Neuropsychologia 77 (2015) 201–210

Contents lists available at ScienceDirect

Neuropsychologia

journal homepage: www.elsevier.com/locate/neuropsychologia

Is there a positive bias in false recognition? Evidence from confabulating amnesia patients

Nura H. Alkathiri *, Robin G. Morris, Michael D. Kopelman

King's College London, Institute of Psychiatry, London, United Kingdom

ARTICLE INFO

Article history:
Received 20 March 2015
Received in revised form
27 July 2015
Accepted 4 August 2015
Available online 4 August 2015

Keywords:
Confabulation
Amnesia
Emotion
False recognition
Semantic-associates procedure

ABSTRACT

Although there is some evidence for a positive emotional bias in the content of confabulations in brain damaged patients, findings have been inconsistent. The present study used the semantic-associates procedure to induce false recall and false recognition in order to examine whether a positive bias would be found in confabulating amnesic patients, relative to non-confabulating amnesic patients and healthy controls. Lists of positive, negative and neutral words were presented in order to induce false recall or false recognition of non-presented (but semantically associated) words. The latter were termed 'critical intrusions'. Thirteen confabulating amnesic patients, 13 non-confabulating amnesic patients and 13 healthy controls were investigated. Confabulating patients falsely recognised a higher proportion of positive (but unrelated) words, compared with non-confabulating patients and healthy controls. No differences were found for recall memory. Signal detection analysis, however, indicated that the positive bias for false recognition memory might reflect weaker memory in the confabulating amnesic group. This suggested that amnesia patients with weaker memory are more likely to confabulate and the content of these confabulations are more likely to be positive.

1. Introduction

Confabulation refers to false memories produced unintentionally in the context of a neurological disorder (Korsakoff, 1889; Johnson et al., 2002). Confabulations are typically self-referent experiences (Fotopoulou et al., 2008b) and have varying manifestations that range from real memories misplaced in context to bizarre beliefs that convey little or no relation to reality (Berlyne, 1972; Kopelman, 1987). Some researchers have distinguished between provoked and spontaneous confabulations (Kopelman, 1987; Dalla Barba, 1993a). Provoked confabulations arise in response to questions or tasks that test the patients' memory. Spontaneous confabulations are more florid erroneous memories that arise without any provocation. Confabulations can sometimes compel the patient to act on their distorted beliefs (Schnider et al., 1996; Kopelman, 1999).

Confabulations have been frequently observed in patients with damage to the prefrontal brain regions, in particular, with lesions in the ventromedial and orbitofrontal areas (Gilboa and Moscovitch, 2002). Spontaneous confabulation has been linked to both memory and executive deficits, and some researchers have emphasised deficits in frontal control mechanisms affecting memory processes (Moscovitch and Winocur, 1992, 2002; Kopelman, 1987; Burgess and Shallice, 1996). For example, Moscovitch and Melo (1997) have argued that confabulation may result from poor strategic and monitoring processes which are required in organising the memory search and determining its accuracy.

Schnider and Ptak (1999) suggested that confabulation results from temporal context confusions and impaired reality monitoring. They argued that confabulation is about past experiences and acting on ideas that overlook the present circumstances (for example, being an inpatient under medical care); there are confusions in what they describe as 'reality monitoring'. Dalla Barba (1993a; Dalla Barba et al., 1997) argued that confabulating patients only employ the most stable memory traces, which are often their past memories. Consequently, these patients tend to refer to well-established early memories, however irrelevant they are to their current circumstances.

Conway and Tacchi (1996) have stressed the relationship between mnemonic recall and self-representations. They proposed that the content of confabulations is influenced by the patient's goals and current preoccupations. Conway and Tacchi (1996) described a patient who displayed confabulatory symptoms following a closed head injury that damaged the temporal and frontal brain regions. The patient showed a tendency to produce confabulations that altered her account of present circumstances into a time of happiness. They argued that the wish to maintain a

* Correspondence to: Academic Unit of Psychiatry, St. Thomas' Hospital, South Wing, Block 8, London SE1 7EH, UK.
E-mail address: nura.ali@kcl.ac.uk (N.H. Alkathiri).

http://dx.doi.org/10.1016/j.neuropsychologia.2015.08.002
0028-3932/

coherent personal account might be due to a dysfunction of executive processes guiding memory reconstruction. When executive processes were impaired, memories were altered to support current goals and to achieve self-coherence (Conway, 2005). As a result, the memories produced might appear implausible and distort the patient's self-identity (Conway and Fthenaki, 2000).

Turnbull and colleagues (2004) explained the content of confabulation in relation to impaired affective regulation. They argued that environmental stimuli (including people and events) provoke a range of emotional responses, which are then checked for memory accuracy. For example, if a person in the street reminds you of a close friend, you would think back in order to check if he/she is a friend or a stranger. In confabulating patients, there is a positive advantage to not checking memory accuracy, especially when their false beliefs have positive consequences.

