

Confabulation: A Symptom Which is Intriguing But not Adequately Known

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Abstract

Confabulation has been defined as the falsification of memory occurring in clear consciousness in association with an organically-derived amnesia. It was first described by Korsakoff in 1889 in alcoholic amnesic patients. Later studies showed that confabulation is also seen in a variety of other pathologies, such as anterior communicating artery rupture, traumatic brain injury, Alzheimer's disease, and brain tumors. Two forms of confabulation have been described: Momentary (provoked) confabulation which is produced in response to questions, for compensating the gaps in memory; and fantastic (spontaneous) confabulation consisting of grandiose and wish-fulfilling characteristics. There is no specific localization for provoked confabulations. However spontaneous confabulations appear as a result of basal forebrain and posterior orbitofrontal cortex lesions. There are numerous hypotheses for explaining the specific nature of confabulations with reference to impairment of general executive dysfunction, temporality, and memory-control processes. Commonly, these interpretations explain memory distortion in terms of frontal network dysfunction. There is a general consensus that confabulation is primarily the result of a deficit of memory retrieval, rather than one of encoding, consolidation, or storage. The normal process of memory recall consists of the evaluation of the cues for retrieval, matching the cues with episodic memory, and reality monitoring. One possible explanation for confabulation is that these patients have lost the checking procedure in memory retrieval, i.e. reality monitoring. This article aimed to describe confabulation and to review its clinical, neuroanatomical, and neuropsychological correlates in an effort to raise clinicians' awareness of the phenomenon and the problematic areas that need to be clarified.

Key Words: Confabulation, frontal lobe, memory

INTRODUCTION

There are various concepts in psychiatry, which are frequently used, but are unclear and lack a consensus definition; confabulation is among these concepts (Berlyne 1972, Johnson 1997, Talland 1961, Whitlock 1981).

The history of the word confabulation dates back to the 15th century. The word fabulation, generated from the Latin word fabulari, and the French word confabulation are related to the term as it is used today (Rey 1995). Research has shown that the word confabulate was used in English in the 15th century. Confabulation, which has a similar phonetic structure in many other languages, means a familiar talk or conversation. (Berrios 1998). Öztürk described confabulation with a Turkish word meaning "telling stories" (Öztürk 2002).

In its classical form, confabulation is defined as the involuntary falsification of memory occurring in clear consciousness in association with an organically derived amnesia. (Berlyne 1972, Chow and Cummings 2000). In other words, confabulations are erroneous memories either false in themselves or resulting from true memories inappropriately retrieved or interpreted (Dab et al. 1999). There are also authors who define this term in more interesting ways. While Moscovitch (1989) defined confabulation as honest lying, Barbizet included the definition that these patients could not remember that they could not remember (Barbizet 1963, Benson et al. 1996). As the content of confabulations can be compatible with reality, it can also be strange and imaginary (fantastic) (Kopelman 1987, Moscovitch and Melo 1997). In all cases, the patient is not aware of his/her memory problem.

Initially, Korsakoff (1889/1996) found that alcohol-dependent patients with amnesia fabricated unrealistic stories about real events, and these false memories were called confabulations; in later research, it was found that confabulation may have other etiologies (Benson et al. 1996, Burgess and Shallice 1996, Fotopoulou et al. 2004, Turnbull et al., 2004).

In the period following Korsakoff's definition, Bonhoeffer (1904, as cited by Berlyne 1972) differentiated between momentary confabulation, in which the patient tries to fill-in a gap in memory and fantastic confabulation, which exceeds the need of filling-in a memory gap.

Although nearly a hundred years have passed, Bonhoeffer's classification is still used (Berlyne 1972, Dab et al. 1999, Johnson et al. 1997). In momentary confabulation the patient tries to cover up a memory gap by giving erroneous information. In fantastic confabulation the patient describes spontaneous detailed and colorful stories which exceed the needs for memory impairment. Berlyne (1972) also mentioned these 2 types of confabulation and proposed that momentary confabulation develops as a response to interviewer questions and involves elements of real memory that are relocated in time. On the other hand, fantastic confabulations develop spontaneously, not based upon memories, and frequently include grandiose and wish-fulfilling themes (Feinberg 1997, Kapur and Coughlan 1980, Schnider 2000, Schnider 2003).

