Temporal consciousness and confabulation: Is the medial temporal lobe “temporal”?

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Since the early descriptions of this phenomenon, there is a large consensus on the distinction between two forms of confabulation. Provoked confabulations are plausible minor memory distortions in response to direct questioning, whereas spontaneous confabulations are unprovoked, often implausible, memories. However, as we show with the analysis of 284 provoked and 52 spontaneous confabulations produced by eight patients with confabulatory syndromes of different aetiologies, the provoked/spontaneous distinction fails to capture the quality of the great majority of confabulations that clearly do not fall in either of the two poles of the distinction. In this study, the majority of provoked (52%) and spontaneous (73%) confabulations consisted of what we refer to as “general memories, habits, and misplacements”, i.e., either true episodes misplaced in time and place, or personal habits and routines which are considered by the patient as specific personal episodes. These observations are discussed within the framework of the Memory, Consciousness, and Temporality Theory. According to this theory, confabulation reflects an abnormal functioning of temporal consciousness (TC). The integrity of the medial temporal lobe (MTL) and related structures is crucial for the normal functioning of TC. Data from the literature show that what confabulators have in common is not a specific lesion site but rather the integrity of the MTL, which is consistent with the idea that the MTL is essential for the function of normal and confabulatory TC. In this sense the MTL is “temporal”, because its integrity allows individuals to be consciously aware of a personal past, present and future. A better understanding of TC, including its neurobiological correlates, will help to better understand confabulation avoiding theoretically untenable and experimentally undemonstrated explanatory idols like memory traces and unconscious monitoring.

Keywords: Confabulation; Temporal Consciousness; Medial temporal lobe.
INTRODUCTION

We are all wrong. Philosophers, scientists, writers, poets, even mathematicians make huge, sometime devastating errors. We make errors in our daily life—errors of judgement, of planning, of memory, among others. Much of the time, we are not aware of our errors, we feel that we are right and we keep maintaining our position regardless of any evidence in contrast with it. In some cases, however, our mistakes in judging and remembering are so evident that we need other names to distinguish them from “normal” errors. Delusion and confabulation are the names we use to indicate “abnormal” errors in judgement and remembering.

In this paper we will focus on confabulation, providing first a tentative taxonomy of this phenomenon. We will then show how different types of confabulation can be accounted for within the framework of the Memory, Consciousness, and Temporally Theory (MCTT). Finally, we will discuss the role of the medial temporal lobe (MTL) and related structures in confabulation.

CONFABULATION: ONE, TWO, OR MANY?

Since the early descriptions of this phenomenon, clinicians and scientists have distinguished between two forms of confabulation. For example, Bleuler in his 1949 handbook of psychiatry distinguished between confabulations of embarrassment (Verlegenheit Konfabulationen) and productive or fantastic confabulations. The first type reflects the need to fill a memory gap when directly questioned, the second is much more context-free, unprovoked and often favoured by a euphoric mood. More recently, Kopelman (1987), following Berlyne, (1972) distinguished between provoked and spontaneous confabulations (see Kopelman, 2010 this issue). Provoked confabulations are plausible minor memory distortions in response to direct questioning or in a test situation, whereas spontaneous confabulations are unprovoked, often implausible, memories. Provoked confabulation is considered as a normal response to a faulty memory, whereas spontaneous confabulation is considered to result from the superposition of frontal/executive dysfunction to an organic amnesia. Kopelman’s conceptual distinction between these two types of confabulation is certainly valuable because it underlines the qualitative difference between two extreme forms of confabulation, which may have differing underlying mechanisms. However, the line drawn between spontaneous and provoked confabulation often appears to be quite a difficult decision and in a number of cases spontaneous confabulations are plausible and provoked confabulations may be bizarre and implausible (Dalla Barba, 1993a, 1993b; Dalla Barba, Cappelletti,
Signorini, & Denes, 1997; Johnson, O’Connor, & Cantor, 1997; Nedjam, Dalla Barba, & Pillon, 2000).

We have proposed that, regardless of their modality of appearance (spontaneous vs. provoked), confabulations can be distinguished according to the semantic quality of their content. Accordingly, confabulations may be “semantically appropriate” or “semantically anomalous” according to the quality of their content. Consider the following example.

“What did you do yesterday?” asks the doctor to patient SD

“Yesterday I won a running race and I was awarded with a piece of meat which was put on my right knee” (Dalla Barba, 1993b)

In order to tell that SD’s report is confabulatory, you don’t need to know that he is a 37-year-old patient who reported a severe head trauma. In fact, SD’s confabulation describes an event that not only he is unlikely to have experienced at that particular time, but which is unlikely that anybody would have or will ever experience. The content of SD’s confabulation is semantically anomalous, in the sense that it carries meanings which are inconsistent with knowledge and information shared by the members of society. Confabulations often described as fantastic or implausible actually contain semantic anomalies (Baddeley & Wilson, 1986; Joseph, 1986; Sandson, Albert, & Alexander, 1986; Stuss, Alexander, Lieberman, & Levine, 1978; Weinstein & Lyerly, 1968). However, although semantically anomalous, these confabulations are often made of autobiographical elements put together in an inappropriate semantic structure. Consider again SD’s example. SD was actually involved in running races and had spent most of his free time in this kind of activity. It was actually during a running race in the mountains that he fell reporting a severe head trauma and an open wound in his right knee. So, his confabulation about having won a running race and having been awarded with a piece of meat on his knee actually contains autobiographical elements inserted in an inappropriately semantic context.

