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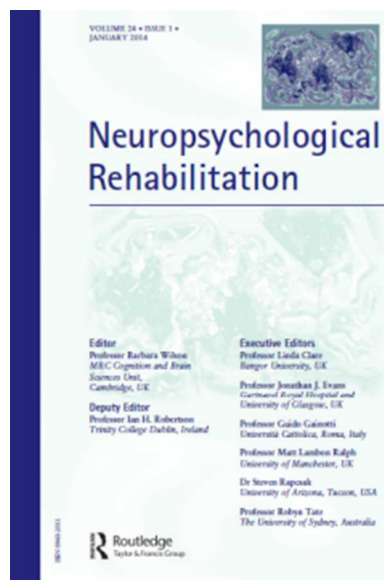
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Developing awareness of confabulation through psychological formulation: A case report and first-person perspective.

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DEVELOPING AWARENESS OF CONFABULATION THROUGH PSYCHOLOGICAL FORMULATION: A CASE REPORT AND FIRST- PERSON PERSPECTIVE.

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ABSTRACT

Confabulation, or the unintentional production of false, distorted or displaced memories, is commonly seen in people who have brain injury. However, it is most frequent in the acute phase, with persistent confabulation being comparatively rare. In this paper, we describe the case of Joe, a 24-year old man who showed confabulation in the chronic phase of his rehabilitation, three years after traumatic brain injury. We describe our approach to therapy for this confabulation, and in particular how collaborative formulation enabled Joe to understand his confabulation, and then to manage it effectively, using a diary and 'detective' procedure to identify whether or not evidence existed to support potentially confabulated memories. Furthermore, we include Joe's own perspective on what it is like to be confabulating, and on his experience of rehabilitation. This is an example of a successful insight-based therapeutic intervention, which is rare in this domain. To the best of our knowledge, this is also the first example of a first-person perspective on confabulation.

Keywords: *false memory, psychological therapy, treatment, management*

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INTRODUCTION

Confabulation has been defined as the production of memories or personal narratives that are either incorrect or displaced in time, without any apparent awareness or intention to deceive (DeLuca & Cicerone, 1991; Fotopoulou, Conway, & Solms, 2007). It can be provoked (i.e. occurring in response to cues), or spontaneously produced. Case descriptions frequently describe clients' confabulations as having "fantastic" content, that is, content that may be grandiose or strongly emotionally charged, but confabulations can also be subtle and include only minor factual errors (DeLuca, 1992). According to Nahum et al. (2012), there are four forms of confabulation. These are 'intrusions', referring to intrusion errors in memory testing which can occur without any other form of confabulation; 'momentary confabulations' which are erroneous recollections in response to questioning; 'behaviourally spontaneous confabulation', which refers to unprovoked confabulations that the person at times acts upon, and is associated with disorientation and understood as a form of reality confusion; and 'fantastic confabulation', which involves spontaneous production of narratives that are incompatible with accepted notions of reality. Momentary and behaviourally spontaneous confabulations often co-occur, with fantastic confabulations being comparatively rare. Confabulation occurs after a range of different types of brain injury. It has been particularly associated with damage to the orbitofrontal and ventromedial prefrontal cortex (Turner, Cipolotti, Yousry, & Shallice, 2008). However, it is most frequently observed in the context of diffuse damage to the frontal and temporal lobes causing combined deficits in autobiographical memory and executive functioning, rather than in the context of focal lesions (Bajo, Fleming, Metcalfe, & Kopelman, 2017; Diamond, DeLuca & Kelley, 1997).

The intriguing nature of confabulation means that it has been the subject of much research. This research has largely focussed on understanding the underpinning mechanisms, and finding out what confabulation can tell us about the nature of memory, consciousness and our recognition of reality itself. Kopelman (2010) reviewed the literature in this domain, and identified four broad categories of theory. The first was of context confusion, source monitoring or reality monitoring, theories with proponents dating back as far as Korsakoff (1889, translation by Victor & Yakovlev, 1955) and more recently, (Schnider, 2013). These focus on the systems that place memories, and thoughts more broadly, in context, with confabulation representing a failure at some point in this system. The second grouping was of motivational theories (e.g. Fotopoulou et al., 2007). These focus on a combination of personal biases of the confabulating individual combined with executive failures. The third grouping is of trace specification and/or verification processes, including work from Burgess and Shallice (1996) and Gilboa et al (2006). These focus on the executive processes involved in producing confabulation, specifically those concerned with the editing and suppression of false memory traces. The final grouping was referred to as "interactionist", with examples being the work of Metcalfe, Langdon and Coltheart (2007) and Kopelman (2010). In these accounts, the focus is on the interactions between the confabulating person's imagination (i.e. their sense of self and creativity),