There are also authors who classify confabulation as spontaneous and provoked. According to these classifications, spontaneous confabulation involves fantastic themes and provoked confabulation seems to resemble momentary confabulation. Recently, contemporary authors often mix these characteristics and use the concept of spontaneous confabulation for fantastic, productive, wide-ranged, grandiose memory distortions which are related to the patient's everyday living (De Luca and Cicerone 1991, Fischer et al. 1995, Schnider 2001, Schnider 2003).

In this paper we reviewed the clinical features, anatomical basis and neuropsychological aspects of confabulation. Pubmed, Psycinfo, Ebscohost and Turkish Medical Index between 1960-2006 were searched by using the key words "confabulation", "frontal lobe", "memory", and "executive functions" both separately and in combination. The cited references were collected from University of Toronto Gerstein Science Information Center, Sunnybrook and Women's College health Science Cent-

er Library and Tübitak Cahit Arf Information Center. Older hypotheses related to confabulation are still being discussed and the confabulation phenomenon still consists of poorly defined aspects. Therefore while we explain different points of view and theories concerning confabulation, we cited relatively older references in order to integrate the information about confabulation.

CLINICAL APPEARANCE in CONFABULATION

Confabulation is generally observed among inpatients with Korsakoff's syndrome, brain trauma, and anterior communicating artery rupture. Although there are some cases without generalized amnesia (Dalla Barba 1993, Dalla Barba et al. 1990, Delbecq-Derouesne et al. 1990, Moscovitch and Melo 1997, Feinstein, 2000), nearly all of these patients are amnesic.

Nevertheless, amnesia in such cases is generally not clinically evident and the patient's daily activities can appear completely normal. A clinician who is not familiar with the patient may evaluate the patient as being normal if he/she fails to conduct a thorough assessment. In such instances, only a clinician who is familiar with and follows the patient may realize that the patient's discourse is inappropriate and that he neglects his brain damage (Schnider, 2001).

As in the thought contents of healthy individuals, there are certain preferred themes in the contents of confabulations. This main theme generally remains stable; however, with time, other distortions related to the main theme might appear. The content is generally wish-fulfilling in nature, emotionally charged, and is based on the patient's real life (Turnbull et al., 2004); however, although the basis of the confabulated story may be correct, there are distortions in time and place. For instance, a dentist who was hospitalized due to a ruptured aneurysm believed that he had appointments with patients and, therefore, repeatedly escaped from the hospital (Ptak and Schnider 1999). Another patient (a tax accountant), with orbitofrontal cortex dysfunction, while hospitalized, insisted that he had to attend a finance meeting (Schnider et al. 1996a, Schnider et al. 2000).

The duration of confabulation varies. In Korsakoff's syndrome, confabulation generally appears in the early phases of the illness and disappears when chronic amnesic syndrome becomes stable; however, there are also cases in which confabulation lasted much more longer (Berrios, 1998; Feinberg, 1997).

In confabulation cases, time and place orientation

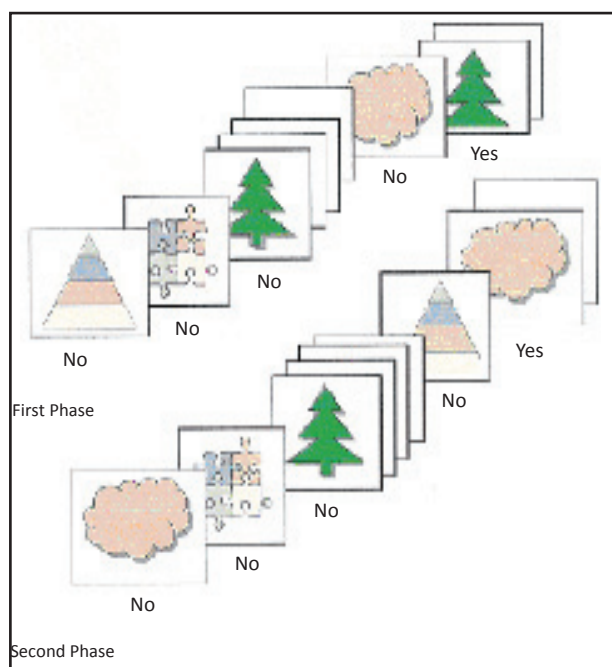


Figure 1. Schnider's experimental model (Schnider, 2000, 2001, 2003). The figure is adapted with permission of the author: In the first phase, patients were presented a series of pictures among which some of the pictures were repeated. Patients were asked to point out the repeated pictures. This phase measures learning and recognition of new information. In the second phase, the same pictures were presented in a different sequence. Patients were asked to point out only the repeated pictures in the second phase. Yes and no indicate correct responses.

of the patient are dysfunctional. He/she is unaware of the reason for hospitalization and frequently denies having a memory problem (Schnider, 2000, 2001, 2003). When faced with the unrealistic content of his/her stories, the patient is surprised, struggles, and tries to make an acceptable explanation. While doing this they can use additional fabrications, which some authors refer to as secondary confabulation (Moscovitch, 1989).