The distinction between semantically appropriate and semantically anomalous confabulations is not an alternative to the spontaneous/provoked distinction, but is rather complementary to it in that it adds information about the content of the confabulation. However, distinctions based on the modality of appearance and on the semantic quality of content are certainly useful at a general level of description, but fail to provide an adequate description of the variety of confabulations which may reflect differing underlying cognitive and neural mechanisms. In the following sections we will show that by focusing on the content of confabulation we can identify a variety of confabulation that goes well beyond the dichotomies proposed in the literature.
VARIETIES OF CONFABULATIONS

Clinical and experimental observation shows that confabulation often consists either of true episodes misplaced in time and place or of personal habits and routines that are considered by the patient as specific personal episodes. When asked what they did today or what they will do tomorrow, confabulating patients may reply with well-established memories from their pasts, however irrelevant these memories may be to their present situation. We will refer to this as “general memories, habits, and misplacements” (GMHM).

METHOD

In order to better characterise and quantify the relative contribution of GMHM to confabulation, we analysed 284 provoked and 52 spontaneous confabulations produced by eight patients with a confabulatory syndrome. Patients’ characteristics are reported in Table 1.

Provoked confabulations were collected with the Confabulation Battery, which comprises 169 questions tapping various aspects of semantic and episodic memory and also includes questions about personal future, e.g., “What are you going to do tomorrow?” and impersonal future, e.g., “What you think will be the most important medical breakthrough likely to take place in the next ten years?” (see Dalla Barba & Decaix, 2009, for a detailed description of the Confabulation Battery). Patients spontaneously confabulated in their daily life. However, the 52 spontaneous confabulations analysed in this study were collected during informal conversation, which lasted approximately 20 minutes for each patient. The examiner’s participation was limited to very general cueing and specific questioning was avoided. Some patients in few occasions acted upon their confabulations, but this was not considered criteria for classifying confabulations as spontaneous.

RESULTS

The percentages of each type of confabulation (provoked and spontaneous) are reported in Table 2. The patients’ number of each type of confabulation is presented in Table 3. The Wilcoxon signed-rank test was used to compare the frequency of provoked and spontaneous confabulations of each type.

GMHM accounted for 52% of provoked and 73% of spontaneous confabulations ($p > .5$). An example of confabulation consisting of GMHM is provided by patient PD.

PD is a 73 year-old woman who suffered from a rupture of anterior communicating artery aneurism which caused a left frontobasal lesion. To
the question “How did you spend last Christmas?” she answered “Last Christmas? During the day we prepared ... we opened oysters, we ate prawns, shrimps, turkey, chestnuts, some French fries, salad, cheese, fruits, a little ‘bûchette’. We gave the presents to the children, we participated in the games ... we had to do something. We played dominos.”

This example shows that PD, when confabulating, recalls a “general” Christmas as a specific one. Instead of recalling what she did specifically during the previous Christmas, she recalls what she has probably done on

### TABLE 2
Types of confabulations

<table>
<thead>
<tr>
<th></th>
<th>Provoked (n =234)</th>
<th>Spontaneous (n =52)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General memories habits, and misplacements (GMHM)</td>
<td>52%</td>
<td>73%</td>
</tr>
<tr>
<td>Memory fabrications (MF)</td>
<td>18%</td>
<td>17%</td>
</tr>
<tr>
<td>Memory confusion (MC)</td>
<td>15%</td>
<td>5%</td>
</tr>
<tr>
<td>Autoreferential contamination (ARC)</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Semantically inappropriate</td>
<td>11%</td>
<td>4%</td>
</tr>
</tbody>
</table>

AACoA = aneurysm of the anterior communicating artery; APCoA = aneurysm of the posterior communicating artery.
### TABLE 3

Number of provoked and spontaneous confabulation

<table>
<thead>
<tr>
<th>Patients</th>
<th>General memories, habits, and misplacements</th>
<th>Memory fabrications</th>
<th>Memory confusions</th>
<th>Autoreferencial contaminations</th>
<th>Semantically inappropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Provoked</td>
<td>Spontaneous</td>
<td>Provoked</td>
<td>Spontaneous</td>
<td>Provoked</td>
</tr>
<tr>
<td>GL</td>
<td>24</td>
<td>4</td>
<td>10</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>MC</td>
<td>24</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>PD</td>
<td>24</td>
<td>2</td>
<td>7</td>
<td>3</td>
<td>8</td>
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</tr>
<tr>
<td>DO</td>
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<td>7</td>
<td>4</td>
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</tr>
<tr>
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<td>6</td>
<td>6</td>
<td>0</td>
<td>0</td>
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<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VV</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>149</td>
<td>38</td>
<td>51</td>
<td>9</td>
<td>42</td>
</tr>
</tbody>
</table>

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many Christmas days throughout her life. This was confirmed by her husband, who also confirmed that they spent the previous Christmas alone.

