the 'period of primordial confusion' (*OIT* ch. 1). Guyau's leading thought is that, from animal to man and from infant to adult, there is an evolution from confusion to distinctiveness.

The first problem is therefore that of mastering the discriminative ability without which one would neither be able to juxtapose the future and the past, nor to distinguish, in the present as such, the multiplicity of experiences that we can talk about in terms of simultaneity. Of course, this approach to the problem is totally opposite to that adopted by Kant, who postulates at the origin an absolute *manifold* on which time imposes the integrative, synthetic form without which it would be impossible to perceive this manifold. This gives rise to the idea that time, like space, is one of the preconditions that enable any impression, internal as well as external, to be perceived in principle. But what is the status of this Kantian manifold? Certainly not that of a 'stage' or 'period' in human experience. No relation is assumed between this manifold and a stage in human history, or in individual existence. Manifold as such is already a transcendental concept, something one must presuppose in order to be able to conceive its opposite – in this case *its form*.

Of course one should admit that this presupposition – together with the presupposition of the form of sensation – was for Kant himself totally opaque. On his view, it could only be articulated in terms of an argument *a contrario*, within the context of transcendental argument that I have outlined above (if not... then none). It is not surprising therefore that once the transcendental had been reduced to the innate idea, the idea of manifold was no longer seen as simply conceptually opaque, but as genetically incorrect: in the beginning was confusion, not manifold.

As a result the difficulty became the inverse of Kant's difficulty: How can one *speak*, for instance, about past time in a language that presupposes the availability of precisely those notions of which the origin is to be explained? After all, who *describes* the origin of the idea of time also possesses in advance the idea that he or she is to generate. The consequence was a tactic of bracketing, or even eliminating, certain parts of animal and child psychology that, incidentally, were themselves already the result of a selection. Thus Guyau claims:

> Time will only emerge when events can be positioned in linear fashion along a single dimension, length. But initially this is not the case: this long line, originating in our remote past and vanishing into the distant future, remains to be drawn. Since children have not yet developed the art of remembering, for them everything is in the present. They have no clear distinction of times, places or people. (*OIT* p. [8]).

And later:

> The child and the animal, therefore, do not have a past that is neatly differentiated from the present, or from a future that is imagined or constructed according to one's fancies. (*OIT* p. [9]).

This illustrates that it is impossible to speak of a period of primordial confusion without naming properties of time that supposedly do not yet exist.

But this is not all. In this first chapter, where Guyau initiates his argument with Spencer – who wanted to derive space from time, – the task is made harder by the claim that the idea of time is derived from the idea of space after some delay. It is one of the strongest points of this little book that spatial order is constructed at the level of *perception*[5], while temporal order is constructed at the level of *representation*:

> ... time is not only connected with representations – the derived phenomena – but, as a matter of fact time can only be perceived if these representations are indeed recognized as representations rather than immediate sensations. This requires the ability to apprehend the difference between representations and presentations (*OIT* p. [12]).

The problem is how we can be certain that by acknowledging 'that every sensation, internal or external, has a more or less vague extension' (*OIT* p.[14–15]), one is not explaining space in some oblique Kantian fashion, in order to subsequently derive the idea of time from that of space. Thus, in fact, the argument, directed against Spencer, who

> ... refers to the more obscure idea of the two, the idea of time, to clarify the less obscure idea which is the most directly intuitive or imaginative, the idea of space (*OIT* p. [15])

becomes inadvertently pro-Kantian. To recognize this is not to discredit Guyau, but rather to highlight a genuine difficulty of Kantian thought. One may indeed question if, in the *Transcendental Aesthetic*, the analysis of time is in fact independent of that of space. Could perhaps the genuinely transcendental arguments that support the first analysis be just copies of those that support the second? In particular, can one imagine that one rids time of all events in the same fashion one can rid space of all content? Does the relation container-contained have the same meaning in both cases? And is the idea that all parts of time are parts of one unique time independent of the idea that we cannot represent more than one single space of which all particular spaces are parts? For, what is our perspective on the totality of time as a 'given infinite quantity'? Do we partition this unique time to determine intervals, partial durations, the way we carve from the raw stuff of unique space an isolated, finite stretch, a finite area, a finite volume? The enterprise of *The Origin of the Idea of Time* has indeed put a finger on a considerable difficulty of Kantian thought that is central to the transcendental argument. The problem is how we know what asymmetry between time and space is hidden behind the notion of unidimensionality. Succession and extension actually do not belong at the same level of discourse. Extension characterizes the visibility of the visible – the world as spectacle – whereas succession characterizes the (invisible) relation between appearing and disappearing, between variance and invariance.

This is why the Kantian analysis of the idea of time is not accomplished in the *Transcendental Aesthetic*, but in the celebrated chapter on *Schematism* (*CPR* B 176–187). Here the determinants of time appear to dissociate themselves from those of space. Thus Kant speaks of the 'time-series', the 'time-content', the 'time-order' and finally of the 'scope of time in respect of all possible objects.' (*CPR* A 145, B 184). What corresponds with this 'transcendental determination of time' (ibid.), expressly related here to the *a priori* structure of productive imagination and not to simple sensory receptivity? The answer is: an activity of a conceptual and judgmental nature, bringing into play the conditions of the actual *objectivity* of the experience of time; time, inaccessible in the inner world, can be deciphered only in the relations between the phenomena in the outer world. As a result we should be unable to perceive time as such but, instead, have an indirect representation of it, by virtue of intellectual and imaginative operations that are applied to spatial objects. Time, one cannot repeat this too often, is not an appearance, but remains a condition of *objective* appearance, and that is what transfers time from the *Transcendental Aesthetic* to the *Transcendental Analytic*.

An important corollary of this non-phenomenal character of time in Kant – or if you like, the invisibility of time – for which Guyau provides a kind of equivalent in terms of genetic psychology, is the following. If time is experientially inaccessible, one cannot possibly attain a *figurative* representation by means of the act of tracing a line. By tracing a line I generate time, says Kant. But the image of time as a line, far from being an extrinsic aid to help us represent time, is an integral part of the indirect way it becomes manifest in the course of applying concepts to objects by means of imagination. But then, of course, one must realize that it is not time as a singular, unique totality that one is representing in this case, but only a particular lapse of time, a quantity of time or a duration. It is, in fact, what Kant calls a 'determination' of time. This determination does not add anything to the presuppostion of an infinite time of which all specific times are successive parts. Actually in the determination of particular successions the indirect character of the representation of time is confirmed.

However, through this transition of the analysis of time from the Aesthetic to the Analytic, and more specifically to the part of the Analytic that deals with schematism, Kant has only added to the enigmatic character of the structure of time, always presumed and never presented. At this point I must quote Kant's extraordinary concession, which can be found in the chapter on Schematism. After having stated that the determinations of time are consistent with the idea of schematism and share with it the character of 'a generic procedure of imagination to impose on a concept its image' (*CPR* A 140, B 179), Kant concedes that this procedure

... is an art concealed in the depths of the human soul, whose real modes of activity nature is hardly likely ever to allow us to discover, and to have open to our gaze. (*CPR* A 141, B 180–181).

This art is so 'hidden in the depths of the human soul' that Kant, who is here in some sense pursuing the ghost of time in a sort of forward retreat, is forced to seek the origins of this art in the many intellectual operations in which time is implied without ever becoming evident. This is what he does in particular in the *Analogies of Experience*, where he unfolds, at the level of the primitive judgments or 'principles,' the schemata of stance, cause, and reciprocity. By virtue of these schemata the determination of time-as-orderedness can be specified. Thus, one reads in the first edition of the *Critique*,

The general principle is that all phenomena are, in as far as they exist, subjected a priori to rules which determine their mutual relations in a time. (*CPR* A 117).

'In a time' – that is, in a definite lapse of time. One has therefore to compare these two expressions: the representation of a necessary connection between percepts – and their relation in an interval of time. It is this detour by way of a representation in a definite lapse of time which gives a meaning to Kant's proposition that 'time cannot be perceived in itself,' (*CPR* A 183, B 226) and that one only perceives objects 'in' time (ibid.).

In my opinion one must appreciate the distinction that Guyau makes between the streambed of time and the course of time (*OIT* p. [25]) in the light of these Kantian riddles. After all, one should recognize that maintaining the transcendental status of time, apart from any confusion with innate experience,brings us close to the limits of what is thinkable.

Guyau's distinction determines the strategy of the chapters that follow upon his laborious reconstruction of the period of primordial confusion. It is remarkable that Guyau did associate his notion of the 'streambed of time' with the 'passive form of time' (*i.e.* the title of Chapter 2) and that of the 'course of time' with the 'active background of the notion of time' (*i.e.* the title of Chapter 3). More precisely, this 'passive form' of time is associated with passive or reproductive imagination, while the active background is associated with active or productive imagination. Thus, curiously enough, we are facing once more the Kantian distinction between the level of receptivity (to which the *Transcendental Aesthetic* pertains) and the level of spontaneity (to which the *Transcendental Analytic* corresponds). It is, in fact, this distinction which leads to the chapter on *Schematism* and the exposition on the *Analogies of Experience*. Kant – in the *Transcendental Aesthetic* – presupposes that the form of time has the peculiar status of being an *intuition* (there is only one time) rather than a concept (the relation between type and token), and that it is an intuition *a priori* – that is, an intuition that cannot be observed. Guyau, in contrast, establishes an empirical domain for analysis. As I argued before, he does not start, like Kant, from the

manifold but from the primordial confusion that psychology leads him to conceive.

What does he encounter on the road from this confusion to the temporal order of the adult human mind? Altogether three operations or processes that, in his opinion, do not presuppose time but constitute the streambed of time: *discriminating*, that is, perceiving differences, *comparing*, that is, perceiving resemblances, and from there *counting*, to the extent that number presupposes duality and duality in turn combines difference and resemblance. This is why Guyau admits the apperception of transitions or degrees in the variation of intensity. And finally:

> The aspects discussed so far simply provide what one might call the *bed* of time, without reference to its *streaming*, or if you prefer, the frame of reference with respect to which time appears to move, the way in which it orders the representations of our mind, in one word: the *form* of time. It is *an ordering of both similar and dissimilar representations forming a plurality of degrees* (*OIT* p. [25]).

It is doubtful that a Kantian will be convinced that none of these notions presuppose time: ought not impressions appear in sequence, he will ask, in order to appear different, similar, or more or less intense? By a strange irony Guyau almost formulates his position with respect to the passive form of time in terms of a transcendental argument: 'If there were no division, no change and no degree in activity or sensitivity, there would be no time.' (*OIT* p. [24]).

Summarizing his analysis of the passive form of time Guyau writes:

> I have specified everything which, in time, is not change even if it is directly observed: this is what I have called the *bed* of time, in contrast to its *stream*. What remains is to make time stream and flow in consciousness... (*OIT* p. [27]).

With his notion of the *course* of time, Guyau once more gains the advantage over Kant. The latter, in fact, wanting only to establish the objectivity of our knowledge of the world, considers only the relations between simultaneity and succession, the necessary prerequisites for a Newtonian physics. Nowhere does he consider the relationship between present, past, and future which, for Guyau, constitutes the course of time, in contrast with its streambed. Thus Guyau, transcending Kant, on the one hand re-establishes the line followed by Saint Augustine, who had identified time with the connection between the anticipation of the future, the memory of the past, and the attention for the present. On the other hand he leans upon the notion of the experience of effort that Maine de Biran had placed at the center of his introspective psychology. The truly original idea of Guyau is to have drawn from the opposition of the activity inherent in effort and the passivity of sense impressions, the principle that distinguishes the future from the past:

> The conceptualization of time into three independent parts constitutes a dissociation of awareness... the division between undergoing and acting. (OIT p. [30–31]).

In short, Guyau is effectively putting *intention* in the limelight, after Saint Augustine and Maine de Biran, but long before Husserl. This is the lineage of thinkers in which Guyau ultimately takes his place, between Maine de Biran and Husserl, whom he resembles more than the distant Saint Augustine. For Guyau, the decisive experience of time is not a present divided into a present of the future, a present of the past, and a present of the present – as Saint Augustine claimed – but rather the anticipatory intentionality towards the future:

Just as the present can be reduced to a conscious and intrinsically gratifying activity, the future can be reduced to the activity-directed outward search for what is missing. (*OIT* p. [32]).

The future is ahead, the past behind:

In sum, *succession* is an abstraction of *motor effort* produced in space, an effort which, when it becomes conscious, is *intention*. (*OIT* p. [36]).

What proceeds from this origin? The temporal equivalent of what in a painting is called the *perspective*, of which history teaches us that it is a product of visual art. Have we made progress beyond the analysis of the 'passive form' of time? Yes we have, since the form of time was paradoxically only the 'static framework of time' (*OIT* p. [iii]). By introducing motor activity, we attain 'the living and moving basis for the notion of time' (ibid.). On this view, the idea of perspective provides only the trace of this play of opposition between activity and passivity.

Desiring, and acting toward our desires we simultaneously create space and time. We live, and the world – or what we designate by that name – comes into being before our eyes. (*OIT* p. [46]).

But properly speaking, did we really *create* time? Guyau himself retreats to some degree and takes a step backwards in the direction of the Kantian transcendental, when he writes:

A desire contains the seed of the idea of possibility and this idea of possibility, in its opposition to the idea of reality, becomes an 'antecedent' – that is, something ideal and imaginary that precedes the true advent of the real. (*OIT* p. [47]).

The word antecedent, in quotation marks, is hiding Guyau's major concession. Guyau has shown, more clearly than Kant, when we do become aware of the ideas of before and after; at the same time he seems to have pushed the birth of these ideas to either side of the alleged origin. Stated in negative terms, the formula is impeccable: 'No movement, no time' (*OIT* p. [47]). But is this *conditio sine qua non* really the outcome of the process that it makes possible? Yes, if one has in mind our becoming aware of the idea of time and not the origin of the idea of time as such. If one limits oneself to saying that psychology gives an account of the origin of the awareness of the idea of time, Guyau is invulnerable. And what is more, he is also far ahead of his empirist opponents with his idea

about the dissociation of consciousness derived from the opposition of undergoing and acting. But if one asks if Guyau has really established the origin of the idea of time, one cannot maintain that he has successfully shown how this opposition and this dissociation between undergoing and acting bring forth the relation between before and after.

This relative failure to account for the origin of the idea of time is to some extent masked by the loans taken out by Guyau in his chapter on 'space as a representational mode of time' (*OIT* p. [49–84]), where he claims that spatial order is more primitive than temporal order (contrary to Spencer, as I mentioned earlier). In doing so Guyau agrees with Kant, for whom time, because it cannot be experienced directly, can be represented indirectly by means of a line. Precisely such a spatial representation of time is inherent in Guyau's idea of perspective; in fact it is space that provides the reference points for the relations of proximity and distance in the activities of memory. We localize in time by localizing in space. This is literally the *mise en scene* of our remembrances which leads Guyau to emphasize that 'the form of our representation of time, the way we imagine it, is essentially spatial.' (*OIT* p. [70]). Guyau's most original contribution is in fact that he places this spatial representation of time in space as represented:

> Such an idealized space is quite unlike real space and it allows us to conceive of an [abstract] setting in which things occur *in succession* instead of co-existing like objects in space. (*OIT* p. [75]).

This permits Guyau to develop an original equivalent of Kant's schematism of which I have said earlier that it is not so much an a priori intuition in the sense of the *Transcendental Aesthetic*, but rather the genuine *location* of time in the *Transcendental Analytic*.

In connection with the preceding argument one may ask if Guyau, like Kant, has not realized how any reflection about a time that passes as a consequence of activity unfolding against a passive background, will plunge into an abyss. Towards the end of his chapter on memory, Guyau takes stock:

> Once memory has been established, the *Self* is established too. Time and motion are derived from two essential sources: outside the unknown, and inside a certain activity, a certain energy being released. We can neither completely know ourselves, nor that which exists outside us but from which the self is largely derived. What are our inner strengths, and what are the limits to the development of this internal source of energy? And, on the other hand, what is the secret of this silent nature surrounding us? These two unknowns constitute, in my view, the fundament for all the other [epistemological mysteries], time included. (*OIT* p. [79–80])

At this point I cannot resist citing Saint Augustine:

What then is time? I know what it is if no one asks me what it is; but if I want to explain it to someone who has asked me, I find that I do not know.[6]

Similarly one is reminded of Kant's recognition that schematism is an art concealed in the depths of the human soul, not open to our gaze (*vide supra* p. 154).

Finally, the reflections of Guyau on the 'normal and pathological illusions of time' (Chapter 5) are not the most interesting with respect to the preceding discussion; after all they deal only with illusions that are pertinent to the estimation of duration, not with the origin of the idea of time as such. More problematic, however, are the pages where a connection is proposed between memory and empathy.

I recognize myself in the other through empathy; similarly I recognize myself in the past through memory. Memory and empathy have basically the same origin. (*OIT* p. [80]).

With empathy, *sentiment* appears onstage, in the wake of *imagination*. But what sentiment! If time originates from a dissociation of consciousness, and if memory keeps closing the gap out of empathy or sympathy with the past Self, how could this sentiment ultimately be anything but 'the feeling of being mentally torn apart' (*OIT* p. [81]), which lies at the root of the *melancholy* of memory. 'Remembering, for a thinking being, is frequently very close to moral suffering' (ibid.) and also:

Human greatness – the ability to recognize oneself in one's past and to project oneself into the future – may eventually become a persistent source of bitterness. The idea of time itself is the incipience of regret. (*OIT* p. [82]).