Patients do not intentionally mislead their doctors when telling these stories, do not have a gain by doing so, and are not consciously aware of what they doing. To conclude, confabulation patient can be viewed as suffering an anosognosia in which the patient is unaware of his memory deficit (Feinberg 1997, Moscovitch 1989, Talland 1965). All of the above-mentioned characteristics could be observed in the case described by Moscovitch (Moscovitch 1989):

A 61-year-old male patient underwent anterior communicating artery clipping because of subarachnoid hemorrhage, after which widespread bilateral frontal ischemia and infarction was developed. He was married since 1951 and had four children who were 27, 31, 32

and 34 years old. During the interview the patient told that he had been married for four months, when he was asked about 'how he had these children in 4 months', he told that they were adopted. When he was confronted that this sounded strange, he laughed and accepted that it was a little strange.

ANATOMICAL BASIS of CONFABULATION

Confabulation was first described in alcoholic people (Korsakoff 1889/1998, Talland, 1965), but was soon thereafter recognized in patients with anterior communicating artery aneurysm (DeLuca 1993, DeLuca and Cicerone 1991, Kapur and Coughlan 1980, Shapiro et al. 1981, Stuss et al. 1978), traumatic brain injury (Baddeley and Wilson 1986, 1988, Shapiro et al. 1981, Stuss et al. 1978), normal pressure hydrocephaly (Mercer et al. 1977), Wernicke's encephalopathy (Mercer et al. 1977), Alzheimer's disease (Kern et al. 1992, Kopelman 1987, Mercer et al. 1977), and brain tumors and infections (Schnider, 2001; Schnider 2003). Recently, Feinstein (2000) presented a fantastic confabulation case related to multiple sclerosis.

It is not possible to describe a specific anatomical location responsible for provoked confabulation; provoked confabulation can also occur in healthy subjects. On the other hand, spontaneous confabulations were repeatedly reported in persons with lesions of the basal forebrain and posterior orbitofrontal cortex (Schnider, 2000; Schnider, 2001; Schnider, 2003). Lesions in these regions generally result from a rupture of the anterior communicating artery or traumatic brain injury.

Confabulation has been reported in dorsomedial thalamic nucleus lesions. It is possible that spontaneous confabulation in Korsakoff's syndrome is also the result of damage of the dorsomedial thalamic nucleus. In addition, there are also single cases related to the right capsular genu, which carries the projections of the dorsomedial thalamic nucleus to the orbitofrontal cortex, the amygdala and the medial hypothalamus lesions.

Each of these mentioned regions are directly or indirectly related to the posterior medial orbitofrontal cortex (Feinberg, 1997; Moscovitch, 1989; Schnider, 2000; Schnider, 2001; Schnider, 2003).

NEUROPSYCHOLOGICAL PROCESSES IN CONFABULATIONS

Although in most cases confabulation and amnesia are observed together, the existence of amnesia alone is

not sufficient for the formation of confabulation. Confabulation is not evident in all amnesic patients. In patients with Korsakoff syndrome, confabulation occurs in the early phase of the syndrome and disappears after a while, even though the Korsakoff's syndrome still exists. These findings point out that there is a different mechanism for the formation of confabulation (Burgess and Shallice 1996, Feinberg 1997, Feinstein et al. 2000, Johnson and Raye 1998). In time, it was found that confabulation existed in various other disorders besides Korsakoff's syndrome (Dab et al., 1999), however, the underlying anatomical localization and mechanisms remain controversial.

According to Barbizet (1970), confabulation is a compensation mechanism that helps fill-in gaps in memory (Barbizet, 1970). Criticism about this view is centered on the finding that not all amnesic patients display confabulation and that all confabulators do not have amnesia (Burgess and Shallice 1996, Dalla Barba 1993, Moscovitch and Melo 1997). Berlyne (1972) proposed that confabulation might be related to suggestibility. According to Van der Horst (1932 as cited by Berlyne 1972, Schnider et al. 1996b, Shapiro et al. 1981, Stuss et al 1978, Talland 1965), there are distortions in the chronological order of the information in memory in confabulation. There are some contemporary researchers who agree with some of these ideas (Turnbull et al. 2004).