Another patient, AB, who had diffuse cortical atrophy and suffered from alcoholism, reported that the previous day he went to the tomato fair. According to his wife they went many times to that fair, but certainly not on the previous day. In this case, a personal repeated event, attending an annual fair, is considered by the patient as a specific one and misplaced in time.

GMHM, though less frequently, was also observed in confabulation to semantic memory questions. For example, to the question “What happened in Nuremberg?” PD answered “There was a criminal trial against the Nazis, four years ago.” In this case, a true episode and a correct memory are misplaced in time.

The second most frequent type of confabulation observed in our patients was what we called memory fabrications (MF). Fabrications are memories, episodic or semantic, without any recognisable link with personal or public events. MF accounted for 18% of provoked and 17% of spontaneous confabulations in our patients ($p > .5$). The following are examples of MF in episodic memory,

“Why are you hospitalised?”
PD: “Because I have lung problems [PD didn’t have and never had any lung problems].

And in semantic memory, the patient PS, a 48-year-old who suffered from a rupture of the posterior communicating artery aneurism, responded to the following question:

“Who is Delanoë (the mayor of Paris)?”
“Delanoë? He is a war chief from ancient times.”

Another type of confabulation observed in our patients is what we referred to as memory confusion (MC). MC, which accounted for 15% of provoked and 5% of spontaneous confabulations ($p > .5$), consisted of confusion with other personal or public events related to the target memory or confusion between family members. GL, for example, a 60-year-old patient with Korsakoff’s syndrome, responded to the question “What happened in Waterloo?” with “Waterloo? It was like Verdun, a battle between French and Germans.” The same patient answered the question “Do you have children?” with “Yes, one, Thévard, he is one year-old.” Thévard was actually his grandson.

Confabulating patients when questioned about public or historical events may refer to the event in a personal context. We call this type of confabulation autoreferential contamination (ARC). In our patients ARC
accounted for 3% of provoked confabulations, but were not produced spontaneously. The following are some examples of ARC.

To the question “What does the Mir station remind you of?” patient VQ, a 78-year-old with lymphoma and a lesion into the corpus callosum, answered “The Mir Station? It’s very important. It is about Vietnam. We have signed something between Mir and Vietnam.” VQ was the wife of a Vietnamese diplomat and she often used to talk about Vietnam and about her husband’s work.

Patient GL had lost his savings in a financial scandal. To the question “What does the Dreyfus affaire remind you of?” he answered “The Dreyfus affaire? A big financial scandal.” The same patient answered the question “Who was the prime minister in 1965?” with “It was Chaban [a well-known French politician]. He is my daughter’s godfather.”

Confabulations described in the literature as “fantastic”, “semantically inappropriate”, or “spontaneous”, which have implausible and frankly bizarre content also occurred in our patients, but accounted for only 11% of provoked and 4% of spontaneous confabulations ($p > .5$). An example of this type of confabulation is provided by VV, a 43-year-old patient who suffered from cerebral anoxia and showed predominantly frontal cerebral atrophy. To the question “Who did you see yesterday?” he answered “I saw Régis, he does osteopathy on butterflies.”

It must be noted that the boundaries between the different types of confabulation were sufficiently clear-cut, and that no particular difficulty emerged in attributing the confabulations to a particular category.

**CONSCIOUSNESS AND CONFABULATION**

From the analysis and characterisation of our patients’ confabulations it emerges that:

1. The provoked/spontaneous distinction may be useful at a very general level of description when it refers to two extreme forms of confabulation. However, it fails to capture the quality of the great majority of confabulations that clearly do not fall in either of the two poles of the distinction.
2. Confabulations described as “fantastic”, “bizarre”, or semantically inappropriate are quite infrequent and are both provoked and spontaneous.
3. The great majority of confabulations, 87% in this study fall into three categories, GMHM (56%), MF (18%), and MC (13%). These confabulations have a plausible content and are more often made of
well-established memories and information that distorts or replaces all the to-be-remembered memory or information.

We have said elsewhere that patients who confabulate remember “another” past (Dalla Barba et al., 1997), in the sense that they are aware of a past but one that is different from their real past, the past they would have remembered if they didn’t have had a severe amnesico-confabulatory syndrome. Most of the time this past that confabulators remember is made of recognisable elements of the patient’s biography or of general semantic information. What kind of memory theory can account for this situation? Confabulation, there is no doubt, is a conscious phenomenon. Individuals who confabulate consciously remember past events and information no matter whether their remembering is inaccurate, false, or even frankly bizarre. They are not lying and they are not in bad faith. Certainly they are unaware of the fact that some malfunctioning mechanism is affecting their memory. In fact anosognosia is almost invariably associated to confabulation. But this doesn’t change the fact that confabulation manifests itself as a conscious act. So, since confabulation is conscious, we need a theory that describes the type of consciousness of confabulators and its differences with the consciousness of individuals who do not confabulate, either because they are normal or because they don’t remember at all, like amnesics. Some theories explain confabulation with unconscious processes. These theories emphasise the role of unconscious monitoring processes, like in the strategic retrieval hypothesis (Gilboa, 2010 this issue; Moscovitch, 1989; Turner, 2010 this issue), and in the reality monitoring hypothesis (Johnson, 1991; Schnider & Ptak, 1999). Others propose that confabulation is unconsciously motivated (Conway & Tacchi, 1996; Fotopoulou, 2010 this issue). We have extensively discussed these theories elsewhere (Dalla Barba, 2001, 2002), showing that they fall into the fallacy of the homunculus, that is, attributing intentionality to unconscious processes, which is unintelligible and not experimentally provable. We will not return to this subject here.