It is precisely at this point that psychology shares territory with *poetry*, something which was clearly understood by those who first brought *La genèse de l'idée de temps* to press, for they added two appendices to the text, one with Guyau's reflections on the poetry of time (Guyau, 1888, pp. 94–101), and one with the lyrical poem 'Le Temps' extracted from Guyau's *Vers d'un philosophe* (Guyau, 1881, pp. 67–76). As an echo from the thoughts that I have evoked in the preceding discussion, all of which stemmed from Guyau's philosophical work, the poem begins thus:

> *We cannot not think time unless we suffer it.*
> *Feeling himself last, man feels himself die:*
> *An evil ignored by all of nature.*[7]

How can we match these verses by the poet Guyau with the proud conclusion of the philosopher Guyau:

In my opinion, time is only one of the forms evolution takes; instead of producing evolution, time emerges from it... Instead of saying that time is the essential factor of change and, consequently, of progress, it would be more appropriate to say that progress (evolution) *constitutes a factor* and fundamental element of time: time is the abstract formula for describing change in the universe. (*OIT* p. [119]).

What distance separates, what proximity unites the *thought* of the philosopher who puts time back into the world and the *sentiment* of the poet who suffers from existing in time?

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NOTES

[1] Translation by John A. Michon.

[2] Translator's note: In the remainder of this chapter the term *precondition* will be used instead of the classical, but somewhat confusing expression 'condition of possibility' (condition de possibilité).

[3] Translator's note: The Transcendental Aesthetic, like the Transcendental Analytic, Schematism, and Analogies of Experience, mentioned later, are chapters in the Critique of Pure Reason.

[4] Translator's note: These references are to the page numbers in the first (A) and second (B) editions of Kant's Kritik der reinen Vernunft (Critique of Pure Reason). The quotations are taken from the English translation by Kemp Smith (1933), henceforth referred to as *CPR*.

[5] Guyau actually accepts the idea that percepts contain so-called local signs that allow the distinction between different parts of space to be derived from specific features that are close to the actual sensations involved (*OIT* p. [12]).

[6] Translator's note: The text is that of the translation of the Confessions of St. Augustine, Book XI, ch.14 (Warner, 1963).

[7] Nous ne pouvons penser le temps sans en souffrir. / En se sentant durer, l'homme se sent mourir: / Ce mal est ignoré de la nature entière. (Guyau, 1881, p. 67).

Guyau's Idea of Time: A Cognitive View

John A. Michon

INTRODUCTION

There is no end to perplexity in matters of time. But with the turn of a century approaching, time's enigmatic character seems to become almost an intellectual obsession: with little more than a decade to go the usually modest trickle of books and other time-inspired products of the human mind is gradually widening into a genuine flood.

One hundred years ago, towards the end of the 19th century the situation was similar. Physicists and astronomers, historians, biologists and chemists, all showed a substantial and quite fundamental concern for the temporal structure of reality. The outcome has shaken the universe! Fundamentally new images of time emerged in the natural sciences as well as in the humanities. If the ideas of Thomas Kuhn about scientific revolutions ever had any validity, it is with respect to the changing views of time towards the end of last century.

The science of psychology – newly established in 1879 by Wilhelm Wundt – followed this general trend. The ideas of Wundt and his students in Leipzig, William James at Harvard University, Henri Bergson in Paris, and still others (see Fraisse, 1957), did much to establish a genuine psychology of time, a branch of psychology that – some 25 years later – would be characterized by Titchener (1905) as a 'microcosm perfect to the last detail.'

With so many bright stars shining on the psychological firmament at the same time, one is likely to overlook some of the more modest twinklings. However, even a faint little star may turn out to be an awesome source of illumination if we watch it through an appropriate filter. This is certainly the case with Guyau.

Jean-Marie Guyau, in spite of his short life, became and remained a considerable presence in the distant galaxy of moral philosophy. On the other hand, his only contribution to psychology, *The Origin of the Idea of Time*, was almost totally obscured by the light of such giants as Bergson, James, and Wundt. With the rise of cognitive psychology, however, Guyau's views on the human experience of time gradually appear in a new light. Only now are we able to recognize this essay for what it really is: a remarkably modern study on the acquisition and use of mental representations of time.

THE PSYCHOLOGY OF TIME

In 1957 Paul Fraisse published his classic review of time psychology (Fraisse 1957; English translation 1964). The empirical study of human time was then just about one century old. Cognitive science, on the other hand, was still in its early infancy (Gardner, 1985). But everywhere psychologists were rapidly beginning to converge on this new approach that would transform psychology once more into a *science of the mind*. In North America faith in behaviorism was badly shaken. To European psychologists who, by and large, had remained sceptical about behaviorism and, instead, had entertained a much broader range of views on psychology, the new cognitive movement brought mostly a feeling of relief together with an enhanced sense of theoretical and methodological coherence. In other words, cognitive psychology was consistent with earlier continental schools but at the same time it cleared the way for a rapid development towards an unprecedented degree of methodological and conceptual rigor.

Initially time psychology had been firmly rooted in the mentalistic tradition of the European continent. For several reasons, which have been discussed elsewhere (see Michon & Jackson, 1985a), the psychological study of time lost its prominence early in this century, except in France. In that country many prominent psychologists did take an interest in the study of time, among them Henri Bergson, Pierre Janet, Henri Piéron, the Swiss Jean Piaget, and Paul Fraisse. But despite the persistence and the formidable intellectual quality of the Gallic effort, the study of time gradually became a minor tributary to the mainstream of experimental psychology.

In the sixties, with the arrival of cognitive psychology as a prominent theoretical paradigm, more and more interest in the dynamic, chronometric aspects of human information processing – perception, cognition, action, learning and motivation – began to emerge. In their turn 'prototypical' time psychologists, that is, those investigators who are willing to treat time as an independent variable in their experiments, began to derive their inspiration from the newly established cognitive approach. It permitted them to treat time *as information* (Michon 1970/1972; 1985).

In recent years experimental research has become increasingly focused on the

problem of temporal organization of behavior and cognition. Several monographs, conference proceedings, and a considerable number of journal articles have appeared as a result of this renewed interest. Some of the more comprehensive volumes are Gorman & Wessman (1977), Friedman (1982), Gibbon & Allan (1984), Michon & Jackson (1985b), Levin & Zakay (1988), and Block (forthcoming). They constitute evidence for a considerable progress in the methodology, the theory, and the meta-theoretical foundations of the psychology of time.

Significantly they also reveal a tremendous diversification of topics.[1] The first century of time psychology had been, if anything, the age of the *psychophysics of duration*, the analysis, under an almost infinite number of experimental conditions, of that remarkably uneven subjective flow of time. Presently a much wider range of topics attracts attention: the syntactic (rhythmic) and semantic properties of time, the planning of future action, event perception, autobiographical memory, the narrative structure of event sequences, the subjective value of time, and still others have been added to the (extremely narrow) repertoire of the classical period. As a result we seem to be moving a little closer again to the microcosm Titchener had in mind, even though it does not seem at all 'perfect to the last detail.'

In retrospect the reasons for this protracted and self-imposed constraint on the scope of the research agenda of time psychology seem less than clear, but at that time narrowmindedness apparently prevailed. What transpired, for instance, into pre-modern time psychology of Guyau's rather comprehensive view on human time experience was largely confined to a simple list of factors that he had identified as the principal influences on subjective duration (*OIT* p. [85–86]; Michon, 1965, p. 409; Michon & Jackson, 1984). Presently this simple list appears to be much less simple than it did a few years ago: gradually we learn to appreciate Guyau's work for the full breadth of its contribution to the psychology of time.

GUYAU'S CONTRIBUTION

> Time is not a condition, but rather a simple product of consciousness. It is not an *a priori* form that we impose on events. Time as I see it, is nothing but a kind of systematic tendency, an organization of mental representations. And memory is nothing but the art of evoking and organizing these representations. Time, initially, is no more intrinsic to our mind than it is to an hourglass (*OIT* p. [117]).

This is the conclusion Guyau reaches towards the end of his essay. Any author who arrives at such a conclusion qualifies as a cognitive psychologist, and indeed my claim is just that: Guyau's position is consistent with the contemporary cognitive view of the mind. Such a claim, however, must be made with some *proviso*. The resuscitation of a historical text must never lead to *rampant precursoritis* (a term I borrow from Gould, 1987, p. 9). On the other hand, if a

voice is reaching us from the past, a careful rephrasing in modern terminology of what it tells us may relieve the symptoms of another, ubiquitous and perhaps more pernicious disease, *rampant auctoritis*, the widespread but misguided conviction that the present generation of cognitive scientists is constantly attaining totally unprecedented insights in the workings of the mind. Listening to the voices from the past may, nevertheless, help us to realize that tremendous progress is indeed being made with our ability to empirically decide on such insights and to quantify or formalize our theories.

Guyau's voice comes to us 'loud and clear.' This in itself is remarkable enough. Undoubtedly it is partly due to Guyau's concise and brilliant writing style, a feature of his work that has been acknowledged even by his most severe critics (cf. p. 32). But style is certainly not the first or only reason for the appeal of *The Origin of the Idea of Time*. Much more important are Guyau's metatheoretical position – essentially a functionalistic stance (Block, 1980; Dennett, 1978) – and the content of his theory. As we shall see later in this chapter, both match contemporary views of the human mind as a cognitive, computational system.

At this point I must emphasize that the perspective adopted in this chapter is psychological rather than philosophical. It is at best representative of the way cognitive psychologists presently look at the issues of time, mind, and behavior, even though there is no 'received view' on these issues. Any ontological or epistemological problem that may arise, will be dealt with in an implicit fashion that necessarily leaves many philosophical subtleties untouched. Paul Ricoeur, however, is covering a good many of these when he compares the position of Guyau with that of Kant, elsewhere in this volume (pp. 149–159).

The reality of time: A cognitive approach

Underlying every discussion about psychological time is the question whether time is ultimately real, or ideal (or as some would say an *illusion* contributed by the human mind); the question, in other words, is what 'stuff' time is made of.

Helpful for our understanding of Guyau's position in this matter, is an appreciating but critical review of *The Origin of the Idea of Time* by Henri Bergson (1891). This review is the only direct confrontation between Bergson and his one time teacher (see p. 21) and it marks the distinction between the two authors in considerable detail. In his review Bergson takes issue with what he perceives as Guyau's attempt to extract the raw materials for our notion of time from the external world. In Bergson's opinion it is impossible to derive the dynamic streaming of experienced time from the ordered but inherently static impressions – the *differences, transitions*, and *intensities* – provided by physical reality. This touches indeed upon a notorious problem that has occupied many philosophers, including Locke, Leibniz, Kant and William James: How can a succession of ideas (representations) ever give rise to the idea (representation) of

succession, to a representation of streaming time? Bergson's answer is that there is a metaphysically independent *lived duration (durée vécue)* that is synchronized with external events but not necessarily causally dependent on them. For Bergson the streaming of time is, in other words, not symbolic and not representational. It is instead the 'existential form of consciousness.'

As an aside, let me point out that the issue persists. The British philosopher McTaggart (1927) made a crucial distinction which, since then, serves as a beacon for all those who sail these difficult waters. Unfortunately it is not altogether clear that the beacon can be trusted: it may in fact have caused more shipwrecks than it has prevented. McTaggart made the useful and seemingly innocuous distinction between the A-series, which orders events in time according to their pastness, presentness and futurity, and the B-series which orders events simply with respect to before and after. The A-series seems to be consistent with our personal perspective with its privileged *now*, and the B-series with a view of the universe *sub specie aeternitatis*.[2] The dynamic streaming of time derives from the A- and B-series moving relative to each other. The image of a boat floating downstream past the (fixed) objects on the river bank comes to mind.

The distinction between these two series stopped being innocuous, however, when McTaggart went on to demonstrate that attempts to combine the two into one coherent image (such as that of the boat on the river) invariably leads to a paradox: to assume that the two series are in relative temporal motion requires a third series, and this introduces an infinite regress. From this he concluded that time is unreal. Since that day philosophers have relentlessly tried to dissolve McTaggart's paradox, either by accepting McTaggart's conclusion, or by postulating the reality of time. The latter solution is usually achieved by eliminating one of the two series altogether.[3] This is not the place to discuss the issue in more detail, but so much is clear: it all hinges on the difficulty of deriving a dynamic, continuous, and integrated flow of experiences from a static series of events. This difficulty is at the heart of *The Origin of the Idea of Time*. Ricoeur (this volume, pp. 149–159) shows that it is also at the heart of Kant's *Critique of Pure Reason*. But the problem is of all times: it goes back all the way to Zeno of Elea (Grünbaum, 1968) and it is presently with us in the so-called 'frame problem' of Artificial Intelligence (McCarthy & Hayes, 1969; see also Shoham, 1987).

Guyau's approach differs considerably from that of Bergson and so do his conclusions. Perhaps we cannot really construct the stream of time from the static inputs we receive through our senses. But rather than being an existential primitive, as Bergson has it, the dynamic aspect of time is an intellectual construction.[4] The question we are facing is whether this makes the streaming of time an illusion. My construal of Guyau's answer is as follows.

In the first place our awareness of time as streaming is functionally adaptive since it allows us to cope more adequately with whatever temporal contingencies

there may be in the external world. Evolution has given us a 'tendency' to develop adaptive strategies or procedures that enable us to organize our experiences. In particular it enables us to transcend the *hic et nunc* of the world of infants and animals.

In the second place the real issue is not the derivation of the notion of the stream of time from the raw materials we obtain from the outside world. Instead our concern is the internal representation of the differences, transitions, and intensities, that we observe. We are dealing with ideas and images, and with their representational properties. The relevant question is therefore if these representations, these ideas and images, are real in the sense that they have the status of independent elements of consciousness.

Phrased in this manner we recognize the basic tenet of the psychology of consciousness as it was developed by Wundt and his school. But Guyau does not follow Wundt's lead either. Rather than explicitly assuming that ideas and images are in fact the real elements of consciousness, he claims instead that the processes, procedures, or strategies that generate our ideas and images are the ultimate basis of our experience, and of our experience of time in particular. This does not necessarily imply, however, that these processes, etc., do have a one-to-one correspondence with the elementary units of our functional architecture. Blind, indifferent evolution is sufficient for the organism to functionally adapt to the contingencies of its environment. Cognitive procedures are acquired, they remain plastic, and they have no necessary *a priori* form. In fact, a purely mechanistic or externalistic approach to the problem of making time stream is bound to fail because it cannot cope with the clearly intentional character of temporal experience.

In his review Bergson (1891) correctly points out that Guyau's position represents a radical instrumentalistic conception of cognitive adaptation. But it also represents, in my opinion, what Guyau claimed in his moral philosophy. His fundamental rule of human conduct, *You must because you can!* – literally the inverse of Kant's categorical imperative – implies that moral obligation is ultimately an arbitrary, but functionally adaptive (*i.e.* culturally acceptable) *interpretation* or '*reading*' of a dynamic internal force. Guyau's term is indeed 'blind indifference' (p. 24) But this immediately raises the question: what are the biological and psychological processes that cause the emergence of what we recognize as moral obligations? It is fascinating that this radical reversal of Kant's position, which Guyau established entirely within the framework of his moral philosophy, worked so eminently well the first (and only) time he applied it to a psychological topic.

Guyau's arguments are very similar to some current issues about the meta-theoretical foundations of cognitive psychology. However, the argument presently takes a somewhat more general form: there are non-intentional, syntactic states (states that in Thomas Nagel's (1974) phrasing 'it isn't like anything to be in')

and the question is how we can get from these states to intentional, semantic states.

One well-known version of the problem is Searle's Chinese Room metaphor (Searle, 1984, pp. 31–38). Searle argues that someone who does not know the Chinese language may still be able to produce correct Chinese messages if supplied with all the rules of Chinese syntax. Can such a person be said to 'really' understand Chinese? Searle's own answer to this question is negative: from a formal syntactic description of a language one can never infer the meaning of that language. But *this* is not the only conceivable answer, and it is certainly not favored by mainstream cognitive psychologists because it would eliminate the possibility of explaining the intentionality of behavior in terms of underlying processes and turn the cognitive program into an utterly useless exercise.

There are presently two popular inroads to the problem of intentionality. One is represented by the work of Fodor (1975, 1981, 1987), the other by Dennett (1978, 1987).

Fodor's approach is to accept the reality of intentional states, say, beliefs or propositional attitudes. They constitute the language of thought and have a neurological basis. On this view human beings are semantic engines and the intentional character of their behavior is caused by the fact that the elementary constituents, the propositional attitudes, have a real genetic and neurological basis. Dennett rejects Fodor's position outright. For him propositional attitudes are not real. Humans are only syntactic engines and the semantic units into which we decompose their behavior need not at all correspond with the syntax that constrains the processes that generate this behavior. On Dennett's view the question whether or not a cognitive system *really* understands Chinese, or *really* feels pain, etc., is meaningless, as long as the *assumption* that it really understands, feels, etc., allows us to correctly predict the system's behavior. In other words, it is enough if we know something about the system's goals and if we assume that it will behave rationally in the prevailing circumstances. This 'intentional stance' – the systematic attribution of intentionality, intelligence, or rationality to a behaving system – is purely instrumentalistic (Dennett, 1987). In practical terms, the intentional stance allows us to deal effectively with *creepy* neighbors, a *disdainful* cat, or an *aggressive* chess computer, even if we know nothing about the cognitive processes that *really* underlie the behavior of these entities.