According to another contemporary theory, a frontal lobe dysfunction in addition to a memory disorder is responsible in the formation of confabulations (Burgess and Shallice 1996, Kapur and Coughlan 1980, Shallice 1999, Stuss et al. 1978). Baddeley and Wilson (1986) also suggested that the severity of confabulation is related to degree of dysfunction in the executive functioning in the frontal lobes. In confabulation, the major problem is related to a deficit in memory retrieval and monitoring of the recalled information rather than one of encoding or storage (Mercer et al. 1977, Schnider 2001, Schnider 2003, Shapiro et al. 1981).

In order to understand the formation of confabulation we first need to understand the normal process of memory recall. In this process, several mental components should function simultaneously. To begin with, the brain should set up the required cues for the retrieval process. Later on, these cues are matched with the data in episodic memory. Lastly, the validity of the retrieved memories should be inspected (Shallice, 1999). This last phase is called reality monitoring.

Reality monitoring ability is defective in confabulation. There, the retrieved information from memory is expressed without any evaluation about its compatibility with reality. Chiefly, the frontal circuits are responsible for the disorder in reality-monitoring (Dayus and van den Broek 2000, Johnson et al. 1997, Johnson and Raye 1998, Moscovitch, 1989, Shallice 1999, Schnider and Ptak 1999).

Confabulation and functions of the frontal lobe

Frontal lobes include feedback loops and connections, which consolidate and integrate all components of behavior. Each of these fronto-subcortical circuits defined by Alexander et al. (1986) have important roles in executing cognitive functions and behaviors. The frontal lobes function like a supervising control structure which participates in all brain functions, and executes, consolidates, monitors and modifies these functions by its connections with these loops and other heteromodal cortical regions (Demirci and Kuzugüdenlioğlu, 2004).

The frontal lobes also have a very important role in memory functions. The control and orientation of information in memory are executed via the frontal lobes. Therefore, it can be said that the frontal lobes function in synchronization with memory (Stuss and Levine, 2002). The frontal lobes have an active role in other brain functions, such as auditing and verification, during the memory retrieval process (Parkin 1997, Stuss and Levine 2002). Considering all of the above-mentioned functions, it can be suggested that the frontal lobes have an executive function in the memory retrieval process.

Memory is not a perfect mechanism; it has a tendency to make mistakes. There will be variations in the remembered details of any event between two individuals who experience the same event at the same time. When we try to retrieve encoded memories, we cannot be completely confident in the accuracy of them all. However, we try to compare the validity of the retrieved information with other encoded information, then combine the clues and try to reach a good conclusion. When we are doing this, we review the remembered information and expurgate the faulty information. According to Barbizet, in order for memory to function correctly, remembering what is not remembered, in other words, considering the possibility that retrieved information may be wrong, is also important (Barbizet 1963, Parkin 1997, Shallice 1999).

Memories are the basis for reasoning and fantasy.. We use the encoded information in our memory for the information about what day it is, where we are and what we

want to do. What is surprising is that memory allows us to dream and brings us back to reality at the same time. How does our brain control the journey between roaming in fantasies and then referring our thinking back to ongoing reality? (Schnider, 2001). If we were to experience our past memories as current realities, our lives would be chaotic.

We can explain this situation with a case example; a woman who was hospitalized due to a ruptured anterior communicating artery was saying that she had to breast-feed her baby; however, her child was 30 years old. This patient could not effectively evaluate time and place (she did have a baby, though 30 years ago) in relation to her encoded information (Schnider et al. 1996a, Schnider 2001).

According to Schnider, fantastic confabulations include traces from the patient's past, and as can be seen from the above case example, a past experience is perceived as a current reality. That is to say, in confabulation, there is a problem in the reality-monitoring function (Johnson and Raye 1981, McDermott and Szpunar 2005, Schnider 2000, Schnider 2001, Schnider 2003).