Within the framework of the Memory Consciousness and Temporality Theory (MCTT) we have argued that confabulation reflects an abnormal functioning of what we called temporal consciousness (Dalla Barba, 2002). In the following section, we will briefly describe the MCTT and show how it accounts for confabulation.

CONSCIOUSNESS: ONE OR MANY?

Intentionality is certainly the main characteristic of consciousness, the fundamental law which consciousness must obey, since it describes the
necessity of consciousness to always be consciousness of something (Brentano, 1874/1973; Husserl, 1950; Sartre, 1943). In other words, it is impossible to separate consciousness from its object. Consciousness is not a generic and aspecific dimension that then becomes consciousness of its object. It is immediately consciousness of something. We would also add that consciousness is always consciousness of something in a certain way. This means that consciousness takes a certain point of view of its object and of the same object consciousness can take various points of view. The first consequence of this statement is that different modes of consciousness exist and each of these represents an original and irreducible mode of addressing the world. By “original” we mean that each mode of consciousness is different from any other. By “irreducible” we mean that the existence of each original mode of consciousness cannot be traced back to something else that precedes it in causal or ontological terms. A taxonomy of the different modes of consciousness is far beyond the aims of this work. Our aim is rather to operate certain distinctions that will allow us to see, though at a rather general level of description, the differences between two modes of consciousness, namely what we will indicate as knowing consciousness (KC) and temporal consciousness (TC).

Knowing consciousness and temporal consciousness

KC describes what is usually referred to as semantic memory. A substantial difference, however, distinguishes KC from what is presupposed in the idea of semantic memory. Unlike semantic memory, KC is not based on the idea of unconscious mental representation. KC is consciousness of the object, it is already outside itself and directed towards the object to be known. And it is consciousness of the object in a certain mode, an original mode that makes it impossible that what I know, for example, can be mistaken for what I remember or imagine. It can be argued that I could never, for example, recognise this packet of cigarettes as red if I had not already somewhere in my mind and my brain an idea of red. But this kind of argument is unintelligible because it presupposes the existence and the activation of unconscious representation and in so doing falls into the fallacy of the homunculus. If I recognise the packet of cigarettes as red it is not because I operate, unconsciously, a sort of correspondence between the packet I perceive and a mental representation that I carry in me. What one should say is that I am conscious of this packet of cigarettes as red because my present consciousness, since it is a synthesis of all my past consciousnesses, is also consciousness of red. But I can also see this packet of cigarettes as ugly, dangerous, attractive, almost finished. In short, the meanings I attribute to the packet of cigarettes are concretely infinite and depend on my being conscious here and now as
synthesis of what I have been before and elsewhere. In this sense, KC is
temporal since it is a synthesis of what I have been or was gewesen ist,
as in Hegel. But at the same time KC is also atemporal in the sense that the time
of which it is made is not recognisable. KC is the past but it is not consciousness
of the past, nor of the present or of the future. There is no time in the packet of
cigarettes in front of me although it is thanks to time, that is of the past I am
made of, that I can see the packet as red, dangerous, etc.

Consciousness of time, i.e., the thematisation of the object in the mode of
temporality, is what we have called TC. TC, as far as it poses its object
according to the structures of time, i.e., the past, the present and the future,
is an organised, original and irreducible form of consciousness, for
addressing the world. Unlike KC, TC transcends the mere presence of the
object in order to set it in time. When I say that I remember yesterday’s
dinner, that now I am in my office and that later I will go out to buy some
cigarettes, knowledge is presupposed, as we will see later, but it is not the aim
of the temporalising act that I am making. In order to remember yesterday’s
dinner, to affirm that I am now in my office and to plan the act of buying
cigarettes, I have to know what a dinner, an office, and cigarettes are.
However, this knowledge is only the structure on which my act is founded. It
is through knowledge that the temporalising act is realised but it is not for
knowledge that it is realised. Although TC is an organised structure of
consciousness because past, present, and future are not isolated dimensions
but continuously refer to one another, consciousness of the past, of the
present and of the future are nevertheless subordinate structures of TC and
for the sake of clarity we will describe them separately.