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3 autobiographical memory (i.e. their store of personally experienced events),
4 and source monitoring (i.e. their contextual knowledge about the origin of
5 information).
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8 Though confabulation seems to occur relatively frequently in the acute phase
9 after brain injury, or in certain neuropsychiatric conditions, there are very few
10 published papers on treatment. This is perhaps because confabulation tends
11 to resolve spontaneously. One study, for example, found that seven of the
12 eight patients with confabulation had stopped confabulating when followed up
13 18 months later (Schnider, Ptak, von Däniken, & Remonda, 2000). Schnider
14 (2001) also identified that the poor theoretical understanding we have of
15 confabulation as a factor in the lack of treatment trials. The clinical focus
16 during this acute phase is often on management. Schnider (2001)
17 recommends an approach comprising four components: (a) risk assessment
18 and risk management, (b) education for staff and relatives, (c) maximising
19 engagement in productive activity, and (d) refraining from direct challenges.
20 Ptak et al. (2010) conceptualise this approach as following the principles of
21 errorless learning – by limiting production of confabulated memories through an
22 environmental/proactive approach, those memories are less likely to be
23 erroneously learned. Fotopoulou (2008) makes similar recommendations,
24 including staff and family education, avoiding direct responses (i.e. those that
25 confirm/contradict the confabulation), and use of individual sessions to identify
26 the meaning of the confabulations, and exploring this with the client in a non-
27 threatening way.
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31 A different approach to the treatment of confabulation, influenced by Crosson
32 et al.'s (1989) conceptualisation of awareness of deficits after head injury, has
33 been reported by DeLuca and colleagues (e.g. DeLuca, 1992; DeLuca &
34 Locker, 1996). Crosson et al. (1989) considered there to be three levels of
35 awareness of deficits in recovery and rehabilitation after head injury. These
36 are intellectual awareness (i.e. knowing in principle that a given problem
37 exists), emergent awareness (i.e. recognising the problem when it happens),
38 and anticipatory awareness (i.e. being able to identify when a problem is likely
39 to occur). DeLuca (1992) described an approach to the rehabilitation of
40 confabulation based on the development of awareness, which included the
41 development of a safe therapeutic environment within which to begin to
42 explore the phenomenon and then gradually to recognise when it occurs and
43 eventually anticipate when it will occur. Two illustrative case reports were
44 provided, both people who were confabulating in the first few months after
45 injury. DeLuca and Locker (1996) described this approach in more detail in
46 relation to a 47-year old man who had prominent confabulation as part of
47 anterior communicating artery aneurysm syndrome. He participated in a
48 comprehensive cognitive rehabilitation programme in which, in addition to
49 group cognitive rehabilitation sessions, included a programme of individual
50 counselling sessions focussed on developing awareness of confabulation.
51 The intervention was graded, including an initial focus on other domains of
52 cognition before beginning to gently confront the idea that his memory was
53 not always reliable. He eventually began to comment that his memories may
54 not be correct and to check with others whether, for example, he had told
55 them the same story before, indicating emergent awareness. The
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3 confabulations ceased during the sixth month of rehabilitation and ninth month
4 after injury, which the authors interpreted as evidence that anticipatory
5 awareness has been achieved. No further confabulation was evident at a
6 follow-up evaluation 18 months after the programme had begun.
7

8
9 Burgess and McNeil (1999) described a somewhat similar approach in the
10 rehabilitation of a 51 year-old man who also had a stable confabulation after
11 the rupture of an ACoA aneurysm. His confabulation related to either having
12 recently completed, or needing to go and complete a stocktake, which had
13 been a significant component of his work. This person was thought to show
14 some ability to introspect on this confabulation, as he looked for proof of
15 confabulated events having happened, and when challenged he could
16 achieve a more accurate recollection. The authors encouraged the client to
17 keep a diary of events, and after having done this for a period of five weeks,
18 the confabulation ceased. Burgess and McNeil also noted that this case
19 showed an abnormally high number of false positive errors on a famous
20 events test, including giving dates for fictitious public events.
21
22

23
24 Comparatively less evidence is available on interventions for confabulation in
25 the chronic phase post-injury. We identified only one case documenting the
26 treatment of confabulation that had persisted past the first year or 18 months
27 after injury. Dayus and van den Broek (2000) reported the case of a 46 year
28 old man who, six years after rupture of an anterior communicating artery
29 (ACoA) aneurysm, exhibited three stable delusional confabulations. These
30 related to the death of his father, having had contact with his former wife, and
31 being dismissed from his job. Several medication trials had failed to moderate
32 the difficulty (specifically, this included trials of thioridazine, sulphiride,
33 propranolol, and fluoxetine). Interestingly, the client's confabulations were
34 uniformly associated with swearing, so the authors decided to tackle this
35 associated behaviour through an intensive, 46 session self-monitoring training
36 programme. They found that the client's swearing dramatically reduced, and
37 that so in turn did his production of confabulations.
38
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40
41 In this paper, we describe the case of a young man presenting with chronic
42 confabulation several years after a severe TBI, in which we used a
43 formulation-based approach to rehabilitation. There have not, to our
44 knowledge, been any reports of formulation-based treatment of confabulation
45 published in people with persistent confabulation. However, it is well
46 established that the development of awareness is a key process in
47 rehabilitation more broadly (Crosson et al., 1989; Klonoff, 2010) and that
48 collaborative formulation, i.e. helping people to make sense of their
49 experiences, is a cornerstone of clinical psychology interventions (Johnstone
50 & Dallos, 2013). There was hence a sensible rationale for taking a
51 formulation-based approach to the persistent confabulation in this case.
52

53
54 Our aims in this article are hence to: (1) describe a formulation-based
55 approach to the treatment of confabulation in which the aim was not to reduce
56 the occurrence of confabulation or confabulatory behaviour, but rather to
57 reduce the negative emotional and interpersonal impact of confabulation. This
58 is consistent with third-wave approaches to cognitive-behavioural therapy
59
60

(CBT) which, relative to earlier forms of CBT, emphasise a shift in focus towards changing the meaning or function of symptoms rather the symptoms themselves (Ashworth, Evans & McLeod, 2017; Hoffman, Sawyer & Fang, 2010; Kangas & McDonald, 2011); and (2) to present a first-person perspective on the experience of confabulation and of rehabilitation for confabulation. There is a growing acknowledgement of the value of service-user narratives in enhancing professional understanding of the experience of health conditions and of health service use (e.g. Sweeney et al., 2009; Rose, 2003), and to date, we do not know of any published service-user accounts of the experience of confabulation.

