
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 interoceptive 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 Fougousse, 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 & Fougrouse, 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 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 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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