Fotopoulou (2010) proposed a related theory which argued that both cognitive and motivational factors influence memory construction. When cognitive processes are impaired, motivational factors have a greater influence in determining which memories are retrieved. Fotopoulou and colleagues demonstrated the enhanced influence of motivation on memory distortion in a series of studies. They found that the content of spontaneous confabulations was often positive and self-enhancing (Fotopoulou et al., 2008b). Confabulating patients contorted past memories to be more positive and wish-fulfilling unlike non-confabulating patients and healthy controls (Fotopoulou et al., 2007a; Fotopoulou, 2010). Confabulating patients were found to recall negative self-referent prose in a manner that portrayed a positive self-image (Fotopoulou et al., 2008b). The content of confabulations was rated as significantly more positive and self-enhancing compared with true experiences (Fotopoulou et al., 2007a, 2008a, 2008b, 2009). These findings suggested that confabulations have a self-serving bias. This was attributed to damage to the ventromedial prefrontal cortex, which is thought to regulate affective information. Self-enhancing distortion of negative events into more pleasant ones enabled patients to maintain positive self-representations, irrespective of memory accuracy.

However, not all studies have shown a positive bias in confabulation and some confabulations may be negative e.g. about the death of a relative (Metcalf et al., 2010; Bajo et al., 2010; Gilboa, 2010). Metcalf et al. (2010) proposed that the self-representations in confabulation can be congruent with individuals' past experiences whether pleasant or unpleasant (Metcalf et al., 2010).

A factor which may underlie these conflicting findings is the method used to elicit and measure confabulation. Many previous studies (although not all; Fotopoulou et al., 2007b, 2008b) have used rating systems to analyse emotional content (Turnbull et al., 2004; Fotopoulou et al., 2008a; Bajo et al., 2010), relying on judges' subjective evaluations to rate the emotional valence of the patient's confabulation. It is plausible that this may have accounted for some of the inconsistencies across the studies, although this remains to be confirmed.

In the present research, we used the semantic-associates procedure to examine the emotional content of confabulation. This procedure was developed by Deese (1959) in non-emotional format, and it is well-established for inducing false recall and false recognition in healthy participants (Roediger and McDermott, 1995). Word lists are presented which tend to prompt false recall or false recognition of a non-presented word (the so-called 'critical lure' or 'critical intrusion'): For example, the words moth, insect, wing, bird, fly, yellow, net, pretty, flower, bug, cocoon and colour can generate the (non-presented) retrieval of the word 'butterfly' (Roediger and McDermott, 1995).

The semantic-associates procedure has previously been used in studies of amnesia to examine false recall and false recognition in non-confabulating amnesic patients. Schacter et al. (1996) found that non-confabulating amnesic patients falsely recognised a significantly lower proportion of critical intrusions compared with healthy controls. Moreover, these patients falsely recognised a higher proportion of unrelated intrusions than critical intrusions (Schacter et al., 1998). Verfaellie and Schacter (2002) concluded that this pattern of false recognition reflected degraded gist memory in amnesia. Critical intrusions elicited a strong sense of familiarity in healthy participants because these non-presented words matched the theme of the studied list. In amnesic patients, limited gist information meant that these patients were less likely to falsely recognise critical intrusions.

Schacter's findings were later replicated by Ciaramelli et al. (2006) in a small group of amnesic patients. Five patients had ventromedial lesions and were confabulating at the time of the study. These patients were compared with a group of 9 non-confabulating amnesic patients. All amnesic groups showed a reduced rate of false recognition to critical intrusions compared with healthy controls. However, the confabulating group produced significantly more unrelated intrusions (Ciaramelli et al., 2006). In a second "proximal" condition, Ciaramelli et al. (2006) aimed to reduce the rate of false recognition by administering a six-item recognition task after the presentation of each word list. They predicted that shortening the delay between the study phase and recognition test would improve the reality monitoring processes that are needed to distinguish real memories from imagined constructs. They found that non-confabulating patients' false recognition rate was significantly reduced with a shorter delay, whereas confabulating patients were unable to suppress the false recognition of unrelated intrusions. Ciaramelli concluded that conditions which enhance memory improved reality monitoring abilities in non-confabulating patients and healthy controls. In contrast, confabulating patients' difficulty in distinguishing true from false memories might be related to a deficit in inhibiting irrelevant thoughts during retrieval.

In summary, the degree to which there is a consistent positive bias underpinning confabulatory phenomena in amnesic patients is still controversial. The semantic-associates procedure offers an alternative method to investigate this, having been previously used to provoke false memories in healthy participants and amnesic patients. In the present study, we have used an *affective* version of the semantic-associates procedure to induce false recall and false recognition in confabulating amnesic patients, and to examine for a positive emotional bias in these patients. We adapted the procedure to explore whether there is differential pattern of false memory in confabulating patients, according to the emotional valence of the material used. More specifically, we compared performance in a relatively large sample of confabulating patients, non-confabulating patients, and healthy controls, using positive, negative and neutral stimuli. This procedure was used to test the following hypotheses:

1. We predicted that both confabulating and non-confabulating amnesic patients would correctly recall and recognise a significantly lower proportion of target words than healthy controls.
2. We also expected confabulating and non-confabulating amnesic patients to falsely recall and recognise a significantly lower proportion of critical intrusions than healthy controls.
3. Consistent with the motivational account of the positive emotional bias, we predicted that confabulating amnesic patients would falsely recall and recognise a significantly higher proportion of positive unrelated intrusions than either non-confabulating amnesic patients or healthy controls.