To put Guyau against this meta-theoretical background requires, of course, considerable caution. To claim that *The Origin of the Idea of Time* was written from a thoroughly cognitive perspective is not to claim that Guyau as a philosopher would have endorsed either of the two modern positions on intentionality. But of the two perspectives, Dennett's instrumentalism appears to be much closer to the view of the author of *The Origin of the Idea of Time* than Fodor's realism that might, perhaps, have appealed to Bergson. For Guyau, after all, time is just 'the abstract formula for describing change in the universe.' (*OIT* p. [119]).

The Origin of the Idea of Time *in cognitive perspective*

In what respects is the content of *The Origin of the Idea of Time* compatible with contemporary cognitive accounts of temporal experience, and of dynamic memory as the 'orchestrator' of that experience? To answer this question I shall first summarize Guyau's arguments in terms that are consistent with such accounts.[5]

The temporal organization of experience

Why do we need a conceptual structure, an idea of time, if ultimately we experience everything as occurring *now*? And how do we attain such an idea? So much is clear from the outset: the idea of time is not present at birth. Children, like animals, live in the present and only gradually acquire cognitive strategies, procedures that allow them to represent the relations between experienced events as past, present, or future. This developmental process is greatly facilitated by what we call public time, the elaborate system of natural and artificial cues – including those provided by language – that society uses to cope with the dynamic contingencies of everyday life.

Without cognitive strategies to represent time we are unable to organize our experiences and expectations. Therefore, to acquire the notion of time is an important functional adaptation to the world in which we live, an adaptation which is the result of a long process of evolution. The fact that young children do not yet possess such temporal strategies does not imply that the world of the child is chaos. It only means that the young child can experience events as occurring right now and right here: the infant has no way of remembering and it has no way of expecting.

The static aspect of the notion of time

The necessary conditions for the development of temporal strategies are differentiation and awareness of intentional, goal-directed effort. In the first place an organism requires sensory systems (transducers) that detect differences and produce representations of distinct events (mental symbols). In the second place an organism must be capable of perceiving its intentional effort, that is, the tension between its present state and a goal state.

An implication of these two conditions is that representations of events must take the form of spatial imagery. Hence space must precede time – logically and psychologically – as a representational medium. In addition something else is required to enable the transition from spatial to temporal representation. The extra requirement is *movement* as the application of intentional effort to bridge a spatial difference: 'No movement, no time!'

Dynamic memory

Human memory is a dynamic, temporal organization of our representations of (past) events. Presently not much is known about the functional architecture of memory. Brain research should uncover the mechanisms that encode, store, and reproduce memory traces. Fortunately, the lack of an appropriate neuro-scientific model is not terribly relevant after all, because the question is not in the first place how memory functions are implemented

in the brain, but rather what functional properties there are to create the impression that we are indeed dealing with a 'conscious phonograph.'

Schematic episodes. Since time is an acquired organization of representations that enables us to store and remember past events, the functions that realize this organization nearly always establish coherent episodes that are situated in concrete, spatially defined contexts. Most of these contexts are culturally inspired. They are passed on from generation to generation. The representations of events and episodes have a schematic or prototypical character. They possess more or less salient features that influence the ease with which they are manipulated.

Match and mismatch. The way in which these schemata are functioning depends on the principles of similarity and uniqueness. We understand something to the extent that it matches some fact we already know, but we learn and remember something to the extent that it differs from this fact.

Spatial analogy. The representation of time is mediated by our representation of space and thus by the processes that operate on spatial relations. This influence is not an arbitrary one. After all, both spatial and temporal representations derive from intentional effort, from the juxtaposition of 'what is and what is to be.' The issue is to find out how we ever get to an independent representation of time as the dimension past-present-future. There are at least two crucial features to establish a distinction between spatial and temporal representations. The first is the inherent asymmetry of temporal juxtaposition (order) as opposed to the symmetry of spatial juxtaposition (placement). The second, related feature is that while spatial representations admit travel back and forth, our traveling in mental time may well bring us back to a point in the past, but from there on our recollection of an event or episode is always asymmetrically oriented 'forward' towards the present.

'Chunking.' Reference points – temporal landmarks – help to simplify the organization of memory. As a rule they are salient experiences that are called to mind more frequently and easily than other events. By virtue of this increased likelihood of recall, their traces gradually become even stronger, increasing this likelihood still further. More importantly, however, they enable us to 'proceduralize' or 'compile' our search rules. Thus the frequent use of a search path creates new, more compact, temporal representations, so that ultimately only the first and last elements of a chain of retrieval operations are retained and all intermediate steps will be eliminated.

Closure. Representations of events and episodes remain plastic. Memories evolve slowly but constantly. They are embellished or deformed until they finally stabilize in ways that may bear little resemblance to their initial form. This is an esthetic process that answers the cognitive need for narrative closure. Memory must remain coherent and consistent with our present 'acting undergoing' if it is to be *someone's* memory, that is, the manifestation of a Self.

Temporal information processing

The inputs to which the cognitive procedures that shape our notion of time are responsive may vary in a number of ways. The characteristics of what we may call

temporal information influence our perception and retention of duration. We may summarize these characteristics in the following way:

(a) *metric* aspects, the number and stochastic properties of event ensembles;

(b) *syntactic* aspects, that is, the structural relations between events that specify the form or rhythm of event sequences;

(c) *semantic* and *pragmatic* aspects, specifying the cognitive, emotional, and evaluative context in which the events take place.[6]

Every one of these aspects will influence the experience of duration, our awareness of time-in-passing. In addition time estimates are based on the effort that is required to generate an adequate, episodically coherent, representation. When in early childhood or old age, or as a result of organic or mental disorders, the regular strategies for processing this temporal information are not yet or no longer available, certain characteristic distortions or illusions of time experience will occur.

THE SEVEN PILLARS OF TIME PSYCHOLOGY

Now, with this resumé of *The Origin of the Idea of Time* in hand, let us compare the position of the cognitive psychologist Guyau with some current views about what it requires to formulate a coherent theory of our notions of time. As I suggested before, there is no received view from which we can draw an undisputed set of criteria for such a comparison. There is, however, enough common territory among the prevailing views on psychological time to propose at least the following set of basic requirements.

(a) A psychological theory of time experience should specify a *functional stimulus* for our 'sense of time'. In other words, a theory should tell us what external stimuli serve as the building bricks from which the human mind builds the rich phenomenology of time experience.

(b) A second requirement is that the *levels of explanation* used in the theory be specified. Cognitive psychology apparently requires a hierarchy of explanatory levels and seems to distinguish at least three of these to deal with the system's functional architecture, its functional design, and its rational behavior and intentions, respectively.

(c) Even if we adopt the functionalistic (instrumentalistic) view that time is largely a conscious product of the computational processes by which people organize their experience, we have to admit that not all temporal relations in human behavior appear to be explicit and accessible to conscious manipulation. The distinction between *explicit and implicit temporality* of human action is a fundamental one, and it must have its place in any acceptable theory.

(d) The explicit mental representation of time can take different forms. A basic feature of a theory of psychological time is what it has to say about various *modes of representation* and about the rules of operating upon these modes.

(e) A special point is the role of space, or perhaps rather the role of the spatial

analogy or *metaphor*, for the representation of time. Not only does the ubiquity of visual imagery suggest that space constitutes an independent medium for mental representation, space is also ubiquitous in language and specifically in the semantics of time.

(f) It is evident that time as an organization of events relative to their being past, present, or future entertains a very close relation to our concept of memory. Time is intrinsically connected with *dynamic memory*, that is, with the memory for concrete episodic events, localized in space, that together constitute a meaningful narrative, including the personal history that we recognize as our Self or Ego.

(g) Last but not least a theory should specify the *ontogenesis of time*, and describe how the cognitive mechanisms that produce our experience of time develop in the course of our life.

These then are the seven pillars of wisdom that, in my view, ought to support any theory of time experience that can come forth as science. A closer examination of each of these basic criteria should bring out more clearly the qualities and contemporary significance of Guyau's theory as a *cognitive* theory of time.

Functional stimuli: the building bricks of time

Psychologists, like most other scientists, conventionally entertain the convenient working hypothesis that the world around us is real, and to a first approximation roughly resembles the way we perceive it. If reality were totally different from experience, the argument runs, the computational effort to cope with the contingencies of the environment would become infinite, and the human species would certainly not have evolved.[7] Apparently our mental models of the world work so well because they are functionally adapted to the contingencies of the real world.

Given that humans live in a world of change, the question is what processes are there to help us represent change and how from these processes a conscious experience of time may eventually proceed. We have already seen that, physically speaking, the raw materials of which our experience of time is fashioned seem to be quite impoverished: succession and order (the *arrow of time*) may be the only attributes that can be defined without reference to an observer. The streaming of time is not a property of the physical world. Not for Guyau: 'What remains is to make time flow and stream in consciousness' (*OIT* p. [26]), and not for contemporary scientists for whom the flow of time is an addition 'to the world as we perceive it in absence of specific physical stimuli that could possibly generate [this flow].' (Davies 1981, p. 63).[8]

But the psychologically inspired view that moves us here, and that is shared by Guyau, is that building bricks as such are not the only thing that should concern us. They are necessary but not sufficient conditions for our experience of time. Building bricks would have little significance if there were no means of

observing or using them. This point was emphasized by phenomenological psychologists like Brentano, Husserl, and Merleau-Ponty in particular (see Brockelman, 1985). They have pointed out that the order of events, psychologically and neuro-physiologically speaking, is represented simply because an earlier event will necessarily constitute a context for the later event.

This fact has figured implicitly in a good deal of psychophysical research, in studies on forward and backward masking in perception, as well as in studies on proactive and retroactive interference in memory (detailed up-to-date reviews of this research can be found in various chapters in Boff *et al.* 1986). This research has given us a detailed insight in the mechanisms that determine the apparent order of events. Depending on the circumstances – the differences, transitions, and intensities, of which Guyau speaks – we perceive events in their proper physical order (or not), they may appear simultaneous (when they are perhaps not), and so forth. But always the perceptual judgment about two successive events will ultimately be in terms of the presence of a later impression in a context which contains the earlier impression. Perhaps the most dramatic and incisive perceptual phenomenon studied in this context is the so-called *apparent movement*. Used as the principle of cinematography and stroboscopy, studied extensively by gestalt psychologists, and still a prominent theoretical issue (Kolers, 1972; Anstis, 1986; Hochberg 1986) it seems the perfect exemple of a sequence of static events becoming a temporal stream. Conventionally research on apparent movement puts the locus of flowing time in the functional architecture, in the structure of the nervous system.

The question about the nature of the building bricks of time has not been restricted to the domain of perception only. The acquisition and recall of sequences of unrelated events – say, a list of words or random digits – is very difficult; so difficult in fact, that someone who has no other cues to rely on (such as causal or logical precedence, or categorical grouping) will hardly be able to remember the order of presentation of the items, although he or she may be perfectly capable of reproducing the items in a free recall test (Crowder, 1976; Tzeng *et al.*, 1979; Michon & Jackson, 1984; Jackson, 1986). This observation underscores Guyau's claim that in the absence of strategies for the establishment of contextual associations no temporal representation is established. Memory contents would appear to move freely along the time-line, their position being determined only by the the attention being paid to them:

> The distinction of past and present is so relative that when we pay close attention to a distant image in our memory, it soon begins to move closer and to appear more recent: it takes its place in the present. (*OIT* p. [44]).

Levels of explanation

There are several levels of discourse at which psychological explanation

normally seems to proceed, but these levels are frequently confused. The consequences may be disastrous. Mixing levels is likely to introduce pernicious homunculi and vicious circles in our theories. Several authors, among them Dennett (1978, 1987), Herrmann (1981), Newell (1982), Michon (1984) have identified the various dangers that the theorist who wishes to establish a cognitive theory is facing.

In the context of time psychology I have distinguished three levels of discourse: (a) an underlying architecture of clocks and regulators (or 'switches'); (b) time as the product of temporal information processing; (c) time as the product of a dynamic (and potentially selforganizing) structure (Michon, 1985). In a sense these three levels are independent: although every temporal behavior is ultimately constrained by the available psychobiological clocks, there is no need to assume that the conceptual units in which we describe temporal behavior at the higher levels must correspond with units at the lower clock-and-regulator level. Different combinations of clock mechanisms may generate identical behavior in different individuals, or even in the same person at different times.

One should recognize that there is a resemblance between these three levels and the levels of explanation that have recently been proposed by Dennett (1978, 1987), Newell (1982), Marr (1982), and Pylyshyn (1983) in particular. The clock-and-regulator level coincides to all practical extents and purposes with physical or architectural levels identified by these authors. Considering time as information is inherently the same thing as viewing it from the point of view of design, function, or syntax. Finally the third, dynamic level of time-in-context bears all the marks of being an intentional, or semantic level of discourse.

The functional architecture of human time

Humans (and animals) have an almost unlimited number of timing mechanisms at their disposal (Moore-Ede *et al.* 1982; Richelle & Lejeune 1980). The ability to resonate or tune to exogenous regularities is one of of the fundamental characteristics of living organisms, anchored deeply in their genetic endowment. Almost any physical or mental function can be recruited to assist in this tuning. The importance of the ability to pick up order in the environment should be evident: any organism that does not possess such a disposition would be fundamentally maladaptive and consequently stand little chance of survival.

However, the tremendous flexibility of our clock architecture makes it a rather opportunistic system from the point of view of the cognitive psychologist. Richelle and Lejeune (1980, p. 165) conclude at the end of a comprehensive analysis of the available literature, that:

> Multiple time bases are continuously constructed in response to the particular requirements of each situation and replaced by others when they become useless.

Apparently then, there are no systematic rules that can unambiguously explain why one internal clock is, or should be, preferred over another. In other words, as a theory about human time experience this level of explanation does not impose enough constraints on the situation. The limitation of the clock-and-regulator level of discourse is that it underdetermines the processes that are required to account for a whole range of behaviorally and cognitively meaningful distinctions. In other words, clocks can only keep time, but psychologically there appears to be more to time than just the keeping of it.

Guyau may or may not have given some thought to this problem. He was undoubtedly interested in facts about the material brain, but in his days biological rhythms were known only in plants and lower animals. The tremendous impact that internal clocks have on human behavior was to be discovered only later. *The Origin of the Idea of Time* remains essentially silent with respect to clocks and regulators.

Guyau refers to the level of functional architecture only in a deliberately *metaphorical* sense (*OIT* p. [49]). He uses his phonograph metaphor only as a means to emphasize that the idea of time, *qua* organization of memory, must necessarily have a physical basis. But rather than concluding that Guyau really believed that the mind is in some ways like a squeaking phonograph, we should remain aware of the fact that the use of metaphors seems to be a predicament of functionalistically inclined theorists. In their desire to describe and explain the complex functional relations of the mind they have usually no other option than to describe a physical architecture, *any* physical architecture, that seems to be able to carry at least part of the weight of the functionalistic description. This implies that the theorist, in order to explain complex mental processes in *functional* terms, is likely to choose whatever is the most intricate information processing structure that happens to be available. For Guyau this was apparently the phonograph, invented in 1877, just three years prior to his article in *Revue philosophique* (Guyau, 1880).

Time as Information Processing

A different frame of reference is indeed needed if we wish to describe how different temporal contingencies (sequential patterns of events) elicit coping responses or strategies, irrespective of the way the organism can neurophysiologically encode or store these patterns. The question now becomes what functional relations about order and change in the world are encoded, stored, retained, retrieved and used. In short, the question is how the rich 'phenomenology' of our experience of time is constructed from the rather simple temporal information the world actually seems to offer us. When the information processing approach was first adopted in time psychology several attempts were made to account for the variations in subjective duration. Michon (1964), for instance, suggested that

information transmission rate (complexity per time unit) in the organism would be the functional stimulus. Ornstein (1969) proposed memory capacity required for storing the information contained in an interval. Block initially proposed as the functional stimulus the effort required in the encoding and retrieval of information (Block, 1972), but later moved to what since has been called 'contextual change' (Block & Reed, 1978). Support for each of these views has been weak to moderate, and in sum there seems to be no advantage gained over Guyau's famous list of influencing factors (*OIT* p. [85–86]) or his conclusion that

> Estimation of past duration depends on the apparent duration of the process of reconstruction itself, that is, on the effort spent in recalling various events. (*OIT* p. [91]).

Since then further serious attempts have been made to distinguish temporal information (about order, date, and duration of events) from non-temporal information (such as phonological or syntactic information in speech) and to specify the various ways in which the two interact (see several chapters in Michon & Jackson, 1985b).

Time as dynamic conceptual structure

Presently it is becoming more widely accepted that interactions between temporal and non-temporal information are in fact the body and substance of time experience. Temporal information cannot be separated in a meaningful way from the structure of events as such. Events (meaningful transitions from one definite state of the world to the next) and episodes (meaningful series of events) carry an intrinsic temporal structure. This structure imposes constraints on the possible representations of time. Meaningless sequences of stimuli – such as they regularly occur in the psychological laboratory, but hardly anywhere else in the known universe – do not qualify as events or episodes, and consequently they are unable to impose constraints on the ways people will represent time. If a series of events has no inherent structure that can be comprehended by the observer, and moreover, if the observer does not succeed in imposing some invented regularity on the input, no temporal representation of that series of events will ensue. This insight lies at the root of Guyau's discussion of the primordial confusion in the minds of animals and infants, as well as of his emphasis on the acquisition of cognitive procedures to anchor experiences with respect to their context. Guyau also emphasizes the active nature of these procedures. Indeed, to the extent that some invented, perhaps arbitrary or socially induced, regularity can be made to fit the input events, a temporal representation of sorts is established and the temporal information can accordingly be encoded and retained. Jackson (1986) has described several elementary strategies of coping with event sequences that have little or no intrinsic temporal structure (see also Michon & Jackson, 1984).