CASE REPORT

In this section, Joe's own descriptions are given in italics, with commentary and therapist perspectives in regular font.

BEFORE THE INJURY

Before my injury I was an engineering student at a good university. I was into various extracurricular activities such as rugby and rowing. I also was known to dabble quite successfully in poker! A successful company gave me a scholarship to help fund my degree.

According to his family, Joe was outstanding academically, achieving top grades with relatively little effort. Joe himself is a more modest about his achievements. He had and maintains solid and close relationships with his family, including his parents, identical twin, and older sister, and a wide circle of friends. He also describes that his primary interests were social. He has some regrets about this now, seeing his exuberant sociability as a contributor to his injury.

THE ACCIDENT AND ITS CONSEQUENCES

When I was 21 and on holiday with friends, I took on a dare and fell head first from a second-floor balcony onto concrete. This resulted in a fractured skull with bilateral temporal contusions. It was treated with a decompressive craniotomy, in which a part of my skull was removed to reduce intracranial pressure. After 17 months of rehabilitation I finally underwent a cranioplasty, which really helped! But, little did I know that that it carried a tiny infection; so it had to get taken off and cleaned. It was replaced about two years after the injury, and it's now in permanently.

MRI showed a right temporal subdural haematoma, left temporal pneumocephalus, and bilateral temporal and frontal haemorrhagic contusions with fracture involving the petrous temporal bone. Joe was placed in an induced coma for three weeks, and experienced a period of post-traumatic amnesia of approximately eight weeks.

THE LONG PROCESS OF REHABILITATION

It is hard for me to tell you in great detail about my initial rehabilitation because large chunks of it have flown from my memory. However, I can say

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3 that from my friends' and family's point of view, it went really well. I now
4 occasionally volunteer at the same ward that helped with my rehabilitation. I
5 feel that I cannot have said that it "went well" because that is only in hindsight,
6 at the time it must have been very stressful for my friends and relatives.
7 Rehabilitation is a very long process and the vital parts of it for me have been
8 done now. I can certainly say that my rehabilitation came along in leaps and
9 bounds after my successful cranioplasty. I am not happy with how long I had
10 to wait for this, and have heard that in some "celebrity" cases they happen
11 much earlier on (e.g. the young woman Malala who was shot by the Taliban
12 received her cranioplasty after 4 months and then began speaking). I also
13 found that brain training was helpful in improving my attention. The most
14 recent stage of my rehabilitation was going to the Oliver Zangwill Centre
15 (OZC) for some fine-tuning, and it is this centre that encouraged me to write
16 this account.
17
18

19
20 Joe spent six months in an inpatient rehabilitation setting, and a further eight
21 months in post-acute residential rehabilitation, before being discharged to his
22 family home. He made a good physical recovery, was independent in
23 personal activities of daily living, and participated in various creative and
24 sporting activities with the assistance of a support worker. He was seen by a
25 community brain injury service for neuropsychological assessment
26 approximately six months prior to his rehabilitation programme at OZC. At this
27 point in time, three years after injury, it was identified that Joe had impaired
28 speed of information processing (Wechsler Adult Intelligence Scales-Fourth
29 Edition [WAIS-IV; Wechsler, 2010] Processing Speed Index: 68, 2nd centile),
30 memory (Rivermead Behavioural Memory Test-Third Edition [RBMT-3; Wilson
31 et al., 20XX General Memory Index: 55, <1st centile), and executive
32 functioning (Behavioural Assessment of the Dysexecutive Syndrome [BADS;
33 Wilson, Emslie, Evans, Alderman & Burgess, 1996] Key Search profile score:
34 0; Zoo Map profile score 1; Delis-Kaplan Executive Function System [DKEFS;
35 Delis, Kaplan, & Kramer, 2001] Verbal Fluency Category Switching: 1st
36 centile). He was not consistently oriented to time, but was oriented to place
37 and person. His reasoning and sustained attention skills were reduced from
38 the estimated premorbid level, but remained within the normal range (WAIS-
39 IV Verbal Comprehension Index: 96, 39th centile; Perceptual Reasoning
40 Index: 94, 34th centile; Working Memory Index 95, 37th centile; Test of
41 Everyday Attention Lottery task: 84th centile). The neuropsychological test
42 data are presented in Appendix 1.
43
44
45

46 Joe's family also asked for advice on a difficulty that had become apparent in
47 the past few months (i.e. more than two years post-injury). Joe had begun to
48 talk about events that had not really happened, but he believed strongly that
49 they were true. The family believed he had been mistaking his dreams for
50 actual experiences. This was causing Joe confusion and considerable
51 distress, and his family were understandably uncertain of how best to
52 respond. An EEG was ordered, which showed mild abnormality but no frank
53 epileptiform discharges. As such, one potential treatment option was to trial
54 anticonvulsant medication. However, neither Joe nor his family were keen to
55 pursue this while other options remained. He was referred to the OZC, and
56 entered the holistic rehabilitation programme there soon afterwards, 3.5 years
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3 after his injury, at the age of 24. His initial rehab goals at the OZC concerned
4 understanding brain injury and developing awareness to enable realistic goal-
5 setting for the future, along with increasing independence in travel, cooking,
6 and pursuing further volunteering opportunities.
7