Consciousness of the past is an act through which the object of
consciousness is seen as absent, or as nonpresent. But, in contrast with
imagining consciousness, which sees the absent object as nonexistent, for
consciousness of the past the object is absent in the past. It is this
consciousness of the past that we call remembering. But consciousness of
the past is not consciousness of a generic and impersonal past. When I say that
I remember that Kennedy was killed in 1963 in Dallas or that Dante wrote the
Divine Comedy, I am not conscious of the past but of a piece of information, a
notion, that joins other notions to form a certain type of knowledge. Kennedy
is president of the United States and past, Dante is a poet, Italian, and past. In
other words, it is about a generic and impersonal past, not my past. In order
for consciousness of the past to exist, i.e., remembering in the mode of TC,
there must be a deep link between the being I am now and a being I was before.
It is to that past being of mine that consciousness of the past refers, and it is
that past being that remembering represents.

In order for consciousness of the past, i.e., remembering, to exist there
needs to be a present of which the past is past. It is present consciousness that
is consciousness of the past. It must be emphasised here that by “present” we
mean subjective or phenomenological present, which distinguishes itself from “objective”, or clock-measured present. Objective present, as measured in neurophysiological experiments for example, lasts a few milliseconds and is practically instantaneous present. William James’ psychological present was postulated to last a few seconds. Accordingly, present consciousness would also last a few milliseconds or a few seconds and as a consequence it would be either instantaneous or always “behind” already in the past. However, the subjective phenomenological present cannot be measured in objective time.

What distinguishes subjective phenomenological present from objective neurophysiological and psychological present is its characteristic of presence. When I say “I am typing THESE WORDS, I am sitting at this desk writing a paper, I live in Paris, I am a neurologist, today is cloudy”, I describe events and situations to which I feel myself contemporary, and which constitute my present. Some of these events and situations last a few seconds, others last some hours, others even years, but they are all constitutive of a world to which I am present. This is not to say that neurophysiological and psychological present don’t exist or are wrong theoretical constructs. But they don’t describe the subjectively experienced temporality, i.e., being present to a world, having a past and projecting a future.

The third subordinate structure of temporality is consciousness of the future. Consciousness of the future puts its object in the future mode. It is thematisation of my probable possible in the future mode. By probable possible we mean what is founded on knowledge of my past and present, and this radically distinguishes consciousness of the future from wishes. Tomorrow I will be in Paris and I will continue working on this paper. This is one of my probable possibles, a thematisation in the future mode of my being that founds itself and is synthesis of knowledge of my being in the world: I know I live in Paris, that I am writing this paper, and that tomorrow is not Sunday. When instead I say “I would like to be an astronaut”, I don’t express a probable possible, but something that transcends the knowledge of the mundane being that I am.

So TC opens the possibility of a temporal existence for the subject. A subject who is conscious of a personal past, when remembering, a personal present, in which he/she is oriented, and a personal future, in which he/she is projected. But before proceeding further and exploring the relationship between TC and confabulation, which is what interests us more, we need to know what the normal operations of TC are.

Uniqueness and multiplicity

Consciousness, we have seen, must always be consciousness of an object. One of the characteristics of the object of consciousness is that it represents
and reveals to consciousness a uniqueness (U) and a multiplicity (M). Let’s consider this point more closely. This pen on the desk is both a pen and the pen. In the first case it is an undetermined pen, something that belongs to the category of “pens”, an object that I recognise and use appropriately because I recognise it. On the contrary, in the second case “the pen” is a determined object, it is exactly this pen in front of me, the pen I bought yesterday and that I will be using tomorrow. So the pen reveals a U and an M. M is reflected in its being a pen and not a different object. U manifests itself in its being this precise pen and not another. However, the U and M of the pen are not adjacent qualities, external to one another. There is a sort of hierarchy that establishes the relationship between the object as representative of an M of objects and the object as representative of itself, in being this object that distinguishes itself from all the other objects of the world. The U of the object, of this pen, of the room, of my feeling happy, are this, i.e., they manifest a U that distinguishes them from the other pen, room, or feeling of happiness. But their U is founded on an M, the M that acts in such a way that these objects manifest themselves to consciousness as unique but under a certain, already distinguished form, i.e., pen, room, happiness. If we consider the opposite condition, we see that for the undetermined object there is no need to represent the U. I can think of a flower, a love, a city, a world without these objects needing to be this flower, this love, etc.

But what happens when in front of me there is an object I have no experience of, that I don’t know? At first sight one would say that any object that I see for the first time is unique and doesn’t carry in itself that M we attributed to known objects. But in actual fact, as soon as an unknown object shows up, all the M of which it is made manifests itself instantaneously. This geometric form that I have never seen before is already “geometric form that I have never seen”, that is it summarises and represents in the negative form what my consciousness has been before. And this can happen without my needing to notice the U of the object. So the object, be it known or unknown, is first the expression of an M and then becomes this object, i.e., declares its U.

However, in order for the U of the object to be revealed, it must be addressed by consciousness in the mode of TC. In other words, in order to achieve the passage from the M to the U of an object there must be an act of consciousness that selects its object as a this, and this can happen only if consciousness transcends the knowing mode to put itself at the level of the temporalisation of the object. One would certainly want to argue that in what we have called KC the object also appears to me as unique. The cup in front of me is in any case this cup, it is with this cup that I interact and not with a generic cup when I pick it up and bring it to my lips. Of course, but its U is revealed only if I consider it as a this, that is when I notice its presence as an object that is not my consciousness, and to which my consciousness is
contemporary. When I simply use it, when I execute the appropriate sequence of gestures in order to pick it up and bring it to my lips, or when I look at it wondering whether it is full or empty, there is no U in my consciousness. I do not even need to be conscious of the cup in order to use it and when I wonder whether it is empty or full I am aware of a problem to be solved, not of the presence of this cup. In short, there is the continuous possibility of varying the relationship between U and M and this possibility depends on the mode in which consciousness addresses the object.