Implicit temporality vs. reflective time

Much of our behavior (and certainly most of the behavior of animals) is not based on an explicit representation of time. Phenomenological psychology in particular has emphasized the dual nature of time in human behavior, as it finds its expression in *action* and *reflection*, respectively. Recently Brockelman (1985) has given a very concise account of the phenomenological analysis of time experience which highlights this distinction.

The first temporal mode, on this view, is the direct, implicit tuning of our actions to the dynamics of the surrounding world. Concrete, adaptive, goal-directed behavior determines a so-called action field (also known as the *Now* or, with a German term, the *Präsenzfeld*). In this field retentions of earlier experiences and anticipations about the future are implied in a manner similar to the way a specific chess position may reveal much about the earlier stages of the game and its possible continuation, despite the fact that none of this is explicitly represented on the board (and even if one has not followed the game developing). The implicit temporal structure or *temporality* of behavior, that is, the dynamic tuning to the objects and events that the behavior is *about* (the so-called intentional objects), is cognitively inaccessible or impenetrable. Actions will therefore *express* temporal relations but do not explicitly represent them. Actions lack, in other words, duration, order, date, etc. Yet one should not consider this a form of 'unconscious' processing as Hasher & Zacks (1979) proposed several years ago. Jackson (1986) has definitively shown this assumption to be incorrect.

Altogether the action level is difficult to grasp. There are many references to the vague awareness that seems to qualify it. Lawrence (1986) for instance spoke of 'the hum in the basement,' and Haldane (forthcoming, p. 25) in similar terms refers to it as 'a faraway, steady, mellow beat to which I am keeping time.'

However it seems that over the last few years progress has been made in the experimental analysis of what Schacter (1987) calls implicit memory. It is a form of memory which expresses itself in and through our knowledge or performance but cannot be represented in propositional (verbal) terms. That description has a considerable likeness with modern theories about associative memory and remembering. The subtleties that are involved in finding out to what extent the investigator is indeed dealing with the organization of memory and to what extent the methodology interferes, have been the subject of a very detailed analysis by Richardson-Klavehn & Bjork (1988).

In particular it is gradually being established that duration is not an explicit control parameter of behavior. This means that variations in the (required) duration of certain perceptual-motor activities play no systematic role in the quality (and the duration!) of the performance of these activities. One relevant example, for instance, is contained in the work of Thomassen and Teulings on handwriting. It is possible to influence people's handwriting by manipulating

various parameters of the finger/hand/arm system. The fine and consistent timing required for writing is 'a consequence of smooth functioning of the physiological and biomechanical systems involved in the process'. (Thomassen & Teulings, 1985; pp. 261/2; Teulings, 1988). Influencing force, mass and trajectory does indeed affect smooth writing. Directly influencing the duration of writing movements, on the other hand, has no systematic effect. The same is true of other types of skilled behavior, *e.g.* musical performance (*e.g.* Shaffer, 1985).

In contrast, time viewed as past, future, order, or duration, is the conceptual structure by means of which humans express their awareness of temporal relations between events, their reflection on their actions. Reflection entwines the action that is the object of reflection into the intentional object with the, initially implicit, Now in which that action is taking place. The action thereby becomes an explicit temporal object, an event that lasts so and so long, and that can be placed at such and such a position in an explicit temporal dimension of past-present-future. Past experiences are localized at a point in the remembered past, expectancies are projected as event that are still to happen in a future that gradually comes closer and closer. Conscious reflection being cognitively penetrable, it enables the organism to plan its actions and to adaptively tune to the prevailing circumstances in the world (Brockelman, 1985).

Representations of time

The transition from the implicit, non-reflective awareness of temporality to an explicit representation of time and of events-in-time is functionally significant. It occurs when the human organism has no appropriate *automatic* tuning procedures at its disposal to cope with the situation in which it finds itself (Michon, forthcoming b). In other words, there will be a shift from automatic information processing towards the reflective mode whenever the organism finds itself in an impasse. Of course, another good reason for the development of the reflective mode is that the intentional (goal-directed) character of the communication between humans frequently refers to events in past or future.

The encoding of temporal information may take three forms: literal or episodic, figurative or analogical and formal or abstract (Michon, forthcoming b). At the first, literal level concrete episodes (Tulving, 1983) and generalized episodes or scripts (Schank & Abelson, 1977) are used to support our awareness of the temporal organization of what is happening. Failing appropriate episodes or scripts we may turn to the figurative level at which we use strategies for finding and using analogies or metaphors (Lakoff & Johnson, 1980; Carbonell, 1982) for the same purpose. In some cases we can rely on formal representations that in an effort of decades or centuries have achieved the status of scientific theories, sometimes to such an extent that we accept them as 'true' representations of the real world. Thus, for instance, we now tend to dress the universe in spacetime

garments designed by Albert Einstein and tailored by the mathematician Herman Minkowski (*e.g.* Smart, 1964; Sklar, 1974).

Rather than being independent, structurally incompatible forms of representation, these three categories seem to be arranged along a continuum with rather smooth and indistinct transitions between the forms, especially between the figurative and formal representations. What ultimately unites the three forms of representation, however, seem to be the following important issues: (1) the structure and function of dynamic memory, including our memory for personal experiences; and (2) the conspicuous role of (visual) space as a medium or analogy for the representation of time.

Literal or episodic representations

In the course of their development humans build a repertoire of temporal standards. We attribute prototypical or 'natural' temporal relations to events. Deviations from the standard are quickly noticed and may be remembered quite explicitly and in great detail. In recent years a considerable body of empirical evidence has been obtained which confirms the idea that humans are quick in picking up a repertoire of elementary temporal structures, and equally quick in using these elements to build an explicit representation of what is going on. The evidence mostly derives from three research paradigms: scripts or scenarios (Schank & Abelson, 1977), qualitative or 'naive physics' (Hayes, 1978), and the perception of structural information in serial patterns (Jones, 1985; Jones & Boltz, forthcoming). In each case the underlying thought is that the human organism must be able to encode the tremendous mass of incoming information without running the risk of a computational explosion. It must therefore have a general disposition to distinguish in any structured domain it has to cope with, a small number of between, say, 30 and 100 elementary units that constitute the 'alphabet' on which to base its syntactic computations. Jackendoff (1987) has recently made a powerful argument for this position on the basis of recent research in such diverse areas as speech, vision, and music.

Consider, for instance a person listening to a musical composition. If there really is a tune, the listener will be able to adapt to it and to generate expectations about the way it will continue. If the melody runs off according to expectation, its time span will seem to be normal. If, on the other hand, the composer (or more likely the psychomusicologist in her laboratory) interferes with the temporal structure as expected, the melody may seem to end sooner than expected, or later than expected as the case may be. The well known experience of time passing too slowly or too quickly is on this account caused, not so much by the number and complexity of events, but by these events experienced in their proper cognitive context (Jones & Boltz, forthcoming).

Only if there is no intrinsic structure will special strategies be called in an

attempt to make sense of the situation. But if no inherent structure can be extracted from the ongoing situation at all, no time experience will follow: time may then pass unnoticed.

This view has much wider ramifications in cognitive psychology than one realizes from the point of view of the experience of duration in the limited sense of the word. Recent work, *e.g.* by DiSessa (1983), Shepard (1984), or Freyd (1987), has made a plausible case for the existence of elementary physical schemata in which generally valid facts about the physical world are represented.

Schank's work on dynamic memory (1982) and on patterns of explanation (1986) is relevant for this approach. In this framework coping with reality is seen as a matter of schema instantiation: whenever people have to understand or explain a state of affairs, they will always attempt to call to mind a concrete example of that state of affairs. People are – to use Schank's phrase – constantly reminded of something. If the situation does not quite fit, some tweaking will be necessary. Tweaking introduces a (minor) modification of the schema so as to retain its functional resemblance with the prevailing situation.

Guyau's arguments rest on this same fundamental point and he thus anticipated, in a remarkably explicit way, the dynamic view of information processing as it is now defended by the authors mentioned above.

The development of the dynamic idea of time is, according to Guyau, guided by a natural logic. Not everything is possible, and although we are capable of forming quite different and personal strategies, the results emerging from these 'natural' processing strategies must ultimately result in more or less uniform concepts:

> There is a certain logic in life and it is this logic which makes it possible for memory to exist. Wherever the illogical and the unpredictable reign supreme, memory will lose its hold. Life absolutely devoid of logic would resemble those ghastly stage *dramas* in which the various events are totally unrelated and from which one extracts only fuzzy images that blend into each other. (*OIT* p. [36–37]).

Figurative representation of time

Reasoning by analogy is ubiquitous in human thinking. It is perhaps the universal way of thinking, because one could well maintain that even the literal 'reminding and tweaking' proposed by Schank (1986) is not literally literal. At this point, however, I restrict the idea of figurative or analogical representation of time to situations where we do not have an adequate, concrete representation, a *simile*, to match the situation at hand. In such a case we are forced to widen our criteria of being reminded until we find a suitable analogy that we may then 'tweak'. The search for such an analogy (or its verbal expression, a metaphor) takes place through a gradually deepening search process (Carbonell, 1982). The difference with a literal representation is that only a few important characteristics,

such as the goal structure and the functional relations of the source domain need to be be applicable to the situation at hand, the so-called target domain. For instance, the metaphor 'time is war' requires that the goal of war – conquering territory (or defending it, as the case may be) and defeating the enemy – can be given a meaning in the context of the temporal domain. If we cannot imagine what it means, for instance, to conquer time or to gain the upper hand in our fight against the past, the analogy is useless and the metaphor will not work. But apparently we do give an interpretation to 'time is war.' That is at least what a recent book under the title *Time Wars* suggests (Rifkin 1987). At the same time it is unnecessary that all the structural features and physical properties of war do integrally apply to time. The organization of the war machine with its officers and soldiers, its guns and its hospitals and cemeteries need not have a counterpart in the domain of time. Years, months, days and seconds do not seem to be organized in quite the same way as an army. Similarly the fact that tanks are made of steel is irrelevant to whatever role it is that the functional counterpart of a tank plays in our time wars.

Thus the criterion of acceptability of an analogy or metaphor may differ from one application to the other, but when it is finally accepted, an attempt will be made at an 'extended reading' in order to find the limits of the match over the full extent of the target domain (Carbonell, 1982).

Although at first sight the number of metaphors would seem to be almost unlimited, reality has been quite constrained in this respect. Lakoff and Johnson (1980) strongly argue in favor of a limited number of core metaphors or analogies, conceptual structures that cover the majority of all metaphors. They suggest there may be only some fifty 'core metaphors' which they then condense into no more then three generic metaphors: ontological categories, which include such metaphors as 'time is money' (*i.e.* time as a valuable substance), personification (*e.g.* time as a killer, or time as the healer of all wounds). The third and most pervasive is the spatial metaphor (*e.g.* we are moving towards the future, leaving the past behind us).

The universal character of the spatial core metaphor has received considerable attention in the scientific literature. First there is the attention paid to it by linguists. Clark (1973), for instance, assumes that there is a special cognitive system for dealing with spatio-temporal relations (or rather a special spatial system on which temporal relations are parasitic). A similar, but better formalized position was adopted by Gruber, whose 'thematic relation hypothesis' holds that human language has a set of very precise substitution rules that enable us to map temporal (and some other) attributes and relations onto the spatial domain (see Jackendoff, 1983, pp. 188–193).

The strong impact of the spatial domain has also been emphasized in the study of the role of 'Anschaulichkeit', visualization or imagability in scientific discovery. It is difficult to overestimate the importance of visualization. To compare the

atom with the solar system was incorrect, and Niels Bohr knew that it was incorrect, but this 'image' has had a tremendous impact on the development of atomic physics, simply because of its visualizability. (See further, among others, Miller (1986); Holland *et al.* (1986); Langley *et al.* 1986).

Formal theories

I will deal only very briefly with the third class of conceptual structures that people can use to deal with time: the formal theories. Some analogies (or metaphors) are so successful that they become the vehicles for scientific thought. In the case of time it is not different. The first such analogy to be elevated to the status of scientific formalism was the mechanical clock, born from ancient attempts to represent or simulate the heavens. When Newton formulated his mechanics the clockwork universe became a fact, and in that universe absolute time, which 'flowed equably in and of itself', was the first formal framework for the description of temporal relations. Around the turn of the last century the revolution that would lead to the dethronement of classical mechanics, to be replaced by the theory of relativity, was already in full swing. Einstein, Minkowski and Weyl, in particular, transformed the old idea of time as a totally independent, but not terribly interesting, attribute of reality, to the modern concept of integrated spacetime: time as a somewhat peculiar fourth dimension of space, actually connected to space by the invariance of the speed of light (Sklar, 1974; Park, 1980).

The formalization of time does not stop with physics, however. Logicians and linguists have successfully tackled the problem of time and as a result temporal logic and a semantics of time have emerged, so that a number of very difficult problems of dynamic systems theory have come within reach. (Van Benthem, 1982; Rosen, 1985; Georgeff & Lansky, 1987).

The formalization of our ordinary representations of time has progressed to the extent that we use geometry and measurement theory to express temporal relations in terms of abstract scales. Guyau was aware of this when he wrote 'time will only emerge when events can be positioned in linear fashion along a single dimension, length' (*OIT* p. [8]), but he could, of course, not anticipate later developments in measurement theory and psychophysics, which would eventually lead to the distinction of various types of one-dimensional scales, the nominal, ordinal, interval, ration and absolute scales (Narens, 1981). The role of these scale types as 'formal mental theories' of time has been outlined by Michon (1985, 1986) in an attempt to account for the hierarchy of levels of temporality proposed by Fraser (1982).

The role of space

What modes of representation do we have for the encoding, storage and recall of information? Most contemporary authors (but not all, see *e.g.* Pylyshyn, 1984) will agree that there is at least an abstract, propositional medium for the representation of knowledge and, very likely, also a concrete spatial one (Shepard & Cooper (1982), Kosslyn (1983), Johnson-Laird (1983). A few authors, moreover, claim that there is some evidence for a special independent conceptual structure for temporal information. Thus Anderson (1983) postulated a special mode for temporal strings, in addition to the conventional propositional and spatial modes. A temporal string representation would be especially useful for representing information that is crucially dependent on order.

To appreciate the merit of a string representation consider repairing a vacuum cleaner. Instead of remembering how to dismantle it by propositionally representing the functional relations between various parts, or the spatial relations between them, one will do better by representing the order in which each part is removed. But such an example casts immediate doubt on Anderson's proposal: doesn't one after all represent this temporal order in a spatial medium? Wouldn't one, for instance, put the loose parts on the work bench in the order one took them from the vacuum cleaner?[9] How could we possibly remember the order if not by using a spatial, or a functional analogy of that order? This and other, similar examples from the literature on the art of memory (Yates, 1966; Luria, 1968) should warn us that the temporal mode may not be nearly as independent as Anderson claimed.[10]

Though there are numerous arguments against a visual correlate of spatial representations (Pylyshyn, 1984), the privileged character of spatial relations – even if they would be encoded propositionally rather than quasi-visually – seems beyond doubt. One picture is worth more than ten thousand words, and we even know why (see Larkin & Simon, 1987).

Even a full century after Guyau made his claims about the precedence of space as the medium in which the idea of time evolves, it is still less than transparent whether the prominence of space as a medium for representing temporal relations should indeed imply priority for spatial extension – by means of effort and movement – in the development of temporal representations. There is no clear empirical evidence (as is pointed out by Friedman on p. 207 of this volume, for instance), and it could therefore well be that the two, the idea of space and the idea of time, develop more or less simultaneously. Logical precedence would, in fact, work just as well as ontogenetic precedence to explain the dominance of space over other representational media.[11] Although he is not particularly clear on this issue, Guyau may have been leaning towards this position; this is at least what he suggests when he argues that by 'desiring, and acting toward our desires we simultaneously create space and time' (*OIT* p. [46]). *Simultaneously*!

Dynamic memory

Perhaps Guyau's idea of memory is the most advanced of the several aspects of his theory of mental time. In his eyes memory is simply a way of effectively and efficiently using the strategies by which we organize our knowledge representations: 'memory is nothing but the art of evoking and organizing these representations.' (*OIT* p. [117]). That is as dynamic a conception of memory as one can possibly conceive. The significance of this conception is underscored by the fact that Guyau's ideas about memory center around two important concepts: schematic representations, and autobiographical or personal memory. Both topics are currently the focus of considerable attention in memory research.

To underscore the timeliness of Guyau's views on these matters, let me first point out that our outlook on human memory has changed fundamentally in the short period that has elapsed since the inception of cognitive psychology and the introduction of the computer metaphor in the late fifties. Especially in the past twenty years a dramatic shift has occurred. At first the standard view of memory was based on the Von Neumann computer architecture with its rigid, spatially distinct memory units: short-term storage, long-term storage, and various kinds of external memories. The model proposed by Atkinson & Shiffrin (1968) is characteristic for this perspective. Ten years later an entirely different view became popular. A functional view emerged in which one single memory system, rather than a series of spatially distinct components, served various short-term and long-term functions, depending on the way this system was addressed or activated. Characteristic models of these days were Shiffrin and Schneider (1977) who integrated long- and short-term memory, Baddeley and Hitch (1975) who redesigned short-term memory and by adding a couple of functions turned it into a genuine working memory, and Tulving (1972) who introduced the distinction between semantic memory on the one hand and episodic memory on the other. Semantic memory contains generalized factual and in principle timeless knowledge; episodic memory, in contrast, serves our personal history by storing and retaining real life experiences.[12]

The structure and function of episodic memory have become a most active and attractive area in memory research in recent years. Two aspects appear to be of special interest for our discussion. One of these, dynamic memory, has been developed by Schank and his colleagues (Schank & Abelson, 1977; Schank, 1982; 1986), the other did derive from the pioneering work of Linton (1975, 1986) on autobiographical memory. I shall briefly outline the main issues of each, in relation to Guyau's ideas with respect to these two lines of thought.