8
9 Further cognitive assessment focussed on areas not assessed previously,
10 which had potential to contribute towards the holistic rehabilitation formulation.
11 As part of this, we administered a pair of unpublished recognition memory
12 tests that incorporated confidence ratings, in order to explore Joe's subjective
13 experience of remembering. These tests revealed that Joe's recognition
14 memory for abstract verbal and nonverbal material was impaired and
15 characterised by a response bias leading to a high proportion of false alarm
16 errors (see appendix 1). It was notable that for several of the false alarm
17 errors made, Joe gave strong confidence ratings, and appeared to have
18 episodic-type recollections of these previously unseen/unheard stimuli. For
19 example, for one word, he said "Yes, I definitely I heard that one before. I
20 remember not knowing what it meant the first time around!" This sense of
21 certainty associated with a false recollection appeared to directly parallel the
22 dream-reality confusion.
23

24
25 There seemed to be no practicable method of testing the family's hypothesis
26 that Joe's was misremembering his dreams as if they had occurred in reality,
27 and from clinical interview, it did not seem that dreams were the sole source
28 of his disputed memories. For example, they often included elaborated
29 versions of events that his family confirmed had actually occurred. They could
30 hence have resulted from Joe's dreams, imagination, films he had watched,
31 elaborated fragments of 'real' memories, or some combination of sources.
32 This, combined with the pattern of performance on cognitive testing, lead us
33 to understand the issue as a phenomenon not exclusive to dreams, but part of
34 a broader phenomenon of confabulation.
35
36

37 **JOE'S CONFABULATION: A PUZZLING PHENOMENON**

38
39 Joe's family's description of his confabulations indicated that he would recall
40 events that may have elements of real experiences, but that were knitted
41 together with false information, and displaced in time. He did not believe
42 others if they said they thought this memory was likely to have been a dream,
43 and he could become frustrated with this. He also on occasion acted upon his
44 confabulations, looking to find photographic evidence of celebrities he
45 reported to have recently met, or to find his name on the credits of films he
46 thought he had been involved in. The family also linked this phenomenon to
47 Joe and his brother's pre-existing interests in lucid dreaming (i.e. intentionally
48 controlling dreams), which they used to do and enjoyed discussing with each
49 other in the morning. This is of interest, as lucid dreamers show elevated
50 rates of false alarms in recognition memory testing (Corlett, Canavan, Nahum,
51 Appah, & Morgan, 2014). Corlett et al. interpreted this as a form of "reality
52 monitoring" deficit, whereby the boundaries between externally experienced
53 and imagined information are blurred. Confabulation had not been
54 documented during his early or post-acute rehabilitation. His family reported
55 that it had begun at some point after he had returned home from the second
56 cranioplasty, more than 24 months after injury. Their opinion was that it
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3 started after his day-to-day memory had somewhat improved. Using Nahum
4 et al.'s terminology, given Joe's confabulations were (i) not exclusively
5 provoked by questioning or conversation, (ii) sometimes acted upon, and (iii)
6 he was not consistently oriented in time, he would be considered to exhibit
7 behaviourally spontaneous confabulation, alongside momentary
8 confabulations. Though the confabulations contained grandiose content, they
9 were not "incompatible with common notions of reality" (p.2525, Nahum et al.,
10 2012), and as such would not be considered fantastic confabulation.
11

12
13 Joe looked back upon one of his confabulations as follows:

14
15 *One example of my confabulations was that I sold a painting to the Queen! I*
16 *have a very clear and detailed memory of this, and I am a very passionate*
17 *painter. However, there is strong evidence that it is a confab. In my memory,*
18 *the Queen looked remarkably like my long deceased grandmother! Not all of*
19 *the confabulations are so easy to disprove, and these ones can be really*
20 *confusing. They usually have elements of truth; in the Queen confabulation, it*
21 *was true that a painting I did and sold for Headway [a brain injury charity].*
22 *However, the actual series of events seems to get over-dramatized to make*
23 *sometimes an elaborate story with elements of truth.*
24
25
26

27 **UNDERSTANDING CONFABULATION: THERAPIST PERSPECTIVE**

28
29 When Joe began the holistic rehabilitation programme at OZC, the
30 confabulations were causing problems in two main ways: first, they took up a
31 lot of time, and hence prevented him from doing things that were more
32 meaningful and important to him. Second, they lead him to doubt himself, and
33 even question his sanity at times, a source of confusion and emotional
34 distress.
35

36
37 To address this first issue and prevent the confabulation from taking up too
38 much session time, the clinicians working with Joe used the strategy of
39 reminding him in each session of the session's main goal, and asking if it
40 would be ok to focus on that goal, leaving the confabulation to be considered
41 in mood sessions. This strategy worked well, and Joe was virtually always
42 able to change focus.
43