However, one could ask, where is the evidence that in TC the object manifests itself to consciousness as unique and not according to its M? I can easily, for example, remember a generic walk along the shore without being able to locate it in any specific time but only in the past in general. But this does not mean that the walk I remember is not a particular walk but instead the general idea of walking along the shore. The fact that in this memory certain details are missing, where and when, for example, does not mean that I am not remembering a specific walk. Remembering, cannot be anything other than remembering an object in its U, because the U of an object is precisely one of the elements that describe the relationship between remembering consciousness and its object.

MEMORY, CONSCIOUSNESS, AND TEMPORALITY

The ideas we have expressed so far are part of the MCTT, which we have detailed elsewhere (Dalla Barba, 2002). Aspects of the MCTT relevant to the interpretation of confabulation are summarised here and schematically represented in Figure 1.

1. Events produce atemporal and aspecific modifications in the organism and, within the organism, in the brain. These modifications, represented in Figure 1 as X, Y, and Z, are atemporal in the sense that they do not contain any information concerning time. They do not represent the past, the present or the future, nor are they organised according to the order of succession, i.e., there is nothing in Y, for example, that tells that Y comes before Z and after X. They are aspecific in the sense that they do not contain any information specifying that they are representing episodes, meanings, rules, procedures, algorithms, etc.

2. The modifications in the brain can be more or less stable and more or less vulnerable depending on a number of variables. These variables include, among others, attention at encoding, emotional value of the event, depth of encoding, rehearsal, and repeated experience of the same event, etc.
3. Consciousness means to be conscious of something in a specific way. That means that consciousness is not an aspecific dimension that passively receives and becomes aware of different types of already specified information, but rather that different types of consciousness exist, each representing an original and irreducible way of addressing the world. Different types of consciousness include, among others, TC and KC. TC means to become aware of something as part of a personal past, present or future; KC means to become aware of something as a meaning or as an element of impersonal knowledge or information.

4. The object of consciousness represents a determination and an undetermination, what we have called U(niqueness) and M(ultiplicity). TC addresses the object’s U, whereas KC addresses its M.

5. Less stable and more vulnerable patterns of modifications of the brain are necessary, but not sufficient, for the interaction between TC and the object’s U, whereas more stable and less vulnerable modifications of the brain are necessary, but not sufficient, for the interaction between KC and the object’s M.

Figure 1. A hypothesis concerning the relation between memory, consciousness, and temporality. NS = nervous system; X, Y, Z = less stable (X), to more stable (Z) patterns of modification of the nervous system; TC = temporal consciousness; KC = knowing consciousness; U = uniqueness; M = multiplicity.
TEMPORAL CONSCIOUSNESS AND CONFABULATION

How do the ideas that we have described apply to the interpretation of confabulation and why is TC involved? It is known that confabulation is not limited to remembering personal past episodes, but also involves the patient’s present and future (Dalla Barba, 1993a; Dalla Barba et al., 1997; Dalla Barba, Nedjam, & Dubois, 1999). Patients who confabulate not only remember “another” past but are also living “another” present and planning “another” future. In these patients the three subordinate structures of personal temporality are contaminated by confabulation, which is not a pure memory disorder but a disorder involving TC. According to the MCTT, in confabulating patients TC is still there, like in normal subjects, and addresses the object’s U, just like in normal subjects. These patients can still remember their past, they are present to a world, and they can project themselves into a personal future. But in doing this they make errors, sometimes frankly bizarre errors. Actually what is happening in these patients is that TC is still there but is not interacting with less stable patterns of modification of the brain, because these modifications are abolished or inaccessible. Most frequently the result of this condition is that personal habits and routines are considered in a personal temporal framework. When asked what they have done the previous day or what they are going to do the following day, confabulating patients typically answer with memories and plans that they usually have in their daily life. Although admitted to the hospital, they will say, for example, that the previous day they went out shopping and that the following day they will be visiting some friends, acts that presumably were part of their routine life. According to the MCTT, in this condition TC interacts with more stable patterns of modification of the brain and addresses the object’s M, habits, routines, repeated events, as U, a specific, unique past event (Figure 2).

It could be argued that patients who confabulate in episodic memory, orientation and planning tasks are not necessarily conscious of a confabulatory past, present, and future but rather they simply produce the most plausible answer without having a subjective experience of remembering, of being in that place at that time or of planning their future. If this were the case our account of confabulation in the past, present, and future would be dismissed because TC wouldn’t play any role at all in confabulation. Confabulation would be just a sort of “best guess” produced as a consequence of a faulty memory. Yet there is evidence that patients who confabulate actually do become aware of their confabulatory past, present and future. For example, patient MB (Dalla Barba, 1993a) when asked to attribute a “remember” or a “know” judgement to his confabulations, he systematically gave “remember” judgements. Also, the same patient showed he was ready to carry out his confabulatory plans (see also Baddeley &
Wilson, 1986; Burgess & McNeil, 1999; Metcalf, Langdon, & Coltheart, 2007; Moscovitch, 1989). In addition, from a clinical point of view, confabulating patients do not look like subjects who produce their “best guess” in answering questions, but rather they seem to adhere completely to their confabulatory reports.