Even the most cursory reading *The Origin of Time* will reveal a very close resemblance between the views of Guyau and Schank on the structure and function of dynamic memory. Their common point of view can perhaps be

summarized as follows: we understand to the extent that things are identical and we learn something new to the extent they are different. Guyau tells us that

> Resemblance activates the recall of differences. The present image, in as far as it is identical with the past image, regenerates the old context in as far as that context differs from the present one (*OIT* p. [63]).

Schank's paradigm can be expressed in an equally simple and very similar way: understanding is a matter of reminding and tweaking.

> In order to to find an explanation, what is required is to find an applicable old pattern, determine to what extent it differs from the current situation and to begin to adapt it to fit that situation. (Schank, 1986, p. 24).

Schank's theory of dynamic memory rests on the concept of schema instantiation. If we are facing a new situation of a kind with which we are already familiar, then understanding that situation involves the instantiation of a schematic structure with details specific to that particular input. In other words 'people do not feel they understand a description unless they can imagine a concrete example of what is being described.' (Glass & Holyoak, 1985, p. 267).

It is impossible to read *The Origin of the Idea of Time*, and especially the second part of Chapter Four (*OIT* pp. [59–84]), and not be struck by the resemblance between these two theories, developed a century apart. It is almost as if they were meant to be an illustration of the very ideas they are dealing with: Schank's theory reminds us of Guyau's theory with just the barest minimum of tweaking. Thus Guyau:

> What in a portrait reminds us of the original are not the features that evoke the reminiscence, but precisely those that play no role in it. In fact, the true object of memory is the context in which you have met originally, in as far as this context differs from the circumstances under which you meet this time. (*OIT* [62–63]).

And Schank:

> The issue in understanding is indexing. We must be able to abstract the cues from the situation that we are processing and use those cues to access a knowledge structure that we have previously stored away using those cues (Schank, 1986, p. 228)

These are very general views of dynamic memory, but they fit even in great detail. As a matter of fact they fit in more respects than I am able to pursue here.

Two important principles of temporal organization raised by Guyau in Chapter Four are the notion of temporal landmarks and the notion of chunking. Both are processes that help us to simplify memory search.

A temporal landmark is a particularly familiar or vivid experience that helps to quickly access the content of memory. Empirical studies have established the nature and extent of temporal reference systems, but they have hardly contributed

any theoretical insight that is not already contained in the paragraphs Guyau has written on this topic (Underwood, 1977; Brown & Kulik, 1977; Brown *et al.*, 1985; Robinson, 1986). The major findings from this research confirm that the organization of memory is heavily dependent on socially induced reference systems, such as clock, calendars and public events. As a rule there is a considerable interfacing between the public and the personal domain:

The knowledge one stores concerning a current event may include facts about the event itself (participants, locations, types of actions), facts relating the event to other events (actions that caused the event, actions resulting from the event), and facts about the event's personal context (how and where the event was learned, with whom the event has been discussed). (Brown *et al.*, 1986, p. 156).

The second principle raised by Guyau in this context is that of 'chunking' (Miller, 1956; Laird *et al.*, 1985), the process by which complex search rules are simplified by integrating a fixed sequence of steps in the search process into a single step.

This process is analogous to habit formation. Intermediate states vanish because they are no longer useful. The series is reduced to two terms, which suffice because their temporal separation is sufficiently established. Without this *abridgment procedure*, without the disappearance of an enormous number of elements, localization in time would be very time consuming, clumsy, and confined to narrow bounds. (*OIT* p. [69]).

Autobiographical memory is for Guyau the effort to make one's personal history into a coherent, well-organized account, a 'narrative' of one's past from the perspective of one's present views and priorities.

Time, in and of itself, is an an artist idealizing the world. In fact, we remember only the prominent and characteristic aspects of past events... We tend to embellish what has been pleasing to us and to deform what has displeased us, and this tendency, incessantly adding effect upon effect, finally reaches a point of maximum beauty or ugliness that constitutes the [ultimate] adaptation of a recollection to our personal inclinations... This is necessarily an esthetic classification. Time is therefore a judgment based on the strength and the esthetic value of objects and events. (*OIT* p. [107–108]).

Temporal order relies on the ability to file our memories coherently. Thus we create time awareness alongside a coherent personal history, and it is this private narrative which, according to Guyau, lies at the root of what we commonly call our Self. This statement reflects the cognitive stance Guyau takes toward personality. The remarkable thing is that the Self in this specific narrative sense appears to be a rather straightforward consequence of the cognitive view. The Self had all but disappeared from scientific psychology, and not just because behaviorism wanted it that way. Even existential psychologists worked towards its demise. They liked to compare the Self with an onion: you may peel off one layer after the other, until nothing remains (Kouwer 1957, paraphrasing Ibsen's *Peer Gynt*). Only recently the Self has made its – not yet quite triumphant –

re-entrance on the stage of experimental psychology. Borrowing from phenomenological psychology (see Brockelman 1985) it is now gradually accepted that our reflective awareness – in Guyau's terms our idea – of time, allows us to recall and expect events as occurring at their proper point on the time scale. On this view our Self is the mental representation of our personal history, a *narrative* made coherent by plausible interpolation, and continuously updated so as to make it comprehensible from the person's present outlook. The recent avalanche of experimental and clinical research into the domain of autobiographical memory supports such a constructive view of Self or personal identity.

Autobiographical memory has come under close scrutiny in recent years. First of all historically, philosophically and, not least in literary criticism (*e.g.* Ricoeur, 1984/86; Brockelman, 1985; Casey, 1987).

The experimental study of autobiographical memory by psychologists is seriously lagging behind; researchers are only just beginning to scratch the surface of this extremely rich domain of creative cognition. It was made into a researchable topic by Linton (1975, 1986), who found an extremely clever way to circumvent the extremely unreliable nature of autobiographical memory. Over a period of many years she systematically collected autobiographical facts and then subjected herself to a strict regimen of systematically recalling these events at various later times. The purpose of these studies was not the actual content of these recollections as such, but the procedures and strategies that she used in organizing and retrieving these recollections. Later Wagenaar (1985) has also reported on a very similar study, which differs from Linton's heroic attempt mostly with respect to the precision of the recording and retrieval procedures.

The ontogenesis of time

Half a century before Piaget (Krafft & Piaget 1925; Piaget, 1946) Guyau already gave a detailed description of the ontogenesis of our notion of time. Unlike Piaget, but consistent with our present inclinations, he did so in terms of cognitive processes rather than in terms of a series of structural age-related stages. In essence Guyau traced the genesis and development of our idea of time from its initial state, confused because of a lack of organizing strategies, to an adult dynamic memory that is capable of creating and maintaining an adequate temporal organization of experiences. Elsewhere in this book Friedman takes a close look at the developmental implications of Guyau's view (pp. 199–211). Here I wish only to highlight one or two issues that appear to be of particular relevance for cognitive development in general.

Acquiring cognitive procedures and strategies means acquiring ways of interpreting and representing the facts about the world. Acquiring a repertoire such procedures brings with it the possibility of representing the same facts in a number of different ways. One of the most remarkable features of the human

mind is the exceptional ease with which it can switch from one context to another, a pervasive cognitive relativism that enables us to sidestep a great many practical problems. The human mind may have various weaknesses, but single-mindedness is not one of them. Flexibility is the propensity that distinguishes us most from the computer as we know it today (Dennett, 1978, pp. 256–266; Goodman, 1984; Bruner, 1986).

We may watch this conceptual relativism at work in the way people deal with metaphors. In order to deal with certain primitive concepts – love, causality, and indeed *time* among them – we need to have access to an ensemble of partially overlapping metaphors; by 'judicious vacillation' between these metaphors we may succeed in thinking coherently about such complex concepts (Goodman, 1984, p. 32). In their delightful analysis of the metaphors we live by, Lakoff & Johnson (1980) have listed a considerable number of metaphors that can be used to express temporal relations, but what their analysis fails to reveal is how we vacillate between these metaphors, or indeed how integration is achieved.

The most systematic effort to study the developmental dynamics of representing our time experience appears to be the work of Montangero (1977, 1985). Montangero, working in the tradition of Piaget, has outlined the gradual development of an integrated structure consisting of three separate subsystems (or metaphors). We may label these *movement, change,* and *repetition.*[13] In this overall structure time *qua* duration is the connecting concept, the glue that holds this intricate mental representation together. Montangero seems entirely in agreement with Guyau's views when he claims that children first acquire the separate concepts within each of the subsystems – *e.g.* number and frequency in the case of *repetition*. Later they will gradually be able to combine these concepts into dyadic and eventually complete triadic relations, but only when they ultimately attain the insight that *duration* in all three subsystems is to be treated as one and the same concept can we say that their notion of time is complete.

Guyau did not quite envisage anything as detailed as this complex developmental model, although he came close indeed. He did stipulate the importance of movement, change, and number in the development of the idea of time (*OIT* pp. [19–24]), but all the same he remained more preoccupied with the fundamental role of effort in space as the antecedent of the notion of time (*OIT* p. [47]). This, unlike Montangero's approach, is actually more representative of the line authors coming after Guyau would take with respect to the development of temporal representation. I have already considered the role of measurement scales as a medium for formally representing temporal relations (p. 181). The relation of these time scales to the properties of space is, of course, evident. But the increasing complexity of these scales from nominal – primordial chaos again![14] – via ordinal and interval scales to ratio and absolute scales is not just a theoretical matter. That there is also a developmental progress from simple to complex was argued only quite recently by Riegel (1977). In Riegel's view the immediate ontogenetic

connection between time and the spatial metaphor is maintained. In Montangero's triadic system this connection remains much more implicit, although it seems natural to assume that in this case too, the various representations of time will, at least initially, take the form of spatial schemata or episodes. It should be added in passing that ultimately these spatial analogies are quite remote from real space. That Guyau was very much aware of the indirect path from space to time to a spatial representation of time is evidenced by his warning that

> such an idealized space is quite unlike real space and it allows us to conceive of an [abstract] setting in which things occur in succession instead of co-existing like objects in space (*OIT* p. [75]).

The development of these more abstract forms of temporal representation does not generally lead to a permanent state of reflective temporal thought in the adult mind. This is evident for Guyau, who clearly indicates that even for the adult mind the more primitive mode of 'acting and undergoing' remains available (*OIT* p. [30]). This is particularly evident in dreams and that is presumably what led Guyau to this statement. In his recent study on dreaming Foulkes (1985) attributes the primordial confusion of the dream to the failure to apply syntactic rules (or cognitive strategies) in the dream state, although isolated elements of the dream can indeed be meaningful. A primitive, unorganized state of mind may, however, also prevail in in other circumstances. Smedslund (1978) suggested in particular that simpler types of representation will as a rule be adopted by adults whenever the situation does not require a more complicated representation. This argument rests on a variation of the principle of least effort.

EPILOGUE

The literary embodiment of Guyau's primordial confusion – not, as I argued earlier, a mental chaos but a 'stream of consciousness' – may have reached its zenith in the work of James Joyce. Surprisingly enough, *Finnegan's Wake* has recently become a metaphor for common thinking, and research has begun to find out exactly what the processing differences are between conscious, reflective thinking and the associative stream of thought that seems to be the undercurrent of organized mental activity (*e.g.* Koriat & Melkman, 1987). Associative thinking, rather than being an exception, should perhaps be considered the rule in everyday adult thinking. On this view the human being would seem to constitute a kind of 'Joycean engine,' a generator of a semi-incoherent stream of thought, occasionally interrupted by a fit of lucidity.[15]

It seems not unlikely that Guyau might, in time, have reached the sort of conclusion that is implied by these last few paragraphs. The notion of a stream of consciousness from which we collect fragments and then proceed to (re)construct a coherent story is certainly present in *The Origin of the Idea of Time*.

Our present life covers, without erasing it entirely, our past life which serves as support and hidden foundation. If we descend into our inner depths, we are lost among the debris. To restore and reconstruct them, to bring them into full daylight again, the most important and almost unique means available is spatial organization. (*OIT* p. [79]).

The metaphor of an archaeologist is evoked, an image that was also chosen by another master of the stream of consciousness, Marcel Proust, in his search for his past. Like Proust, Guyau was concerned about the restoration and reconstruction of the 'remembrance of things past.' Although it is probably more plausible to assume that Proust was influenced by the then very conspicuous Bergson, rather than by Guyau, he did stress the strategic aspects of the remembering so repeatedly that to infer a more direct connection with Guyau's thought would not seem totally extravagant.[16] Actually Proust intended to disagree with Bergson to a considerable extent (*e.g.* Kern, 1983).

The archaeology of the mind is an enterprise for every individual, but it is also a collective enterprise. For Guyau the continuity of life depends, after all, on society rather than the other way around (p. 24). He testified to this beyond the grave. On his tomb we read his own words:

Our highest aspirations, namely the ones that seem most unlikely, are like waves that, once they have reached us, move on beyond us and perhaps, by converging again and amplifying each other, will shake the world... Not one of my dreams will likely be lost; others will take them up again and dream them once more until, one day, they will come true.'[17]

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NOTES

[1] More general, interdisciplinary, treatments can be found in the proceedings of the conferences of the International Society for the Study of Time, published in 1972, 1975, 1978, and 1981 by Springer Verlag (Berlin and New York), and by the University of Massachusetts Press (Amherst, MA) in 1986. The principal editor of all volumes is J.T. Fraser.

[2] Elsewhere in this volume Ricoeur (p. 154) makes the same distinction to emphasize the difference between the psychological position of Guyau and Kant's transcendental position.

[3] One may gain access to this domain of philosophical activity through Gale (1968) or Mellor (1981). Recent examples are the studies by Loizou (1986) and Seddon (1987), who represent diametrically opposing views on the matter.

[4] Ricoeur (p. 156) elaborates this point when he argues that 'if one limits oneself to saying that psychology gives an account of the awareness of the idea of time, Guyau is invulnerable.' In my opinion, this straightforward cognitive approach is exactly what makes *The Origin of the Idea of Time* so impressive to the modern reader.

[5] I have, of course, tried to be faithful to Guyau's ideas. By comparing the following resumé with the original text or the translation the reader may judge if this attempt has been successful.

[6] This is my own preferred way of partitioning the characteristic features of psychological time, but I find it easy to recognize this division in Guyau's factors (*OIT* p. [85–86]).

[7] Versions of this argument are currently popular in cosmology, where it is known as the anthropic principle (Barrow & Tipler, 1986): Had the universe evolved differently, we wouldn't be here to observe it.

[8] Actually Davies treats the present (now) in the same way. For him the present is such an addition too. Physically speaking there is no privileged now in nature. At this point Guyau is of a different opinion. For him the present is real. The issue is still a very central one in the philosophy of time. It hinges on the distinction between the A-series (past-now-present) and the B-series (before-after) drawn by McTaggart. Psychologists and biologists tend to consider the A-series real, physicists prefer the B-series approach. The battle rages on.

[9] One should mark the ambiguity of this question. On first reading it suggests what it is supposed to suggest: one puts the parts in a spatial row that represents the temporal order of extraction. But that is not what the sentence 'really' says!

[10] Recent discussions with John R. Anderson have given me the impression that he does not any longer pursue the idea of temporal strings as an independent mode of representation.

[11] I owe this point to John J. Haldane, St. Andrews, Scotland.

[12] Beginning in the early eighties a fundamental discussion has surfaced about the the distinction between sequential and parallel, or between rule-based and distributed information processing. Interesting as this discussion may be for our future views of mental representation, it is largely taking place at the level of functional architecture. Guyau had, however, little to say on this issue and I shall therefore leave it without further mention.

[13] The three subsystems can ultimately be represented at the formal level bij the relations [distance = velocity × duration], [$dX/dt = f(t)$] and [number = frequency × duration], respectively.

[14] This scale level is representative of J.T. Fraser's concept of *atemporality*, the bottom level in his hierarchy of temporal levels (see Fraser, 1982; Michon, 1986).

[15] Proposition made by D.C. Dennett at a conference held at the University of Pittsburgh, 4–5 May, 1987, under the title Brain: Philosophy, Neurology, and Artificial Science.

[16] One should, however, be aware of the fact that Guyau's thoughts on the notion of time kept playing an important role in psychology in those days. In a famous series of lectures for the *Collège de France*, for instance, Pierre Janet (1928) discussed Guyau's work at considerable length. See also Kern (1983).

[17] 'Nos plus hautes aspirations, qui semblent précisément les plus vaines, sont comme des ondes qui, ayant pu venir jusqu'à nous, iront plus loin que nous, et peut-être, en se réunissant, en s'amplifiant, ébranleront le monde... Non pas un de mes rêves peut-être ne sera perdu; d'autres les reprenderont, les rêveront après moi, jusqu'à ce qu'ils s'achèvent un jour.' (quoted in Fouillée, 1889, p. 196).

A Developmental Psychological Perspective on Guyau's 'The Origin of the Idea of Time'

William J. Friedman

Questions about the nature of time have appeared at so many points in history that the questions themselves come to seem timeless. Reading Guyau's work today, one cannot help feeling a strong connection with the questions raised and with many of the answers proposed, a tie more salient than the passage of 100 years since the work was written. Guyau's monograph is a not only a perceptive analysis of the experience of time in adults, but even more fundamentally, it is an attempt to understand temporal experience by considering its origins and development. This provides another strong link to the present, since the basic premise of most contemporary developmental psychological research is that studying the process of development provides a crucial perspective on human behavior and experience.