44
45 To address this second issue, Joe set a mood goal, which was "*for the*
46 *confabulations not to affect me emotionally*". The plan to achieve this goal
47 was hence to: (1) develop a shared understanding (i.e. formulation) of the
48 confabulations; (2) share this understanding with Joe's family and team of
49 support workers; (3) develop and put in place strategies for differentiating
50 between actual and confabulated events, specifically (a) keeping a detailed
51 daily calendar of events using Google calendar, and (b) deciding if a potential
52 confabulation could be set aside or was worth investigating, and if it was
53 worth investigating, to do so using a Sherlock Holmes-style procedure i.e.
54 being his own detective and weighing up the likelihood of the event ever
55 occurring. Using a "who, what, when, where and how" structure, he made a
56 checklist with tick boxes and was encouraged to believe the event could only
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3 have happened if all the boxes were ticked; and (4) use these strategies
4 consistently.
5

6
7 As the psychologist working with Joe on this topic, I thought it important that
8 Joe had access to a therapeutic space in which to discuss his confabulations,
9 and in particular the confusion, worry, and frustration associated with them,
10 and to do this in a manner that respected his experience, regardless of the
11 veracity of the memories. It was then possible to share information with Joe
12 about some of the counter-intuitive ways in which the mind works – that
13 actually, our brains are always seeking to fill in gaps, be they in memory,
14 perception, or language, and that false or distorted memories occur in all sorts
15 of people, in all sorts of ways. The aim of sharing this information was to
16 enable Joe to feel confident that confabulation was not a sign of “madness”
17 and to begin to re-conceptualise his experiences, i.e. to begin to develop a
18 collaborative formulation. The formulation in diagram format can be seen in
19 Figure 1, and the letter written to Joe summarised our formulation as follows:
20
21

22 “We learned that **confabulation is a documented consequence of brain**
23 **injury**, particularly when there is damage to the temporal and frontal lobes.
24 Cognitively, it is the result of combined changes in memory and in executive
25 functioning. First and in terms of memory, the difficulty is having a sense of
26 recognition even for new information, which we called “over-familiarity”. This
27 means that **your confabulations feel exactly like memories of actual**
28 **events**. The second bit is the **challenge of thinking something through to**
29 **determine whether or not it actually happened**, something that is more of
30 an executive task, and that does not come as easily to you now as it did
31 before your injury.
32

33 We also considered how **aspects of your personality feed in to your**
34 **confabulation**. You have always had a great imagination, been creative,
35 been interested in lucid dreaming, and loved story-telling. This contributes to
36 how compelling and interesting your confabulations are! **There are also**
37 **many repeating themes in your confabulations - and each of these has**
38 **several elements of truth. This makes them even harder to distinguish**
39 **from things that have really happened**.
40

41 It was also really important to know that the confabulations are **not a sign of**
42 **“madness” or “psychosis”** – we have this clear understanding of how they
43 have resulted from your brain injury, and furthermore, you didn’t have any
44 other symptoms that people with psychosis tend to have.

45 Other things that we learned over the course of your programme were that:

- 46 - When you are physically unwell (e.g. have a cold or the ‘flu), you tend to
47 have more confabulations, and they can include more upsetting content.
48 - Your twin brother sometimes has similar types of experience, where he has
49 very vivid dreams and it takes him a while to realise whether or not they
50 happened. This is evidence that confabulation is probably an extension of a
51 normal memory phenomenon.”
52
53

54 [FIGURE 1 APPROX HERE PLEASE]
55

56 In addition to understanding Joe’s confabulation, an important part of our work
57 was to develop strategies to differentiate between actual and confabulated
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3 memories. The strategies were a calendar for logging completed and planned
4 activities, a key question to clarify whether or not a potential confabulation
5 was worth verifying (if not, he was simply to identify a way he would rather
6 spend time), and a “Sherlock Holmes” procedure for examining memories
7 considered sufficiently important or troubling to warrant attention. The diary
8 was comprehensive in its time coverage, but succinct in its activity
9 descriptions. It was initially completed with a family member’s assistance and
10 in paper format, before being transferred to Google calendar, which Joe was
11 learning to use as part of his other rehabilitation goals. The Sherlock Holmes
12 procedure simply involved using the Notes application on his phone to write a
13 note of the memory to investigate, and then a series of prompts to weigh up
14 the likelihood of the event having happened, by examining the memory in
15 relation to the time in which it happened (using the calendar), using other
16 evidence from his phone (e.g. pictures and messages), and speaking to
17 someone he trusts about it. After this process had become incorporated in his
18 routine, he began examining the potential confabulation against what he
19 understood about his confabulations more generally, in terms of themes and
20 structure. Once investigated, the memory was ticked off the list and stored in
21 a separate section.
22
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24
25

26 **UNDERSTANDING CONFABULATION: JOE’S PERSPECTIVE**

27
28 *In my confabulations, actual series of events seem to get over-dramatized to*
29 *make sometimes an elaborate story with elements of truth. It happens*
30 *completely unintentionally, and feels very real. This links to my cognitive test*
31 *results, which showed “overfamiliarity” in my memory for things that I hadn’t*
32 *actually seen. I believe that overfamiliarity came naturally to me early in my*
33 *rehabilitation, when my memory was almost non-existent. I probably had no*
34 *idea that a lot of my memories may have been confabulations!*
35

36
37 *Confabulation makes it harder to believe myself and forces me to question*
38 *myself. It feels like a lot of my precious time is used trying to investigate*
39 *whether something did actually happen. I fear for my sanity, “normal” people*
40 *don’t have to cope with this! Am I just being stupid? No; I am told*
41 *confabulations can happen to anyone! Personally, I hope that it may a good*
42 *sign (however confusing that sign may be) because I’ve always been very*
43 *imaginative and pre-injury I was quite fond of lucid dreaming! A lucid dream is*
44 *any dream during which the dreamer is aware that he or she is dreaming. My*
45 *brother and I used to talk in great detail about our lucid dreams. So I think that*
46 *ability may have returned without intention.*
47