However, although habits, routines, and repeated events are the most frequent content of confabulation, as we have shown in this paper, confabulations are sometimes made of elements that cannot be traced back to any aspect of the patient’s history, present, or future situation, like in patient PD who claimed having lung problems. Does the MCTT account for this case?

Well, it is clear that PD is immersed in a temporal existence: He remembers being at the hospital for lung problems. So TC is working in this case and, as it usually does, is addressing the object’s U. Can we say in this case that TC interacts with more stable patterns of modification of the brain, like we said for habits, routines, and repeated events? Clearly there is no evidence in this sense. In this case confabulation appears as being created *ex nihilo*. This is difficult to understand only if we are prisoners of the idea that memories must *necessarily* be traced back memory traces. But if we consider that in PD TC is still there, the appearance of confabulation *ex nihilo* is not a problem, since we don’t need to trace confabulation back to an unconscious elsewhere, memory traces, imagination whatsoever. In fact, TC cannot escape to the general law of
consciousness of being consciousness of something. So, if TC is there, it must be consciousness of something, i.e., it must temporalise its object according to the subordinate structures of temporality, past, present, and future. There is no need to ask where the object of this temporalisation comes from because it doesn’t come from any sort of unconscious world. It is not behind consciousness; it is down there, right in front of consciousness. If we are not in a psychoanalytic perspective, do we ask where thoughts or imagined objects come from? We don’t. So why should we ask this question for TC? All we can say is that when TC temporalises its objects, in normal conditions we can recognise a true temporal world, a real past, present, and future, probably because TC interacts with less stable patterns of modification of the brain. When TC temporalises its object in confabulatory conditions, sometimes we can recognise habits, routines, and repeated events, probably because TC interacts with more stable patterns of modification of the brain; other times we don’t recognise any meaningful element of the patient’s history, present, and future situation.

So, the difference between normal memory and confabulation is that in the case of patients who confabulate we are faced with a confabulatory consciousness in which past, present, and future are somehow distorted. Distorted with respect to what? The truth, you will say; with what actually took place, is taking place, or will take place. But who establishes the truth? If temporality, and therefore its subordinate dimensions, are inherent to consciousness, what relationship of truth can there be between what you suppose to actually have taken place, to be taking place or to be going to take place and the reality of TC? And yet for a witness, the doctor or the psychologist observing the patient who confabulates, his stories about the past, his perception of the present, and his future plans are confabulatory, in that they are totally at variance with what the listener expects as an answer, so much so that they push him to consider the patient’s answers as not normal, namely as confabulatory. Where does this discrepancy between what the observer expects and the answers he receives come from? In other words, what is the origin of this confabulatory temporality?

The answer to this question can only be a biological one. There is a biological difference between normal subjects and confabulators. This biological difference is represented by the brain lesion, which prevents the interaction between TC and less stable modifications of the brain.

It could be argued that we made it out with a shortcut since we have established an interaction between the biological level (patterns of modification of the brain) and the psychological level (TC). However, this is not a shortcut because TC depends on brain function and can be altered or abolished by a brain lesion. TC works normally in subjects without brain lesions, is altered in patients with brain lesions that cause confabulations, and is abolished, as we will see, in patients with brain lesions that cause
amnesia. Now, the question is what are the brain structures that need to be intact for the normal functioning of TC, altered in confabulation, and damaged in amnesia? This is an experimental problem that needs more experimental work to be answered appropriately. However, the literature on amnesia and on confabulation indicate the hippocampus and the medial temporal lobe are good candidates as brain structures involved in the functioning and dysfunction of TC.

TEMPORAL CONSCIOUSNESS AND BRAIN: IS THE MEDIAL TEMPORAL LOBE ‘TEMPORAL’?

Patients with medial temporal lobe (MTL) lesions are known to be deeply amnesic for personal past episodes and to have relatively preserved general knowledge or semantic memory (see Kopelman, 2002, for a review). Patient HM was the first well-documented example of this condition (Milner, 1958). However, amnesic patients not only do not consciously remember their past, but neither can they imagine their personal future. These patients are lost in a nontime, or in a sort of instantaneous present. The patient, NN, described by Tulving (1985) is a good example of this condition. Tulving’s patient had preserved semantic abilities, but was unable to retrieve any episode from his personal past or to say anything about his future.

N.N. has no difficulties with the concept of chronological time. He knows the units of time and their relationships perfectly well, and he can accurately represent chronological time graphically. But in stark contrast to his abstract knowledge of time, his awareness of subjective time seems to be severely impaired. When asked what he did before coming to where he is now, or what he did on the previous day, he says that he does not know. When asked what he will be doing when he leaves “here”, or what he will be doing “tomorrow”, he says he does not know.