In spite of its obvious relevance, Guyau's book has had virtually no influence on developmental approaches to the study of time. Even Piaget, who well aware of the work of late 19th century and early 20th century philosophers, makes no mention of Guyau in his two important works treating time (Piaget, 1937/1954, 1946/1969). It is my goal in this chapter to describe a number of connections between Guyau's notions about the development of time experience and subsequent theory and research in developmental psychology. I hope that this chapter and, more importantly, the translation itself will help to direct future researchers to Guyau's work as a source of ideas.

The *Origin of the Idea of Time* contains dozens of specific claims about the development of children's understanding of time. Since not all of the claims are fully developed and since several appear in different parts of the monograph, I

took it as a first task to classify them according to the developmental issues raised. The following seven issues seem to capture most of Guyau's concerns as well as those of many of the 20th Century developmental psychologists who have studied time. The issues range from the origins of the awareness of time to how children come to represent order and duration, how they remember the time of past events, how the experience of the passage of time changes with age, and how temporal knowledge relates to spatial representation. I will not attempt a thorough review of the literature within the confines of this essay, however, so I encourage the reader to examine the sources cited for their treatment of particular topics or Friedman (1978, 1982b) and Levin & Zakay (1988) for broader coverage.

DEVELOPMENTAL ISSUES IN GUYAU'S ORIGIN OF THE IDEA OF TIME

Origins and Development of the Idea of Time

Even though Guyau was not a developmentalist himself, his general approach is remarkably similar to that of Piaget and many other cognitive developmentalists and to Fraisse's (1957/1963, 1982) analysis of the child's adaptation to time. Guyau argues that the idea of time emerges from the adaptation of the child's actions and desires to the environment (*OIT* p. [45]). Like Piaget (1946/1969), he rejects Kant's position that time is an a priori form, instead stressing the gradual, constructive nature of the development of the child's understanding (*OIT* pp. [ii, 5, 117]).

Other comments clearly show Guyau's interest in establishing the developmental starting point of the awareness of time. He suggests three sources: the discrimination of differences (*OIT* p. [18]), confronting the gap between needs and their fulfillment (*OIT* pp. [32, 34]), and the arrangement of actions in service of some intention (*OIT* p. [38]).

Developmental psychologists have found it very difficult to study the early awareness of something as abstract as time because of infants' obvious inability to describe their experiences. However, it has been possible to conduct research that reveals which stimulus patterns are the same from the infant's point of view and which are different. Among the hundreds of studies of infant perception are a handful that demonstrate the ability to discriminate between stimuli which differ in their temporal properties. For example, within the first months after birth, infants respond differently to certain speech-like sounds that differ by only 0.02 seconds in the acoustic feature, voice onset time (Eimas, 1985; Eimas *et al.* 1971). Other studies demonstrate abilities in the first year to discriminate auditory patterns on the basis of their rhythm (Demany *et al.* 1977; Morrongiello, 1984) and visual stimuli on the basis of their flashing frequency (Lewkowicz, 1985). This research shows a very early sensitivity to the fine-scale temporal structure of stimuli.

By observing the temporal organization of the actions of his children, Piaget (1937/1954) employed still another approach to studying early sensitivity to time. He agreed with one of Guyau's points about the origin of time consciousness. Guyau wrote that

> ... need satisfaction and motor innervation are the basic expression of life in every animal. It is the relationship between these two terms, which, in my view, first engendered the awareness of time; the latter initially only being, in a certain way, the conscious gap between a need and its satisfaction (*OIT* pp. [33–34]).

In a similar vein, Piaget asserted that in the first months of life, time is '... completely reduced to impressions of expectation, desire, success, or failure' (Piaget, 1954, p. 347). Each sequence is

> ... a gliding from a preliminary phase of desire or effort into the terminal phase of success or failure, experienced as a present without a past (ibid. p. 348).

An important turning point comes at about eight months when infants are for he first time able to sequence actions to accomplish some goal (Piaget, 1936/1952, 1937/1954). This is yet another of Guyau's proposed origins of the awareness of time.

Order, Succession and Simultaneity

According to Guyau the representation of succession and of the order of a set of events are not present at the outset, but develop through a process he refers to as 'reflective analysis' (*OIT* pp. [7–8, 22–23, 35, 120]). Even simultaneity is a developmental achievement, being preceded by a diffuse state of co-existence. This view is generally consistent with Piaget's (1936/1952, 1937/1954) portrayal of the gradual development of the ability to represent sequences. Piaget found that it is not until about 18 months of age that children come to remember temporal sequences in which they play no direct part.

Other sources of information about the early awareness of succession, simultaneity and order come from recent studies of the representation of everyday events, the development of word meanings, and the development of causal understanding. Consistent with Piaget's (1937/1954) findings that 18-month-olds can represent temporal sequences, O'Connell & Gerard (1985) have shown the ability of children as young as two years of age to imitate familiar event sequences, such as the events involved in bathing. The children's success did not extend to the imitation of random sequences, however, suggesting that the children must be relying on enduring representations of the familiar sequences and not just the ability to remember for a short time any sequence that they see. By three years of age children can also describe familiar event sequences in order (Nelson, 1986). These early achievements led Nelson to conclude that sequencing ability is an 'innate property of the human cognitive system' (1986, p. 241). This nativist interpretation, of course, contradicts Guyau's position.

Studies of language production and comprehension show that order is not only an important feature of young children's representations but that the relations 'succession' and 'simultaneity' are themselves understood in a sufficiently abstract way that they can be applied to novel events. By three years of age the terms before and after are both used and understood (Carni & French, 1984; French & Nelson, 1981; Friedman & Seely, 1976), and children of the same age act out two events simultaneously to express their understanding of the term together with (Friedman & Seely, 1976). Other evidence for the awareness of succession in early childhood comes from the tendency of children as young as three years to attribute a consequence to a prior, as opposed to a posterior, 'cause' (Bullock *et al.* 1982).

Taken together these studies show that children can represent the temporal organization of small sets of events by two to three years of age. Developmental research does not allow us to directly evaluate Guyau's characterization of an earlier, undifferentiated state of temporal experience or his claim that reflective analysis brings about the transition.

Duration

In Chapter One Guyau observes that the young child, lacking an understanding of temporal markers, has a limited sense of duration (*OIT* p. [7]). The concept of duration, as contrasted with duration perception (see the section on Perception below) has been the most intensively studied of all developmental approaches to time, and most of this work has been dominated by Piaget's (1946/1969) definitions and paradigms. Piaget was interested in determining when children come to understand time as all-encompassing flow, one in which the times of different actions can be uniquely coordinated. This Newtonian conception of time is consistent with Guyau's view (*OIT* p. [114]) that eventually we conceive of time as a mathematical continuum. In order to investigate duration in this sense, Piaget asked children to compare pairs of actions (*e.g.* two figures running a race) which differed in speed, distance covered or stopping positions. In each case information about starting and stopping times was logically sufficient to determine which duration was longer (*e.g.* the two figures started at the same time but one stopped earlier). However, children younger than about eight years were misled by the nontemporal dimensions, such as which figure covered more distance.

It is now clear from numerous studies that the coordination of duration, distance, speed and stopping position develops slowly, with errors common at least into late childhood (*e.g.* Acredolo *et al.* 1984; Levin, 1982; Montangero, 1985; Siegler & Richards, 1979). But Levin (1982) has argued that failure on Piaget's tasks is not necessarily the result of an inability to infer relative durations from starting and stopping times, but rather reflects children's tendency to be distracted by salient, but extraneous cues. In her 1977 study, Levin showed that even five-

year-olds could correctly compare two durations on the basis of starting and stopping times when the events did not involve spatial displacements (*e.g.* comparing the times that two dolls slept). Levin's study shows that the ability to apply a common temporal framework to two different actions is present by five years, an earlier age than would be expected from Piaget's (1946/1969) work. Other researchers, however, have emphasized children's tendency to confuse duration with distance or end point in the traditional Piagetian tasks, and concluded that this reveals an immature understanding of duration.

One last finding also concerns young children's knowledge of duration. In an as yet unpublished study, I asked preschool and school-age children to judge how long a number of familiar activities (*e.g.* drinking milk, a cartoon show, sleeping at night) take. They indicated their responses by placing a marker on a scale with one end depicting a small hour glass and the other end a large one. Even three-year-olds' judgments showed above chance concordance with true relative durations. Thus it appears that the representation of duration, as well as the order, of familiar events is possible at this early age.

The Past, Present and Future

Guyau argues that the ability to differentiate the past, present and future is a developmental achievement, preceded by a stage at which everything is experienced at a single level (*OIT* pp. [6–7]). It is difficult to imagine an experiment that would support a first stage at which children fail to differentiate the three temporal categories, but one can try to find the earliest age at which the distinction is clearly present. Simply referring to past events or anticipating future events, both of which Piaget (1937/1954) found by 18 months, of course, does not mean that the child is aware of the past/present/future distinction. One needs more direct evidence that the child himself/herself divides experience into the three categories. Such evidence might be the use of terms for the past, present and future, or, as Guyau suggested (*OIT* p. [6]), the understanding of tense distinctions. If children of a given age can use or comprehend two or more tenses accurately, then we can reasonably credit them with at least some knowledge of adults' past/present/future division of time.

Several recent reviews show accurate tense reference by three years of age, with even earlier ages in some studies (Harner, 1982b; Smith 1980; Weist, 1986; Weist *et al.* 1984). Studies in which children were asked to describe particular events that had either already occurred or were expected to happen in the future show significant accuracy in matching tense to true time by three-year-old English speakers (Harner, 1981) and by two-and-one-half-year-old Polish speakers (Weist *et al.*, 1984). Harner's study found that past and future tense use were about equally accurate, whereas Weist *et al.* found that future use was more difficult. Past tense use appears at even earlier ages in spontaneous speech

samples. Weist *et al.* (1984) showed that Polish children as young as one-and-one-half years used past tense to refer to situations that had actually occurred, for which there were no apparent present results to cue them and when the past tense could not have been 'given away' by the example in an immediately preceding adult utterance. Future tense was also produced at this early age, though there were relatively few instances in which it was used in the absence of present cues.

Harner (1982a) provided additional evidence that three-year-olds can accurately categorize events according to the past/present/future division. She asked children to distinguish between sets of toys that they had played with the previous day, had or were to play with on the test day or were scheduled to play with the following day. Three-year-olds were quite accurate in responding to the question, 'Show me a toy for the day after this day,' and by four years a similar 'before' question also reached levels well above chance.

Still a third way of coding the present, past and future in language is by means of adverbs like yesterday or tomorrow. Weist *et al.* (1984) point out that temporal adverbs appear at about two-and-one-half to three years in a number of languages. However, they note that errors, such as using yesterday to refer to the past in general, are common (see also Harner, 1982b).

In spite of the considerable evidence for early past/present/future differentiation, the researchers in this area seem to agree with Guyau that these divisions are developmental achievements, preceded by an earlier stage. Using Piaget's (1937/1954) theory, Harner (1982b) proposed that the past and future may grow out of sensorimotor memory and intentionality. Weist (1986) and Weist *et al.* (1984) suggested that before children begin to use tense, their speech reveals a less abstract 'here and now' stage.

Memory

One of the most valuable contributions of Guyau's *Origin of the Idea of Time* is his demonstration of the close connection between time knowledge and memory. One implication, noted by Guyau, is that young children who do not yet understand systems for measuring the passage of time will have unordered memories of the past (*OIT* p. [7]), a 'string of increasingly faint images' (*OIT* p. [71]). There has been very little research on children's memory for the time of past events, but the topic is so important that it warrants some discussion.

Adults' memory for the time of events appears to depend largely on two sorts of information: direct cues, such as the 'strength' of a memory or the ease with which we can retrieve it (*e.g.* N. Brown, Rips, & Shevell, 1985), and indirect cues, such as associated facts that can be used to logically reconstruct when the event must have occurred (*e.g.* Friedman & Wilkins, 1985). It seems likely that even young children have access to direct cues to help distinguish recent from

more remote events. The evidence for this is very limited at present: A. Brown (1973) found no age changes from seven through eighteen years in the accuracy of deciding which of two of pictures, drawn from a long series, had appeared more recently. However, as Guyau points out (in his Chapter Five) and N. Brown *et al.* (1985) demonstrate, direct cues may be of little help in the normal course of events, because activation of a memory between the time of the initial experience and the time of recall can increase the memory's accessibility. The greatest age changes are likely to be found in the more reliable reconstructive process. Adults appear to use their knowledge of personal, social and natural temporal patterns to localize past events in time (*e.g.* Baddeley *et al.* 1978; Friedman & Wilkins, 1985). Probably the development of day, week, and year representations between about four and ten years of age (Friedman, 1982a, 1986) provides a framework for locating memories in conventional time. But localization of past events may also require the acquisition of inferential strategies for temporal reconstruction. When and how these abilities develop are important questions for future research.

Perception

Time perception has been the topic of greatest interest among psychologists studying time, and Guyau devotes considerable attention to our impressions of duration. It is useful to distinguish the perception of duration from the more logical, inferential processes involved in the knowledge of duration (see the section on Duration above). His important contributions to theories of time perception are discussed elsewhere in this volume, so I will restrict consideration to age changes in the experience of duration. In his Chapter Five Guyau describes the common impression that time appears to pass slowly in childhood and rapidly in old age (*OIT* pp. [100–102]). He attributes this to the more varied and distinct experiences in the child's life, in contrast to the greater homogeneity in the life of an adult, for whom fewer experiences seem to stand out in a given interval.

Several recent experiments have shown that adults do report time passing more rapidly at their present ages (about 20 through 60 years) than at half or one quarter of their present ages (Joubert, 1983, 1984; Lemlich, 1975; Walker, 1977). There have been few, if any, experiments to explore the causes of the phenomenon, however, though several alternatives have been proposed. Both Fraisse (1957/1963) and William James (1890) offer explanations similar to Guyau's, that old people attend less to changes because most of them are familiar. It is somewhat troubling for this account, however, that time acceleration is reported not only by older adults but by undergraduates, who are likely to be encountering many new experiences (Lemlich, 1975; Walker, 1977). A second explanation, discussed by Whitrow (1980) among others, is that a slowing of physiological processes with age makes external events seem to take place more

rapidly relative to an internal standard. This type of explanation is made plausible by research showing that chemical stimulants tend to lengthen the duration experience of humans (Block, 1980) and lead to shorter produced intervals in rats (Church, 1984). However, it requires the untested assumption that we are able to compare the internal-external ratio that we experienced at different periods of our life.

Another related age effect would follow from Guyau's general model of time perception, though he does not specifically discuss it. Guyau argues that the retrospective estimation of some interval of time is directly related to the difficulty of the reconstructive process (*OIT* pp. [91–92]) Thus an interval filled with unrelated events seems longer than an interval filled with an equal number of related ones. In an earlier work (Friedman, 1978), I suggested that children of different ages may experience the same objective sequence of events as longer or shorter depending upon their ability to understand the relationship between the events. For example, a shopping trip or religious ceremony might seem to have been especially long to a young child who does not understand the purpose or meaning of the component actions. This assumes, perhaps incorrectly, that children who are less cognitively advanced would recall the same number of events as those who are more advanced. But this example points to some of the complexities of studying age changes in time perception: cognitive development can affect many of the factors that theorists believe influence adults' experience of time, including not only the ability to organize events but whether many or few events are attended during an interval and whether many or few or later recalled.

While little research has addressed the effects discussed so far, there have been a number of experiments designed to test the perceptual abilities of children and their susceptibility to illusions (see Fraisse, 1957/1963, 1982; Friedman, 1978; Pouthas, 1985). In general, these studies show that four- and five-year-olds can learn to reproduce relatively brief intervals (2–15 s) if given sufficient practice. Children of about this age also appear to be subject to several of the illusions that affect adults' time perception for example, overestimating intervals in which a metronome beat rapidly *vs.* slowly or intervals that are filled with boring *vs.* interesting activities.

The Relationship between Space and Time

For Guyau, time has a strong psychological link to space. He argues that our sense of space is more basic to that of time, that spatial order is represented earlier than temporal order, and that time can only be represented through space (*OIT* pp. [8, 11–12, 70–74, 106, 114]. The developmental literature allows us to consider what are really two separate aspects of Guyau's position: the claim for the priority of spatial representation and the claim that time is eventually represented by spatial images.

A quite striking parallel to Guyau's view on the first issue, the priority of spatial representation, is found in Clark's 1973 analysis of metaphors in adult English. Clark observed that many temporal terms, such as *before* and *after*, reflect spatial models the flow of time which, in turn, are rooted in a universal way of perceiving space. One such model also described by Guyau (*OIT* pp. [70–71]) has time flowing from the front to the back of the hypothetical observer. Since time language is based on space language in this analysis, Clark predicted that children who are learning terms that have joint spatial and temporal reference will acquire them in their spatial sense first. However, this prediction has been disconfirmed. Friedman & Seely (1976) asked three- to five-year-old children to act out their understanding of terms like *before* and *after* by responding to simple sentences in either a spatial context (*e.g.* which of two dolls stands in front of the other) or a temporal context (*e.g.* which of two dolls gets out of bed first). We found that most of the terms tested were either acquired in their temporal sense first or there was no difference between the two contexts. These findings are inconsistent with Guyau's and Clark's positions on the priority of spatial representation. Taken together with the research discussed in Section 2, it seems most reasonable to conclude that temporal representations develop gradually from infancy through middle childhood, a time when spatial representation also show substantial growth.