48
49 *Good use of coping strategies has made it a lot less problematic. The coping*
50 *mechanisms are very simple: document everything! I use Google Calendar*
51 *and recommend it to everyone. Mine is called “Team Forrester” which lets me*
52 *know all the family’s plans, including my own. If I need to check if a possible*
53 *confabulation happened, I usually just check the calendar on my iPhone or*
54 *ask friends and family to weigh up the likelihood of them actually having*
55 *happened. The use of modern technologies is vital for this. If the strict*
56 *monitoring system is followed, then the confabulations are much less of an*
57 *issue.*
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4 *When the confabulations have elements of truth, they are more difficult to*
5 *investigate. One strong argument against their reality though, is that their*
6 *general plot is quite dream like, and there are set of common themes. For*
7 *example, there is always a bad guy, good guy, argument or embarrassment.*
8

9
10 *The confabulations were more frequent and became more vivid when I was*
11 *feeling poorly with flu and also when I was feeling a bit emotionally down. At*
12 *this time, they were also always more negative. As soon as I got better the*
13 *confabulations decreased.*
14

15 *The hardest thing, but one of **the** most important things is just forgetting them!*
16 *I do feel a bit crazy when it happens and a bit down while I investigate, but it*
17 *is getting much better. I see it as part of my recovery that I am able to assess*
18 *my situation, and a good sign that now I am aware and can use coping*
19 *mechanisms to try and restrict my confabulations. On the bright side, it also*
20 *means that I have a very lively imagination!*
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23

24 **CONSOLIDATING JOE'S NEW UNDERSTANDING**

25
26 Towards the end of Joe's rehabilitation programme, he began speaking to the
27 other clients at the Centre about confabulation, and put together a
28 presentation, "The Dummies Guide to Confabulation" (named after a popular
29 book series published by Wiley & Sons) with the aim of sharing what he had
30 learned with others. The idea for the current paper developed from this. Soon
31 afterwards, Joe attended a talk as part of the Wellcome Trust exhibition on
32 States of Mind: Tracing the Edges of Consciousness (2016), where he
33 learned more about false memories and met another person with brain injury
34 who had confabulation. This was a really interesting experience for Joe and
35 his family, and helped to consolidate the things he had learned in his time at
36 OZC. At a review six months after Joe completed his programme, he
37 continued to use the strategies. Joe and his family reported that though the
38 confabulation was still present, they all have a much better understanding of
39 it, and it was much less problematic than was previously the case. There had
40 been times when Joe has felt invalidated by people assuming that he was
41 confabulating, but he dealt with this very sensibly by speaking with the people
42 involved and asking them to investigate it if he personally did not want to or
43 see it as sufficiently important to investigate himself. This worked well, and
44 demonstrates the degree of ownership that Joe has over his confabulation,
45 and increased autonomy in shaping his support system. At the final review 12
46 months after the rehabilitation programme, Joe and his family reported that he
47 now confabulated only rarely when he was over-tired or unwell. He also
48 demonstrated high-level insight, for example on an occasion where he had
49 misplaced his keys, and remarked that if he had still been confabulating he
50 would probably think someone had stolen them.
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54 **DISCUSSION**

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56 In this paper we have reported on a case of behaviourally spontaneous
57 confabulation in a young man several years after a traumatic brain injury,
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3 referred to here as Joe. We include his first-hand narrative of his experience
4 of confabulation, and describe the psychological intervention we successfully
5 undertook to reduce the confusion and emotional distress associated with it.
6 We were motivated to write this piece to increase knowledge about the clinical
7 presentation and phenomenology of confabulation, and to describe a
8 successful psychological intervention. We think it is a good example showing
9 (a) how theory can influence practice, as we used the evidence-base to build
10 our understanding of the experience, and also (b) that abundant theory does
11 not *necessarily* lead to improved practice. The latter is evident in the number
12 of treatment-focussed papers on confabulation available, where there were
13 perhaps a dozen of direct relevance, and only five case reports in four papers,
14 relative to the hundreds of papers on theories of confabulation. We wanted to
15 write this piece together as first-person perspectives in neuropsychological
16 rehabilitation are rare relative to other health domains (e.g. cancer, mental
17 health). We do not know of any other published report of this type. We hope
18 that our joint paper will help clinicians to understand more about what it can
19 be like to confabulate, and for other people in a similar situation to know that
20 they are not the only person experiencing something like this.
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24 The approach to intervention we used is not likely to suit every person with
25 confabulation. We think it was particularly suitable for Joe as he had a strong
26 sense of curiosity about the phenomenon he was experiencing, retained good
27 intellect, could remember key points from sessions with sufficient repetition,
28 and had a very supportive family and home environment. Were these factors
29 not present, a different management approach may have been warranted.
30 Further, the cognitive underpinnings of confabulation can vary considerably,
31 and interventions need to be tailored accordingly. In particular, it is obvious
32 that the degree of amnesia and executive impairment will likely influence the
33 type of intervention selected, and for people with severe amnesia behavioural
34 management strategies are likely to be of greatest benefit. The important
35 lesson from this work is that for those with relatively stable presentations, and
36 in the context of a therapeutic relationship and sufficient cognitive ability, it
37 is possible to increase clients' awareness and understanding of confabulation. It
38 is in turn possible for this understanding to reduce distress, make the difficulty
39 more manageable by enhancing the uptake and effectiveness of
40 compensatory strategy use, and even to reduce the frequency of
41 confabulation.
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45 The type of confabulation that Joe showed is similar in some ways to the case
46 reported by Burgess & McNeil (1999). This case also showed a degree of
47 insight, and found that filling in a diary helped him to realise that he was not
48 remembering events as they had actually happened. However, Joe's case is
49 distinct in that his confabulations were more varied in content, and the former
50 case did not come to understand his difficulty as confabulation, or become
51 aware that it is an established consequence of brain injury that other people
52 also experience.
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55 The intervention reported here shared similarities with DeLuca's (1992)
56 awareness-based intervention for confabulation. Both aimed to help the
57 persons with confabulation to learn about their memory problem and to find
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ways of identifying when they were confabulating, alongside other rehabilitation interventions. Both hence served to initially increase Joe's intellectual awareness (i.e. knowing that they confabulate), then to develop emergent awareness (i.e. knowing when they are confabulating), and finally anticipatory awareness (i.e. recognising in advance situations in which they may be likely to confabulate). Something that distinguishes this piece of work from earlier awareness-based approaches is the use psychological formulation as a means of developing awareness. Formulation is now commonplace in clinical psychology and neuropsychology but was not at the time of the previous published reports. Interestingly, Joe's confabulation emerged much later on in his recovery than most of the cases who have participated in awareness-based interventions reported in the literature, all of whom have all been within the first six months after injury when treatment commenced. The one more chronic case, who was six years post-injury when treatment for confabulation commenced, was successfully treated but via a behavioural management approach focussed on developing awareness of swearing rather than of confabulation.