How are memories that do not pertain to ongoing reality are perceived like pertaining to ongoing reality in confabulation? In his research, Schnider used a very different research design for evaluating the memory records that are currently valid and currently invalid (Shallice, 1999; Schnider, 2000; Schnider, 2001; Schnider, 2003). In Schnider's study, patients were shown a series of pictures. Some of these pictures were shown more than once and others only once. There were multiple phases in which the same pictures were presented to the subject in a different order. In each phase, the patients were expected to only consider the pictures shown in that particular phase. In other words, the patients were required to determine which pictures were presented for the first time and which pictures were presented before in the first phase of the study. In the following phases the patients were required to detect only the pictures that were shown for the first time during that particular phase (Figure I).

Schnider found that confabulation patients gave a higher number of false positive responses when compared to amnesic patients who did not display confabulations. This highlights a deficit in the reality monitoring function of memory in the confabulation patients (Shallice 1999, Schnider 2000, Schnider 2001, Schnider, 2003).

DISCUSSION and CONCLUSION

For the formation of human actions, integration of

past experiences, ongoing perceptions and future concepts should be integrated. In order for the behavior to be compatible with reality, the brain must identify the mental representations that are currently relevant (Schnider and Ptak 1999). While forming these representations, previously stored knowledge and incoming information should be integrated which is accomplished by widespread neuronal networks in the brain. The integration, consolidation and integration of incoming information with the previously stored knowledge and storage as memory traces are accomplished by the medial-temporal region (particularly hippocampus), diencephalic regions and basal forebrain. The strategic control and coordination of memory functions is accomplished by frontal lobes: e.g. the proper encoding of knowledge, production of necessary cues for retrieval, monitorization of the relevance of the responses, suppression of the irrelevant responses and spatial and temporal sequencing of information (Luria 1980). Normal memory processes may also involve some distortions in information-processing. Confabulation is characterized by memory distortions that are clearly beyond this normal range which occurs as a consequence of brain damage (Johnson and Raye 1998).

In the previous sections we discussed the various proposals concerning the content, mechanism, duration, etiology, and types of confabulation. The common point of all these proposals is that confabulation exists and cannot be ignored. Yet, perhaps due to the many ambiguities of confabulation, there are various questions, which remain unanswered. Important points needing further delineation are:

What is the difference between confabulations and delusions?

At a general level, it can be said that confabulation can be considered as sharing a conceptual space with delusion, mythomania, pseudologia fantastica, and pathological lying (Berrios 1998). The majority of the researchers defined confabulation in its own framework, did not emphasize the distinguishing characteristics of confabulation from delusion. According to Berrios, the difference between confabulation and delusion is related to the degree of departure from the truth (Berrios, 1998). Confabulations are expected to include partially real elements; however, this is not true for some extreme fantastic confabulation cases. Again, some researchers propose that confabulation is the result of a functional disorder in memory and is different from delusion; however, amnesia is not detected in all confabulation patients. The suggestion that faulty beliefs in Alzheimer patients are due to amnesia is also contro-

versial to this point of view . In addition, there are also studies that have reported the existence of confabulation in schizophrenia (Salazar-Fraile et al. 2004).

- Can the story telling in confabulation be limited only to verbal expressions? Are there also confabulations cases, which include other senses, such as, sight, touch, or behavioral patterns in memory?

If confabulation is related to distortions in retrieval of encoded information, it can also affect other areas besides verbal regions. In a case with colorful visual hallucinations, Downes and Mayes (1995) proposed that these findings were related to confabulation.

- Is the difference between momentary confabulation and fantastic confabulation only related to the content and the quality of confabulation? Some researchers believe that these two different clinical presentations are associated with different brain regions and should therefore be considered as totally different phenomena.

- There are some new and important studies on neurocognitive processes involved in lying (Mohamed et al., 2006). The connection between confabulation and

pathological lying seems to be another area that deserves further investigation (Berrios 1998).

Confabulation is a symptom that can provide a lot of information about the memory processes, memory monitoring and the role of the frontal lobes in memory. Examination of the interlapping conceptual area between delusion and confabulation may provide exciting information for understanding cognitive dysfunctions that are evident in many psychiatric disorders. To date, frontal lobe functions were studied in many disorders, such as schizophrenia and mood disorders, but the relationship between delusion and confabulation, which is related to the frontal lobes, has not been investigated in detail.

In conclusion, it is quite surprising that extensive research studies have not been conducted on confabulation, which is a symptom that is related to memory, the frontal lobes, Korsakoff's syndrome, and psychotic disorders. On the other hand, this concept is nearly nonexistent in the Turkish psychiatric literature, which is another important issue that should be addressed.

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