The second of Guyau's claims about time and space has been supported by studies of the role of imagery in temporal representation. Many cognitive theorists have assumed that mental images are an essential part of our knowledge of space, but far less attention has been given to the possible involvement of imagery in thinking about time. However, several recent studies show that imagery is one of two types of processing that adults use to extract information about temporal structures such as the days of the week and months of the year, the other being a verbal list system (Friedman, 1983, 1984; Seymour, 1980a, 1980b). Subjects in these studies often report images similar to the linear representations of time described by Guyau. But imagery is apparently not the first way of representing the temporal relations in structures like the days of the week and months.
months.

Children rely on the ability to overtly or covertly recite ordered series of days or months for several years before they can use imagery (Friedman, 1986).

We do not yet know whether imagery is present at an earlier age in young children's representations of briefer sequences like daily routines. However, there is at least some evidence that spatial and temporal knowledge share some representational properties even by early childhood. Friedman & Brudos (1988) tested a group of four-year-olds who were both familiar with the temporal order of their nursery school activities and had learned a novel, unidirectional spatial route. We reasoned that if similar representations underlie both contents, then children should be able to perform similar tasks using their route and routine

knowledge. Our tasks involved arranging cards that depicted activities from their routine or locations from the spatial route in the forward order, which had been experienced, and in backward order, which had not been experienced and thus required a more complex manipulation of the information in one's representation. We found that the children performed in a similar way for both the temporal and spatial contents, including on the backward order task. Thus, while we cannot yet say whether imagery or some other form of representation underlies the children's knowledge of either content, the two representations at least appear to be similar. Guyau may have been correct about the close connection between spatial and temporal representations even in children as young as four years.

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Guyau on the Illusions of Time: Normal and Pathological

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'On voit combien sont nombreux les rapports de représentation, d'émotion et de volition qui influent sur le sentiment de la durée.' (Guyau, 1890, p. [85])

Whenever a scholar deals with the genesis of the idea of time, he runs the risk of sounding either profoundly vague or vaguely profound. Guyau was more profound than vague. Whatever vagueness there is in Guyau's remarkable work appeared to stem from the lack of an adequate terminology in his era in which to cast his ideas. With more modern and specific terms, Guyau's proposition that time derives from a 'set of relationships' between experiences of 'undergoing' and 'acting' might be cast as follows: The sense of duration derives from observing relative changes between the passive awareness of successive events and the active, intentional construction of order and temporal perspective. This thesis was prophetic of a good deal of later research.

The tension between undergoing and active intentionality is essential for understanding Guyau's chapter on 'The Illusions of Time: Normal and Pathological.' My purpose is to discuss what appears to still hold true for Guyau's statements about these illusions and to point out relevant new developments.

The chapter was divided into two parts: Part I dealt with normal illusions of time, and Part II dealt with pathological illusions. The so-called 'normal illusions' referred to common everyday discrepancies between subjective and objective time. I will select for discussion those normal illusions that appear pertinent to the field of psychiatry. They will help introduce my particular interest in the pathological illusions of time (Melges, 1982, 1986).

In Part I, Guyau jumped back and forth somewhat indiscriminately between alterations in (1) the internal estimation of objective clock time, (2) the subjective sense or feeling of time as it passes, and (3) the construction of temporal perspective into the past and future. For clarity, although these alterations are interrelated, initially I will deal with each of them separately.

These distinctions are more than mere academic exercises; they are relevant to the ways in which people struggle with time in their daily lives. Especially with the pace of modern society, people commonly try to fit their plans of action into a segment of anticipated future time (Melges, 1982; Edlund, 1987). This is why they keep agendas. As they act and are bombarded by changes, they estimate how much duration has passed and then check these estimates against clock time to see how much time they have left to meet a deadline. All the while, depending on whether or not their plans amidst the changes go smoothly, their feeling of duration may or may not be in tune with their internal time estimates of clock time. Thus, these definitions have practical relevance: People have to compensate for what Guyau described as 'normal illusions' of time in order to tune their responses to changes in the external or internal environments (Michon, 1986).

Internal estimation of duration

With the term estimation of duration, Guyau appeared to be referring to the internal estimation of objective clock duration without the person using a watch as a guide. This internal estimation of duration, he asserted, is influenced by a 'multiplicity of relationships between representation, emotion, and will.' On pages [85–86], he listed nine factors that commonly influence this internal estimation of objective clock duration. For 1888, this was a remarkable list, especially since many of the items seem to have been derived only from introspection. Given a few qualifications, the list could well serve as a summary statement of a modern book on time estimation (Frankenhaeuser, 1959; Fraisse, 1963; Ornstein, 1969; Gibbon & Allan, 1984; Michon & Jackson, 1984). The needed qualifications relate to such recent concepts as event uncertainty and storage size of memory. By translating the list into the idiom of modern information theory and cognitive psychology, Michon & Jackson (1984) and Jackson (1986) have shown that Guyau's list remains comprehensive and relevant to recent research.

The first five items of Guyau's list highlighted the number, rate, and organization of distinct changes being passively apperceived. The last four items emphasized the active construction of temporal connections as mediated by attention, emotion, and anticipation. Both of these general factors influence our internal estimation of duration. They relate to his earlier contrast between the passive and active modes of processing information.

Michon (1986) calls the first process 'timing your mind,' in which exteroceptive and enteroceptive successive events tune the mind to the intrinsic temporal information of the environment; the second process is called 'minding your time,' in which people actively construct temporal relationships in order to adapt to novel changes that cannot be handled automatically.

Although Guyau's list of factors that influence the internal estimation of duration was remarkable, his explanation of the so-called 'indifference point' as relating to the standard of one step of our legs requires considerable amendment in light of a century of experimental research. The so-called 'indifference point' is that period of objective time that is neither underestimated or overestimated; it is accurately estimated. According to Guyau as he borrowed from Wundt, this period is about 3/4 of a second, which is the time to take one step in space. As such, Guyau proposed, it may be the basic unit or temporal standard in which internal and objective duration are perfectly matched in time and space.

Unfortunately, this perfect matching has not been found to be invariably true for 3/4 of a second (Ornstein, 1969). Three-fourths of a second may be a central tendency whose range varies approximately from 0.1 to 1.8 seconds (Fraisse, 1963). This brief period may be an anchoring effect derived from a host of factors, such as the learning of a second, heart rate, processing time of working memory, etc. Its singular relationship to one step of our legs was oversimplified. Moreover, it is doubtful that there is a single factor underlying a general physiological 'clock form' for the internal estimation of objective duration (Michon, 1967, 1985).

Nevertheless, Fraisse (1963, p. 128) emphasizes that the 0.70 second interval is the optimal duration for the nervous system to make successive associations. In other words, events that occur together within 0.70 seconds are perceived as temporally contiguous or simultaneous. This is consistent with modern neurophysiological research (Fuster, 1984; Niki & Watanabe, 1979). The pairing of conditioned stimuli and even the perception of a cause-effect relationship depend on their joint occurrence within about .70 seconds (Fraisse, 1963; Prescott, 1966; Michotte, 1958). Thus, an interval of about 3/4 of a second may be a basic temporal building block of the brain-mind for conditioning and the immediate perception of causal relationships. It is of interest that schizophrenic patients, who have difficulty with keeping track of temporal sequences, have problems with immediate memory revealed by backward masking for stimuli occurring within less than 0.5 seconds (Saccuzzo & Braff, 1986; Braff, 1986). This impairment of early information processing may underlie the deranged thinking of schizophrenic patients (Melges, 1986).

Subjective sense of duration

Although they are related, the feeling of duration can differ from the internal estimation of objective clock time. That is, experienced duration may differ from

one's objective judgment of duration. In dealing with this discrepancy, Guyau's wisdom shined through lucidly on this matter. He emphasized that motivational and emotional factors substantially influence our subjective sense of duration.

In accord with this theme Guyau stated: 'The flow of time is nothing more than the distinction between what one needs and what one has.' (*OIT* p. [33]). He was even more explicit on page [98]:

> The true tension resides in the desire, in the motivation... which is pushing from the present to a future end... Apparent time varies with motivation and desire.'

In line with this, he emphasized how waiting and anxious anticipation prolong the experience of duration. For the child, as Guyau (*OIT* p. [34]) stated, initially the sense of duration comes from the distance between 'the goblet and the lips,' and later in adulthood this tension is elaborated as the gap between intention and satisfaction. This resonates with later elaborations by Fraisse (1963) and with a number of psychoanalytic formulations about the origin of the sense of time from the difference between what is and what one desires (Spitz, 1972; Hartocollis, 1975; Arlow, 1986a, 1986b).

This contrast between the present and the future, between one's current state and the desire for satisfaction, provides an alternative general framework for understanding Guyau's list of nine factors of the 'relativistic character' of our sense of duration (*OIT* p. [85–86]). The first five factors, such as the intensity and rate of successive images, can be related to our present perceptions. By contrast, the last four factors, such as our attention to the images as we relate them to pleasure/pain, desires, expectations, and anticipations, are largely future-oriented. This overall tension between the present and the future may be the essential relativistic change that gives rise to our sense of duration (Melges, 1982).

The feeling of duration may or may not alter the internal estimation of objective clock time. The latter is largely a cognitive process, but it can be influenced by emotion. In this regard, it has been found that unpleasant emotions, compared to periods of calm or pleasure in the same subjects, are correlated with shorter productions of future duration compared to clock time (Melges and Fougerousse, 1966); that is, when anxious, internal time seems longer than objective time. This is in accord with Guyau's description of anxious waiting:

> We wish to conceive of (the distance to the future event) as shorter than it can or must be... By comparison with the ideal time and its ideal tempo, real time seems to drag intolerably (*OIT* p. [99]).

By contrast, Guyau pointed out that the time of happiness 'flies by.' He seemed to suggest that this stems from having a wish for an extended future in which the bliss will continue. Without a constricted temporal horizon, duration seems to pass by quickly. This is in line with hypnotic alterations that expand the present or future and thereby make the sense of duration feel less pressured

(Aaronson, 1966, 1968; Zimbardo et al., 1971, 1973). Guyau's point about time 'flying by' is interesting, but this experience during happiness, calmness, or even creative work may have a simpler explanation. During such states, we do not pay attention to clock time; that is, we are so absorbed with the images and events that we do not notice the passage of time. Only after we emerge from our absorption to take note of clock time do we remark that the time spent seemed to have elapsed quickly.

We are most likely to pay attention to time when we have to meet an important contingency within a relatively short period of anticipated future time. Our awareness of the urgency of time is heightened when we are emotionally aroused by some event about to occur in the future (Pribram & Melges, 1969). As Guyau stated about time, 'We cannot help but measure its length relative to our desires.' (*OIT* p. [98]).

The construction of temporal perspective

With regard to the construction of temporal perspective, Guyau dealt mainly with illusions about the apparent duration of events of the past. In this regard, he stated that the vividness and attention given to a recollection makes it seem closer to the present and seem to have greater relative duration. This is roughly in line with recent experiments by Block (1985), who found that rich contextual cues surrounding past events make them seem longer and closer in time. The estimation of past duration also is affected by perceived distance and velocity, particularly change in velocity (Cohen, 1967).

Guyau also stated that the apparent length of retrospective time increases with the number of 'well-delineated and intense differences' perceived about the recalled events. This is in line with systematic studies by Michon & Jackson (1984). There is a growing body of research to indicate that temporal perspective and the duration ascribed to its episodes are mental constructions rather than perceptions or faithful representations from memory stores (Jackson, 1986).

The elements from which one construes these temporal horizons and their durations are a subject of current debate about different memory processes. Tulving (1985) posits that there is a memory system for episodes of time as occur in narratives. Episodic memory may be different from semantic memory, whose contents are relatively unlocalized in time. This distinction may prove to be highly useful for psychiatric treatments that aim to revise and crystallize autobiographical memories (Rubin, 1986). In psychotherapy, the recall and reworking of one's personal narrative – with its interconnected temporal episodes – is crucial for revisions about the self facing the future (Melges, 1982). In this regard, Guyau stated: 'Once memory has been established, the *self* is established too.' (*OIT* p. [79]).

In addition, it is likely that the weaving together of episodes of long-term

memory about self-other interactions accounts for expected loyalty and trust in family and other long-term interpersonal relationships. These self-other episodes become part of the self's life story. Moreover, this time line of past interactions facilitates present and future interpersonal synchrony (Gottman, 1982). This may be why old friends, dating back to childhood or young adulthood, are hard to replace with new friends; the old friends seem intertwined with our sense of self over time. This expectation of interpersonal synchrony can be thought of as an extrapolated normal illusion of past time that, when discordant with reality, brings disappointment and grief.

Although long-term memory and conscious attention to time appear to be necessary for the construction of temporal perspective, it appears that immediate memory and short-term memory subserve the timing and the judgments of recent and short durations (Gibbon & Allan, 1984). Intervals of less than a second appear to be served by immediate memory, judgments of about 20–30 seconds appear to be based on short-term memory, while intervals longer than 30 seconds are constructed from long-term memory (Michon, 1975). These different memory systems subserving distinctive temporal functions have been demonstrated by Hicks (forthcoming) in patients with Korsakoff's disease, which is a syndrome of markedly impaired long-term memory induced by chronic alcoholism. Because these patients have deficient access to long-term memory, they are grossly inaccurate in judging intervals longer than half a minute, but their intact immediate and short-term memory enables them to time and estimate durations up to 20 seconds accurately.

Possible interrelationships and summary

Throughout Part I, Guyau suggested that the sense of duration and temporal perspective are interrelated. The contexts of the past and future influence our experience of duration. With regard to the context of the past, he pointed out that, during childhood, time seems to 'drag' because each event seems novel and vivid within the short span of life of a child. By contrast, in old age, each event has less impact and novelty within the context of a long life, making time seem to pass more quickly than it did during childhood (Neugarten, 1979). Guyau also emphasized that future time perspective influences our sense of duration. For example, on page 103, he noted that the apparent duration of a trip varies with 'differences in expectancies.' That is, the end portion of a trip, when one is wanting it to be over, seems longer than the earlier part. This sensation is similar to the time urgency gradients found by Lewin (1942) and (Schonbach, 1959) in which duration seems longer when one is nearing a valued goal.

To summarize and extend Part I, Guyau postulated that normal illusions of time stem from observing changes between (1) 'undergoing' successive perceptions and representations from memory, and (2) the 'active' construction of temporal

perspective as related to our emotional-motivational expectancies. To extrapolate, the latter may provide for linkages between short-term and long-term memory functions of temporal experience. Disruption of these linkages may be central to the emergence of pathological illusions of time.

PART II: PATHOLOGICAL ILLUSIONS OF TIME

Whereas so-called normal illusions of time are everyday experiences, pathological illusions refer to extraordinary experiences that for most people are unusual or uncanny. In Part II, Guyau mentioned two pathological illusions: (1) distortions of time in 'insanity' or mental illness, and (2) 'false memory' or *déjà-vu*. Guyau's major focus was on déjà-vu. This reduplicative experience, as we will see, may be more than a curious anomaly. The understanding of the mechanism of déjà-vu may not only reveal some important brain-mind temporal processes but also may be pertinent for the understanding of the temporal distortions in severe mental illness (Melges, 1986).

Distortions of time in mental illness

If someone were to tell you that 'time has stopped' or that it was difficult to tell the present from the past and future, no doubt you would think that he or she might be crazy. Being out of tune with time suggests that a person is out of his mind. By contrast, the healthy mind is tuned into the reality of time.

In this regard, acute psychotic patients, who have difficulty with telling the real from the unreal, often have marked distortions of the sense of duration and confuse past, present, and future (Melges, 1982, 1986). These temporal distortions have been found to correlate with common psychotic symptoms that reflect problems with testing reality (Melges & Fougerousse, 1966; Melges & Freeman, 1977). These symptoms include depersonalization, paranoid delusions, and hallucinations. Moreover, by using hashish to induce these temporal distortions in normal subjects, it has been found that similar psychotic symptoms emerge and covary with the temporal distortions (Melges *et al.*, 1970a, 1970b, 1974).

Although these recent discoveries are more specific and systematic, Guyau's earlier speculations and observations reveal that he had insightful hunches about the temporal distortions that occur in 'insanity.' Nevertheless, the term 'insanity' is too general for modern medical discourse. Since 1888, considerable advances have been made such that many distinct forms of mental illness have been specified (American Psychiatric Association, 1987).

The general forms of these mental illnesses can be differentiated in terms of different types of temporal distortions that involve predominant problems with sequence, rate, or temporal perspective (Melges, 1982, 1986). Problems with tracking sequences characterize organic brain disease and schizophrenia. Problems with accelerated or slowed internal rate of mental events predominate in

manic-depressive illness. Although problems with sequence and rate can produce secondary distortions in the order and span of the past and future, problems with temporal perspective often occur without disturbances of sequence and rate in neurotic-personality disorders.

These different temporal problems roughly correspond to the types of normal illusions discussed in Part I: that is, problems with the internal estimation of time stemming from difficulties with tracking sequences, distortions of subjective duration because of changes in the rate of internal versus externally perceived events, and misconstructions of temporal perspective. In a general way, Guyau intuited some of these later findings about temporal derangements in mental illness by stating that 'insanity ... suppresses or alters the perspective of time' (*OIT* p. [109]). Let us organize some of his statements about time distortions in insanity, which he made somewhat in passing, in terms of distortions of sequence, rate, and temporal perspective. We will then relate the distortions to the phenomena and diagnostic categories of modern psychiatry.