Of course, this work has a number of limitations. We did not directly measure the frequency of Joe's confabulations, and as such we rely on the feedback from Joe and his family in concluding that the confabulation has reduced. We did consider monitoring the frequency and/or content of the confabulations, but thought that the potential benefits were outweighed by the limitations of (a) not being certain about what constituted a confabulation given independent verification is not always possible, (b) wanting to give Joe agency over dealing with the phenomenon (rather than, for example, asking family members to provide ratings). Also, and as previously stated, our primary focus was on reducing the emotional impact of the confabulation rather than the confabulation itself, and because of this, Joe's self-report is the most important indicator of outcome. Similarly, we did not repeat assessment of Joe's cognitive functioning. This was primarily because we did not expect any changes in cognitive status to occur at this stage after injury except those that might reflect the adoption of strategies during testing. Another contributing factor towards this decision is that we do not typically repeat cognitive assessments at the end of a rehabilitation programme as part of our routine clinical work, given we subscribe to the philosophy that rehabilitation outcomes should not be measured by change in performance on cognitive tests (Wilson, 2003). Another limitation of this study is that we cannot be sure that the positive effects resulted from the processes of formulation and strategy use versus other aspects of rehabilitation, or indeed, experiences occurring outside rehabilitation or as a natural product of time. However, it would not have been practicable to conduct this particular piece of work in a controlled experimental manner. We think that each of these factors probably facilitated either Joe's understanding of his confabulation, and/or the decreased emotional impact of it.

There are other questions that remain to be resolved. We do not know if the elevated rate of false positive errors on memory testing, or "over-familiarity", as we referred to it, was a consequence of Joe's brain injury, or something that existed previously. This is particularly pertinent given Joe's premorbid

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3 interest in lucid dreaming and Corlett et al.'s (2014) findings that lucid
4 dreamers make more false alarm errors than controls. It would be possible to
5 examine this issue by testing Joe's twin, also a lucid dreamer, on the same
6 memory test. Similarly, we do not know if Joe would have demonstrated
7 impaired reality filtering given clinical versions of tests such as those used in
8 Nahum et al. (2012) are not available. However, the findings from either
9 examination would not necessarily be conclusive, and importantly, it is not
10 clear that the intervention would have differed at all had we conducted further
11 such investigations.
12

13
14 When we met to finalise this paper, Joe made an astute observation, with
15 which we will close this paper: *in order to overcome any problem, the first*
16 *thing is to understand it in detail, then you can come up with an intelligent*
17 *solution.*
18
19