Here is part of the transcript of the interview with me as the interviewer:

E.T.: “Let’s try the question again about the future. What will you be doing tomorrow?” (there is a 15-second pause.)
N.N. smiles faintly, then says: “I don’t know.”
E.T.: “Do you remember the question?”
N.N.: “About what I’ll be doing tomorrow?”
E.T.: “Yes. How would you describe your state of mind when you try to think about it?” (A 5-second pause.)
N.N.: “Blank. I guess.”

… When asked to compare his state of mind when he is trying to think about what he will be doing tomorrow with his state of mind when he thinks about what he did yesterday, he says it is the “same kind of blankness.” (Tulving, 1985, p. 4).
As emerges from the description of this patient, what characterises the core deficit of N.N. is a loss of TC. Past and future have disappeared as possible objects of his consciousness and the result is that N.N. is shut in an atemporal instantaneous present.

Further evidence of selective loss of TC in amnesia comes from patient DB described by Klein, Loftus, and Kihlstrom (2002). DB suffered severe amnesia for the personally experienced past. By contrast, his knowledge of the nonpersonal past was relatively preserved. A similar pattern was evidenced in his ability to anticipate future events. Although DB had great difficulty imagining what his experience might be like in the future, his capacity to anticipate issues and events in the public domain was comparable to that of neurologically healthy, age-matched controls. These findings show a dissociation between TC, which is impaired, and KC, which is preserved. Impairment of TC has also been documented in Alzheimer’s disease (Dalla Barba et al., 1999).

So, there is increasing converging evidence that lesions which produce amnesia also produce deficits of TC. This suggests that the integrity of the MTL and related structures is crucial for the normal functioning of TC. Further evidence on the involvement of the MTL in TC comes from a recent neuroimaging study which showed that in normal subjects the hippocampus was activated both when individuals remembered their past and when they imagined their future (Addis, Wong, & Schacter, 2007).

Now, if the integrity of the MTL is crucial for the functioning of TC, what happens in confabulation, where TC is present but functioning in an abnormal way? The most plausible answer to this question is that in confabulation the MTL is intact, but lesions to other brain structures prevent its normal functioning, which is the biological counterpart of the claim that in confabulation TC is preserved but no longer interacts with less stable modifications of the brain. This seems actually to be the case. Gilboa and Moscovitch (2002) found that only 2 out of 79 patients with confabulation had lesions involving the MTL. These patients had lesions in more than 20 brain regions, although the frontal lobe was preferentially affected, but almost all these patients had preserved MTL. Twenty-eight additional confabulating patients not included in Gilboa’s and Moscovitch’s review also had preserved MTL (Ciaramelli & Ghetti, 2007; Ciaramelli, Ghetti, Frattarelli, & Ládavas, 2006; Dalla Barba, 1993b; Dalla Barba, Cipolotti, & Denes, 1990; Dalla Barba, Mantovan, Cappelletti, & Denes, 1998; Fotopoulou, Conway, & Solms, 2007; Fotopoulou, Solms, & Turbull, 2004). So, what these data show is that what confabulators have in common is not a specific lesion site but rather the integrity of the MTL, which is consistent with the idea that the MTL is essential for the function of normal and confabulatory TC. In this sense the MTL is “temporal”, because its...
integrity allows individuals to be consciously aware of a personal past, present, and future.

We have shown so far that the MCTT can account for confabulation and amnesia. Can it also be applied to the interpretation of delusion? Certainly not to the interpretation of all the numerous forms of delusion. Delusional memories, however, might share similarities with the more extreme or semantically inappropriate forms of confabulation (see Kopelman, 2010 this issue). In patients with delusional memories, TC is still working, since they are aware of a personal past, but it is still unclear what are the malfunctioning mechanisms that make these memories delusional. Further experimental investigation is needed, in particular concerning the role of the MTL and possibly of its interaction with retrosplenial and prefrontal cortex in delusional memories.

There are a number of important questions that we have not addressed because they were far beyond the aims of this work. Why confabulation is often a transitory symptom? Does confabulation reflect a disconnection of the MTL? Why amnesia, i.e., loss of TC, occurs for lesions outside the MTL? Is it also a matter of disconnection of the MTL? And if this is the case, what is the difference between confabulators and nonconfabulating amnesics with preserved MTL? What is the exact role of frontal lesions in confabulation, if we reject, as we do, the possibility of unconscious monitoring? What is the exact nature of what we indicated as patterns of modification of the brain, if we reject, as we do, the notion of memory traces that would contain the past? Some of these are experimental questions that will be answered by experimental work. Others are theoretical and their discussion couldn’t have been included in these pages. What we have shown in these pages is that understanding confabulation is a difficult and ambitious enterprise, an enterprise doomed to failure if based on theoretically untenable and experimentally undemonstrated explanatory idols like memory traces and unconscious monitoring. Confabulation is a conscious phenomenon, indeed a phenomenon that involves TC. A better understanding of TC, including its neurobiological correlates, is therefore demanded, legitimate, and necessary.

REFERENCES


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