Problems with tracking sequences

Problems with tracking sequences are common in organic brain disease and in the group of schizophrenias. Organic brain disease refers to global impairment of brain function, usually caused by neurochemical alterations, such as in Alzheimer's disease. In organic brain disease, the patient is often grossly disoriented to time, so much so that he or she cannot tell the date or estimate how much time has passed since a recent meal. Schizophrenia is a severe form of mental illness that is characterized by disordered thinking such that the person has difficulty in maintaining his or her train of thought. The patient commonly has bizarre experiences such as hallucinations or delusions of paranoid conspiracies aiming to harm the self. In contrast to organic brain disease, the schizophrenic patient usually is oriented to clock time and, when he or she is not acutely disturbed, can accurately estimate minutes and hours. This is consistent with their intact short-term and long-term memory. However, the schizophrenic's immediate memory for events less than one second's duration is evanescent and intermittently disrupted. This evanescent immediate memory appears to give rise to episodes of losing awareness of the flow of time. During these episodes, the schizophrenic patient becomes quite confused about the order of sequences.

Although Guyau did not use the terms organic brain disease or schizophrenia, he appears to have discerned some of the temporal distortions in these disorders. For example, on page [109], Guyau stated that 'insanity may cause past events ... to be totally blotted out from memory.' Today the blotting out of memory would most likely indicate organic brain disease. Another possibility is a dissociative disorder, such as an amnesia for one's identity or fugue, during which the person engages in a prolonged activity such as a trip and has no awareness of the intervening sequences.

Earlier (*OIT* p. [90]), he referred to the work of James Sully, who had observed that in insanity 'events long past, remote circumstances will merge with present facts.' In acute schizophrenia, the past and future telescope into the present such that memories and expectations seem as real as present perceptions (Melges, 1982, 1986). In schizophrenia, this temporal indistinction between past, present, and future does not appear to be caused, as Guyau asserted, by a past 'terrible shock.' Rather, it probably reflects a genetic vulnerability to deranged information processing in the lower part of the brain, specifically the limbic forebrain and its prefrontal connections (Braff, 1986; Saccuzzo & Braff, 1986; Weinberger *et al.*, 1986).

From a cognitive standpoint, in schizophrenia immediate memory appears vulnerable to distraction so that the patient cannot use the mental present to index and differentiate past memories and future expectations from the present (Melges, 1982, 1986). This difficulty with keeping track of sequences markedly impairs the patient's capacity to tune into and test temporal reality. Inside events (memories and expectations) become confused with outer perceptions. Events lost in time become dislocated in space.

This may in part explain hallucinations such as hearing voices or seeing people when no one is present. Such hallucinations may stem from a confusion of memories and expectations with present perceptions. This confusion appears to result from the schizophrenic patient's inability to keep track of sequences.

Problems with rate and the sense of duration

Although Guyau did not deal specifically with distortions of rate and duration in mental illness, much of his discussion of the normal illusions related to alterations in the experience of duration. He pointed out that these alterations are influenced by the rate and intensity of mental events. An increased rate of mental events is common during moderate to severe anxiety and anger, making internal duration seem prolonged when compared to clock time. In comparison to one's internal time, clock time seems to pass by slowly.

A markedly accelerated internal rate of mental events is common in manic illness, which is characterized by a 'flight of ideas' in which thoughts and images jump discursively from topic to topic. For manic patients, the usual finding is that clock time is dragging compared to their accelerated internal rate. By contrast, in depression mental rate is slowed, and the patient commonly feels he cannot keep up with the rate of external events. The disturbances of mental rate in manic-depressive illness are thought to stem from an inherited predisposition to deranged biological rhythms that become desynchronized during acute periods of illness (Melges, 1982).

Problems with temporal perspective

Problems with temporal perspective are common in neurotic-personality disorders. These patients have little to none of the above sequence and rate problems but nevertheless misconstrue the personal past and future. Guyau intuited some of these misconstructions of temporal perspective. Thus he stated that

> insanity causes past events... to be ... pushed far back into the past [so that] events have become so vague and so foreign to the individual that he can hardly recognize them as having occurred to him personally (*OIT* p. [109]).

Freud, a contemporary of Guyau, would have been proud to have made this statement. It relates to the repression of early developmental influences that unconsciously alienate the person from himself. This warping of temporal perspective by alien repressed memories is often at the core of neurotic-personality disorders (Arlow, 1986; Melges, 1982).

On page [89], Guyau noted that the tendency to 'nourish a passion' gets one 'into the habit of returning incessantly to some painful circumstance' and can 'even lead to a partial confusion of remote and recent experiences.' This is typical of what we call 'flashbacks' and 'unbidden images' that occur in post-traumatic-stress syndromes. Here a catastrophic past event, such as the killing of children and women during the Vietnam war or during the Nazi concentration camp atrocities, intrudes on the person's mind as though it happened yesterday (Horowitz, 1976). These unbidden images indicate that strong emotion can cause a loss of voluntary control over past recollections and thereby distort temporal perspective.

On page [116], Guyau obliquely dealt with the problem of discontinuity of temporal perspective. Normally, although 'the mind ... works predominantly in jumps,' ultimately 'the gaps become smaller' and result in 'a fusion between different intervals of perceived time.' He did not mention what happens when such a fusion fails to take place. The discontinuity of temporal perspective is a frequent finding during acute psychoses and psychotic-like states induced by drugs such as hashish and lysergic acid diethylamide (Melges *et al.*, 1970a, 1970b, 1974; Freeman & Melges, 1977). It also can occur in emotionally charged situations, such as acute grief. Discontinuity means that the experience of temporal perspective is broken up and fragmented. Discontinuity of temporal perspective has been found to be highly correlated with the experience of depersonalization, in which the self feels strange and unreal. This loss of identity appears to stem from a lack of familiarity with the self over the continuum of past, present, and future.

In summary, although Guyau's propositions about time distortions in insanity lacked the specificity of modern research and psychiatric thinking, he appears to have intuited some general hunches about these later findings of distortions of sequence, rate, and temporal perspective in mental illness.

Déjà-vu: A second look at the brain-mind seeing itself

Déjà-vu refers to the experience of a series of current perceptions as seeming to be happening again in the exact same way as sometime before. This 'sometime before' is hard to specify, and the person usually notes that it is a logical impossibility to have had the experience before. For example, the déjà-vu may take place in Singapore even though the person has never been in Singapore.

Guyau devoted most of Part II to this peculiar reduplication of experience that he called 'false memory.' His interest in déjà-vu again showed his sagacity, because the brain-mind processes underlying déjà-vu may provide a key for understanding the temporal confusion of acute schizophrenic psychosis. The latter can be likened to a prolonged déjà-vu experience (Melges, 1982, 1986).

However, it should be noted that the occasional experience of déjà-vu does not indicate psychosis. In fact, between the ages of 15 and 45, about 65 percent of the people seen in a general medical clinic have had an occasional déjà-vu experience, and its occurrence is not limited to neurosurgical or psychiatric patients (Chapman & Mensh, 1951/1952; Richardson & Winokur, 1967). When this relatively rare event does occur in normal people, however, it is a striking and uncanny event that may, as Guyau pointed out, momentarily fill the person with 'unspeakable terror.' Its frequent and intense occurrence may indicate a pathological derangement of the brain, such as temporal lobe epilepsy or schizophrenia (Weinstein & Kahn, 1959; Bear & Fedio, 1977; Lewis *et al.*, 1984). With this background, let us now look at some of the explanations for déjà-vu that Guyau proposed and evaluate them in light of more modern hypotheses and studies.

Simple resemblance.

On pages [110–111], Guyau discussed 'simple cases' in which 'there is an immediate feeling of resemblance between two states of consciousness that forces us to consider them as identical.' That is, something in our past resembles a current experience. It is doubtful that this is true déjà-vu.

Wish fulfillment

Guyau mentioned a patient who 'was caught up in unspeakable terror' when he was 'informed of the death of someone he knew,' and 'he felt that already once before' he had been told this in exactly the same way (*OIT* p. [111–112]). This case may have represented the patient's unconscious wish that he would have known beforehand of the man's death so that the impact of the current news would not have been as terrible (Arlow, 1959). That is, by wishing and believing that he had been through it already in the past, the current event seemed more familiar and less frightening. It is as though the person wished he had precognitive powers so that frightening events would seem to have been predicted (Orme,

1969). That psychological factors can give rise to déjà-vu has been corroborated by Banister & Zangwill (1941), who produced déjà-vu experiences by posthypnotic suggestion.

Pathological and recurrent déjà-vu

On pages [111–112], Guyau dealt with a 'chronic form of déjà-vu' in Dr. Pick's patient who, 'each time he engaged in a new activity, it seemed to him as if he had already performed it before in the same context.' This patient probably had a subcortical brain disorder such as a tumor, temporal lobe epilepsy, or schizophrenia. In attempting to explain this pathological form of déjà-vu, Guyau struggled with two proposals: Ribot's inversion of memory and Fouillée's lack of coincidence.

Inversion of memory hypothesis

According to Ribot, déjà-vu comes from 'an inversion of time' in which 'the mechanism of memory 'operates in reverse." Here the 'same experience' seems to the person that it 'has been experienced twice,' whereas, in reality, it occurred only once. That is, the original sensory impression is split into two images. One of these images initially becomes a memory but later returns to consciousness as a vivid hallucination at a time when the original impression is fading into memory. The latter, because it is 'already waning,' is taken for a recollection, whereas the the former recollection, as it returns to consciousness as a vivid hallucination, 'is taken for the real sensation.' This explanation hinges on the power of an hallucination to override current perceptions, but the precise mechanism for the hallucinatory recollection is not addressed.

Lack of coincidence hypothesis

With Fouillée, Guyau believed that 'the cerebral mechanisms are lacking synergy and coincidence.' This results in a 'double image in consciousness' because new images have two facets: (1) a current image, and (2) a replicated image that is 'projected into the past.' In déjà-vu the latter image returns like an 'echo' to consciousness because of cerebral dissynchrony 'in which similar wave patterns do not fuse entirely.' That is, unlike the normal fusion of these images, the two images – one a current sensation and the other an 'echo' of its memory associations – 'no longer combine to form a single object.' (*OIT* p. [113]).

Given that these proposals were tendered around 1888, when brain research was just beginning, they are remarkable. Modern models of the neurophysiological basis of déjà-vu deal with similar hypotheses to explain how the same experience can be temporally divided and experienced twice.

Ribot's inversion of memory explanation of déjà-vu is similar to that of Pribram (1966), who highlights the role of the amygdala (a nerve center in the limbic system close to the base of the brain) in deciphering current from past experience. The amygdala is often damaged or subject to seizures in patients who have frequent and intense déjà-vu experiences (Gloor *et al.*, 1982). When the the amygdala is deranged, the brain has difficulty in distinguishing redundant 'old' information from novel input.

Fouillée's lack of coincidence proposal is a forerunner of Efron's (1963a, 1963b) sophisticated model of cerebral dissynchrony to explain déjà-vu. Efron's basic hypothesis is that the left (dominant) cerebral hemisphere, which has greater powers of temporal discrimination than the right hemisphere, receives the same information twice. In the normal person, input from the right (nondominant) hemisphere is not noticeably delayed in crossing over (via a bridge called the *corpus callosum*) to the left hemisphere. But in déjà-vu, the input from the right hemisphere is delayed by a minor seizure in the lower brain near the corpus callosum, usually in the right hemisphere. When this delayed information from the right hemisphere reaches the left hemisphere, the latter registers a replay of the successive events it had just experienced. That is, the same successive events are temporally discriminated by the left hemisphere, first directly and then again indirectly when the information crosses over after a noticeable delay from the right hemisphere. This model is supported by findings that epileptic foci associated with déjà-vu usually are in the lower brain in the right hemisphere (Cole & Zangwill, 1963), and also that the electrical induction of seizures in the right, rather than the left, cerebral hemisphere predominantly produces illusions of familiarity and déjà-vu (Mullan & Penfield, 1959).

By highlighting déjà-vu, Guyau intuited that the study of its mechanism may provide discoveries for how the brain-mind discriminates the present from the past and future. As Brain (1963) emphasizes, understanding this process is fundamental for an important brain-mind problem: How do instantaneous brain states simultaneously refer to successive psychological times such as past, present, and future? In déjà-vu, there is a failure of this temporal discrimination; the past seems to be present, and often there is a feeling that the future is already known.

Moreover, as already mentioned, in acute schizophrenic psychosis, the present is not clearly discriminated from the past or future. This temporal indistinction appears to stem from deficient immediate memory functions involving dysfunction of the lower brain, specifically limbic-forebrain derangements largely in the hippocampus and left dorsolateral prefrontal cortex (Weinberger *et al.*, 1986). Without the index of immediate memory for distinguishing as well as linking short-term and long-term memories with the expectancies of the frontal lobe, the mental present may become flooded with past memories and future expectations as though they were taking place in the present (Melges, 1982, 1986).

As noted earlier, this may be a mechanism for hallucinations in which stored

experiences return to the mind with the vividness of present perceptions (Melges, 1982). As Guyau intimated, hallucinations and déjà-vu may be closely linked. To elaborate, hallucinations may be representations of past memories and associated expectations that cannot be distinguished from the present as the mental present is blurred by deranged immediate memory. Hallucinations indicate a confusion of inner and outer events. In this regard, during acute psychosis, a confusion of inner events (memories and expectations) with outer perceptions has been found to covary with the disruption of immediate memory and associated indistinction of the present from the past and future (Melges & Freeman, 1977). This time telescoping was substantially correlated with hallucinatory experiences.

Furthermore, the sense of identity or self may reside in the capacity of different parts or functions of the brain-mind to observe one another from different points in time (Melges, 1982). The capacity to observe oneself, to have an 'observing ego,' cannot take place if the person remains entirely in the momentary present; such a person could not become independent of present input. The person would be like those patients with frontal lobe brain damage who are present-bound and cannot become autonomous from current input (Lhermitte, 1986).

To observe oneself requires that the brain-mind both holds onto and gets out of the present to observe itself moving through past, present, and future. There must be both an awareness of *now* and an awareness of *flow* (Michon & Jackson, 1984). The interplay between *now* and *flow* may constitute the observing systems that make possible the sense of self. Brockelman (1985) proposes that the sense of self comes from an acting entity that both perceives and stores experiences in the present, and from another point in time reflects upon the experiences so as to observe them.

The exact mechanism for this dual consciousness of *now* and *flow* is an intriguing but speculative subject. In this regard, Comfort (1977, p. 314) highlights the importance of delay factors for enabling a system to objectivize itself: 'what 'we' perceive as self is a delay-generated echo.' There is both our current perceptions and the replay of these perceptions after they have been associated with stored experiences. The delay permits the systems to observe one another, in effect to 'know' the other. Thus, Comfort (1977) relates the sense of 'I-ness' or self-identity to the déjà-vu phenomenon. That is, like déjà-vu, a delay in time between different perceptual and memory systems may allow the brain-mind to observe itself.

In this regard, Efron (1963a, 1963b) has found such a slight time delay of 2–6 milliseconds between direct input into the left cerebral hemisphere and the crossing over of the same input through the corpus callosum from the right hemisphere. Normally, this delay is not consciously noticed; but, as already discussed, in déjà-vu a further delay causes it to be noticed. Even with the normal delay, we have a now and a later now that may generate our sense of directionality of time (Comfort, 1977). With a longer delay, as occurs in déjà-vu, we have co-

consciousness of 'participating' and 'observing.' This split between a participating and an observed self is often reported by patients who have déjà-vu and associated depersonalization (Arlow, 1984).

It is of interest that marked time distortions often accompany depersonalization (strangeness about the self), and that depersonalization occurs more commonly with derangements in the right rather than the left cerebral hemisphere (Schenk & Bear, 1981). It may be that the right hemisphere serves as the core observing system for the self's orientation in the *now*. Although the left and right hemisphere have overlapping functions, the immediate Gestalt-like simultaneous perceptions of the right hemisphere seem especially suitable for the synthesis of *now*. By contrast, the sequential processing of the left hemisphere seems more appropriate for the registration of *flow* (Levy & Trevarthen, 1976; Mills & Rollman, 1980). No doubt this is oversimplified, because subcortical brain areas are important for our immediate and automatic perceptions, and frontal lobe connections are involved in our voluntary sequential plans toward goals. Nevertheless, Ben-Dov & Carmon (1976) have proposed an information processing model for how the right and left cerebral hemispheres might observe one another from the standpoints of their different temporal functions. In this model, there is a form of relativity built into the brain such that simultaneity and succession are both juxtaposed and integrated. This integration appears to break down in depersonalization and déjà-vu.

Guyau's interest in the relationship between cognitive events and the consciousness of time suggests that he would not have shied away from these speculative models as being beyond scientific inquiry. Whatever we discover to be the underlying brain processes, Guyau's emphasis on déjà-vu pointed the way for relevant hypotheses that link the sense of self to observed directionality through time, both of which are torn asunder in acute psychosis.

CONCLUSION

In reading Guyau 100 years later, one gets the sense of déjà-vu. Many of his statements about normal illusions of time still hold, and his ideas about pathological illusions of time are becoming increasingly relevant to the understanding of severe mental illness.

Guyau directed our attention to some of the antinomies and contrasts from which we construct our notion of time. Experiential time is both a medium and perspective: We live through its unfolding *nows* as we observe its changing *flow* of the future becoming present then past. We are both 'in' the present and 'out' of it seeing it pass by. Perhaps our brains continually undergo a subtle time delay, like a subliminal déjà-vu, that divides 'undergoing' from 'acting' to give us our sense of time.

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