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28
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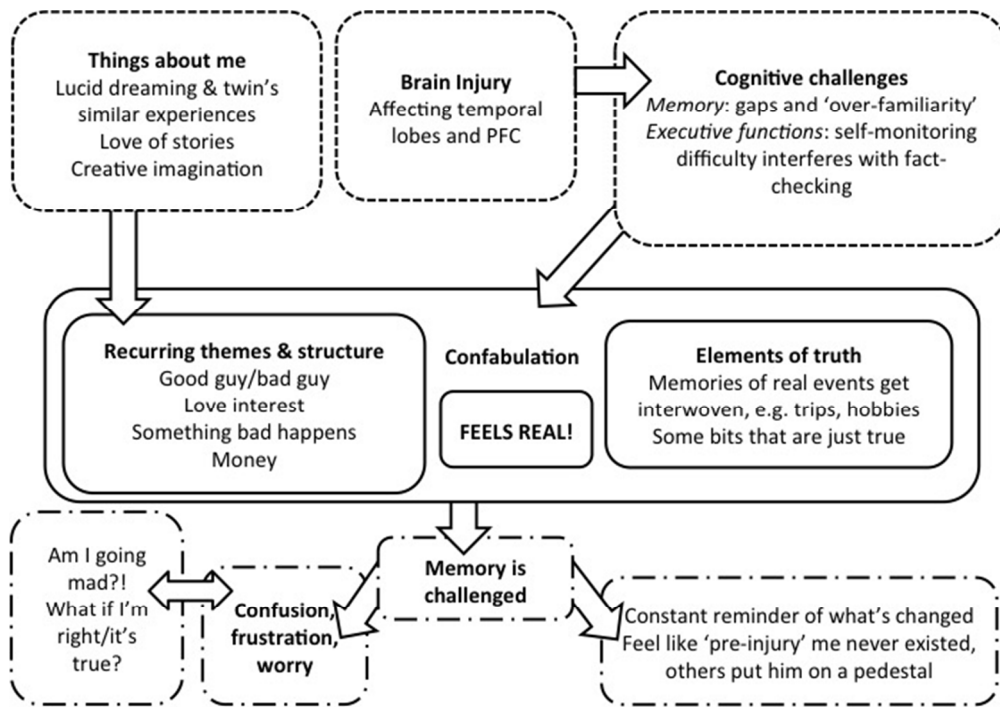


Figure 1. Formulation diagram showing personal, brain-based, and cognitive contributions to confabulation (in the upper dashed boxes), our understanding of the experience of confabulation (in central solid-lined boxed), and its consequences (in lower dot-dashed boxes).

247x172mm (72 x 72 DPI)

Appendix 1. Neuropsychological assessment results from approximately three years post-injury.

Wechsler Adult Intelligence Scale – Fourth UK Edition (WAIS-IV)				
Subtest	Raw Score	Scaled Score	Percentile	Classification
Block Design	46	10	50	Average
Similarities	23	9	37	Average
Digit Span	26	9	37	Average
Matrix Reasoning	20	11	63	Average
Vocabulary	37	11	63	Average
Arithmetic	12	9	37	Average
Symbol Search	15	4	2	Impaired
Visual Puzzles	8	6	9	Low average
Information	9	8	25	Average
Coding	35	4	2	Impaired
WAIS-IV Index Scores				
	Index Score	Percentile	Classification	
Verbal Comprehension	96	39	Average	
Perceptual Reasoning	94	34	Average	
Working Memory	95	37	Average	
Processing Speed	68	2	Impaired	
Rivermead Behavioural Memory Test – 3rd Edition (RBMT-3)				
Component	Raw Score	Scaled Score	Percentile	Classification
Names Delayed Recall	0	3	1	Impaired
Belongings Delayed Recall	3	2	0.4	Impaired
Appointments Delayed Recall	1	5	5	Borderline
Picture Recognition	15	11	63	Average
Story Immediate Recall	3.5	6	9	Low Average
Story Delayed Recall	0	1	0.1	Impaired
Face Recognition	3	1	0.1	Impaired
Route Immediate Recall	7	3	1	Impaired
Route Delayed Recall	4	1	0.1	Impaired
Messages Immediate Recall	2	2	0.4	Impaired
Messages Delayed Recall	4	5	5	Borderline
Orientation and Date	10.5	4	2	Borderline
Novel Task Immediate Recall	15	3	1	Impaired
Novel Task Delayed Recall	4	2	0.4	Impaired
General Memory Index	49	55	0.1	Impaired
Test of Everyday Attention				
	Raw Score	Scaled Score	Percentile	Classification
Map Search 1	36	7	16	Low average
Elevator Counting	7/7	n/a	n/a	Normal range
Lottery	10	13	84	High average
Delis-Kaplan Executive Function System (DKEFS) Verbal Fluency				
Component	Raw Score	Scaled Score	Percentile	Classification
Letter Fluency	26	7	16	Low Average

Category Fluency	35	9	37	Average
Category Switching	8	3	1	Impaired
Category Switching Accuracy	7	5	5	Borderline
DKEFS Color Word Interference				
Component	Raw Score	Scaled Score	Percentile	Classification
Colour naming	34	7	16	Low Average
Word reading	30	5	5	Borderline
Inhibition	50	10	50	Average
Inhibition/switching	70	7	16	Low Average
Behavioural Assessment of the Dysexecutive Syndrome (BADS)				
Component	Profile Score		Interpretation	
Key Search	0		Impaired	
Zoo Map	1		Impaired	
Hotel Test (Manly, Hawkins, Evans, Woldt, & Robertson, 2002)				
Component	Raw Score		Interpretation	
Tasks Completed	2/5		Out of normal range based on Manly et al (2002).	
Cleveland Verbal Working Memory Test with Interference (Mack, unpublished)				
Component	Raw Score	Scaled Score	Percentile	Classification
Trigram Recall	37	+.07	50	Average
Reverse Counting	8.2	-1.48	7	Borderline
Cleveland Recognition Memory Tests (Mack, unpublished)				
Component	Sensitivity (d')	Response bias (C)	Interpretation	
Visual-nonverbal first half	-.143	-.511	Poor sensitivity, slight improvement in second half, liberal response bias	
Visual-nonverbal second half	0.272	-1.09		
Auditory-verbal first half	1.075	-.689	Initially reasonable sensitivity, deterioration in second half, liberal response bias	
Auditory-verbal second half	0.332	-.606		