



## Research report

## Confabulators mistake multiplicity for uniqueness



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## ARTICLE INFO

## Article history:

Received 11 July 2013

Reviewed 27 September 2013

Revised 21 January 2014

Accepted 18 June 2014

Action editor Gus Buchtel

Published online 25 June 2014

## Keywords:

Amnesia

Confabulation

Hippocampus

Temporal consciousness

## ABSTRACT

Some patients with organic amnesia show confabulation, the production of statements and actions unintentionally incongruous to the subject's history, present and future situation. It has been shown that confabulators tend to report as unique and specific personal memories, events or actions that belong to their habits and routines (Habits Confabulations). We consider that habits and routines can be characterized by multiplicity, as opposed to uniqueness. This paper examines this phenomenon whereby confabulators mistake multiplicity, i.e., repeated events, for uniqueness, i.e., events that occurred in a unique and specific temporo-spatial context. In order to measure the ability to discriminate unique from repeated events we used four runs of a recognition memory task, in which some items were seen only once at study, whereas others were seen four times. Confabulators, but not non-confabulating amnesiacs (NCA), considered repeated items as unique, thus mistaking multiplicity for uniqueness. This phenomenon has been observed clinically but our study is the first to demonstrate it experimentally. We suggest that a crucial mechanism involved in the production of confabulations is thus the confusion between unique and repeated events.

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## 1. Introduction

Confabulation is an infrequent and mainly a transitory sign shown by patients who suffer from an organic memory disorder. At a general level it can be defined as the production of

statements and actions that are unintentionally incongruous to the subject's history, background, present and future situation (Dalla Barba, 1993a). A number of interpretations have been proposed in order to explain the underlying cognitive and the anatomical substrate of confabulation (Conway & Tacchi, 1996; Fotopoulou, Solms, & Turbull, 2004; Johnson,

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<http://dx.doi.org/10.1016/j.cortex.2014.06.011>

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1991; Kopelman, 1987; Moscovitch & Melo, 1997; Schnider & Ptak, 1999). All of these interpretations correctly capture some cognitive and neuroanatomical aspects of confabulation, however a conclusive agreement among authors concerning the origin of this phenomenon is still lacking. This is mainly due to the fact that confabulation is not a unitary phenomenon and therefore it may reflect differing underlying cognitive mechanisms.

Several studies show that confabulation is more often associated with lesions involving the ventromedial portion of the frontal lobe and related structure, including the basal forebrain (see Schnider, 2008 for a review). Nevertheless confabulation can be observed following more than twenty anterior and posterior brain lesions (Dalla Barba & Boissé, 2010; Gilboa & Moscovitch, 2002) and different lesions may be associated to different qualitative types of confabulation.

An important characteristic concerning confabulators is their tendency to confabulate about their personal temporality as a whole. In fact, patients confabulate about their past, but also about the ongoing reality (Dalla Barba, 1993a; Schnider, 2008) and when foreseeing their personal future (Dalla Barba, 1993a; Dalla Barba, Cappelletti, Signorini, & Denes, 1997). Usually, they do not confabulate about impersonal temporality, being perfectly able to answer questions concerning the semantic past (e.g., “What happened to Lady Diana?”), the semantic present (e.g., “Who is currently the President of the United States?”), and the semantic future (e.g., “What will be one of the most important breakthroughs in the medical domain in the next ten years?”). Although this was not the goal of the study, personal and impersonal temporality were measured (see below) in order to have a baseline profile consistent with findings from other studies on confabulating and non-confabulating amnesiacs (NCA) (Dalla Barba, Cappelletti, et al., 1997b; Klein, Loftus, & Kihlstrom, 2002; La Corte, George, Pradat, & Dalla Barba, 2011).

Notwithstanding the different taxonomies, cognitive and neuroanatomical distinctions, it has been shown that, regardless of the underlying pathology and the brain lesion site, confabulators mainly report “Habits Confabulations”, which are plausible, repeated personal events, indistinguishable from true memories unless one is familiar with the patient's history, background, present and future situation. Confabulating patients tend to recall as temporally specific memories, events that belong to their habits and routines (Dalla Barba & Boissé, 2010; La Corte, Serra, Boissé, & Dalla Barba, 2010). They are more inclined than normal subjects and NCA to produce responses that have a high probability of occurrence in a particular situation. With minor exceptions, such patient's memories are driven by routines, which they believe persist even when they no longer occur. It is clinically well known, for instance, that hospitalized confabulators, when directly questioned on what they have done the previous day, usually report routine activities from their life before the accident. For example, they may say that the previous day they went to work or that they had dinner at home “as usual”. In this case, irretrievable episodic memories, i.e., events that occurred in a unique and specific temporo-spatial context, are replaced by routines, i.e., multiple, repeated events that didn't occur in a unique and specific temporo-spatial context. Therefore we can say that multiplicity, i.e., routines and

repeated events, is mistaken for uniqueness, i.e., a specific unique event that occurred in a specific, unique temporo-spatial context (such as the previous day). These patients still retain the knowledge that they had gone to work and had dinner at home “as usual” many times in their life, but they erroneously think that these repeated events also occurred the previous day.

However, Habits Confabulations are not the only type of confabulation observed. Dalla Barba's group (La Corte et al., 2010) analysed 424 confabulations produced by Alzheimer's disease confabulating patients and confabulating amnesiacs (CA) and found that, although Habits Confabulations accounted for approximately 40% of confabulations, other types of confabulation were present, namely ‘Misplacements’ (true episodes and facts misplaced in time and place) and ‘Memory Fabrications’ (plausible memories without any recognizable link with personal or public events), which together accounted for 20% of confabulations, respectively, and ‘Memory Confusions’ (confusion with other personal or public events related to the target memory), which accounted for approximately 10% of confabulations. In sum, although different types of confabulations exist, Habits Confabulation are significantly the more frequent type of confabulation observed.

Another study from the Dalla Barba's group (De Anna et al., 2008), aimed at seeing whether over-learned information interferes in episodic memory recall, showed that Alzheimer's disease confabulating patients produced significantly more confabulations in the recall of semantically modified fairytales (i.e., Little Red Riding Hood is a friend of the wolf) compared to the recall of other types of stories (the original versions of other fairy tales, e.g., Snow White, and of unknown stories). Confabulations in the recall of the modified fairy-tale always consisted of elements of the original version of the story. These findings indicate that strongly represented, over-learned information interferes in episodic memory recall and is therefore likely to be implicated in the production of confabulations.

An explanation of these observations, together with other clinical and experimental data, is provided by the Memory, Consciousness and Temporality Theory (MCTT, Dalla Barba, 2002). Within the framework of the MCTT, it is proposed that confabulation reflects a distortion of Temporal Consciousness (TC), i.e., a specific form of consciousness that allows individuals to remember their personal past, to be oriented in their present world, and to predict their personal future, whereas classic amnesia due to hippocampal damage reflects a loss of TC. In confabulators, TC is present, but it is malfunctioning. These patients still have a personal temporality, although they make errors when questioned about their past, present and future. Conversely, NCA, who have lost TC, are completely unable to recall anything about their past, present and future. In confabulation, TC addresses routines and repeated events, what we call multiplicity, as unique and specific past events, what we call uniqueness. The condition we have sketched here (for a more detailed description see: Dalla Barba, 2002, 2009; Dalla Barba & Boissé, 2010; Dalla Barba & La Corte, 2013) accounts for what we indicated with Habits Confabulations. A prediction of this part of the MCTT is that confabulators, but not NCA, mistake repeated events for

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