Implausible Future Events in a Confabulating Patient with an Anterior Communicating Artery Aneurysm

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Abstract

Patient MW, a known confabulator, and healthy age-matched controls produced past and future events. Events were judged on emotional valence and plausibility characteristics. No differences in valence were found between MW and controls, although a positive emotional bias toward the future was observed. Strikingly, MW produced confabulations about future events that were significantly more implausible than those produced by healthy controls whereas MW and healthy controls produced past events comparable in plausibility. A neurocognitive explanation is offered based on differences between remembering and imagining. Possible implications of this single case in relation to confabulation and mental time travel are discussed.

Introduction

A recent focus in human memory research is the overlap between cognitive processes used in retrieving past events from one's personal life and the construction of imagined future events. Neuroimaging and behavioural data suggest that imagining and remembering draw upon similar brain regions and mental processes (Abraham, Schubotz & von Cramon., 2008; Addis et al., 2007, 2009; Botzung, Denova & Manning, 2008; D'Argembeau & Van der Linden, 2004; Hassabis, Kumaran & Maguire, 2007a; Okuda et al., 2003; Schacter & Addis, 2007) and emerges at around 3-5 years of age (see Atance & O'Neill, 2001; Perner & Ruffman, 1995). In the current paper we examine these issues from a neuropsychological viewpoint. In short, does a patient who re-constructs implausible memories of non-existent past events also show a similar generation of implausible future events?

The relationship between remembering and imagining has its roots in neuropsychology – for instance, patients with circumscribed amnesia find it difficult to imagine future events (e.g. Hassabis, Kumaran, Vann & Maguire, 2007b; patient DB, Klein, Loftus & Kihlstrom, 2002; patient KC, Tulving, 1985, 2002). Recently, there has been an upsurge in interest in this relationship in healthy populations, and in particular neuroimaging studies (e.g. Addis et al., 2007, 2009; Botzung, Denvoka & Manning., 2008; Hassabis, Kumaran & Maguire., 2007a; Okuda et al., 2003). In these studies, whereby participants are required to reconstruct autobiographical events or construct novel but plausible future events, a core network has been delineated. This system covers the medial temporal lobe (in particular, the hippocampal cortex), posterior cortices and medial prefrontal regions (Abraham, Schubotz, & von Cramon, 2008; Addis, Wong, & Schacter, 2007; Botzung, Denkova, & Manning, 2008; Szpunar, Watson, & McDermott, 2007), An emerging consensus is that both past and future events

may be mentally constructed using a common episodic construction system (Addis et al., 2007; Atance & O'Neill, 2001; Schacter & Addis., 2007; Suddendorf, Addis & Corballis., 2009) or at the least that imagining future events is heavily reliant on memory (Szpunar & McDermott, 2008; D'Argembeau & Van der Linden, 2004; Okuda et al, 2003). In particular, Addis, Schacter and colleagues have focussed on the novel re-combination of episodic details involved in simulating future events and its commonalities with episodic memory (Addis et al., 2007, 2009, Schacter & Addis, 2007, *constructive episodic simulation hypothesis*). One underexplored question that may be pertinent to these theoretical perspectives is what happens to imagined future events when the autobiographical memory system becomes distorted as per confabulation after brain damage. One recent experimental study has found that confabulators misrecognise more false autobiographical memories and future events as true, recent memories than non-confabulating amnesics (Fotopoulou et al, 2007a). These results suggest that the same deficit in reality monitoring may be responsible for confabulations, irrespective of their temporal source or context.

Interestingly, some researchers have tentatively suggested a link between remembering and imagining in pathological forms of memory distortion (Dalla Barba, Cappelletti,, Signorini, & Denes, 1997; Schacter & Addis., 2007). In two notable studies of confabulation (Dalla Barba et al., 1997, 1999), Dalla Barba and colleagues specifically assessed future confabulation using a word-cue paradigm and ten questions (e.g. 'what are you going to do in a few minutes?) that mirror ten questions referring to the past (Confabulation Battery, Dalla Barba, 1993a). In both tasks they found that the percentage of future confabulations was equal to or greater than past confabulations. Intriguingly, a positive correlation has been demonstrated between past and future confabulation on the word-cue task (Dalla Barba et al., 1997) and the confabulation battery (Lee et al., 2007). In the current

paper we emulate this approach but we also aim to compare the qualities of the confabulated future and past events and particularly their valence and plausibility characteristics.

Overall, there are many instances of patients anticipating unlikely personal events in the confabulation literature. For example, patients hospitalized for many years confidently insist they are only visiting for brief observation and need to go to a meeting; and in some extreme cases act upon these false beliefs (e.g. Fotopoulou, Solms & Turnbull., 2004; Schnider, von Daniken & Gutbrod, 1996; Talland, 1961). These often mirror the character of plausible past confabulations, in the sense that one can trace a relation between the confabulated future event and events that occurred in the patient's pre-injury life. To explain these observations and to contextualise our case study, we shall now describe *strategic retrieval*, *source monitoring*, *temporality* and *motivational* explanations of confabulation.

Strategic retrieval can be defined as higher-level effortful memory processes which consist of searching and retrieving details from long-term memory and monitoring their relevance based on task demands (Conway, 2005; Moscovitch, 1989; Moscovitch & Melo, 1997). To date, several authors have argued that confabulation arises out of disruption to strategic retrieval processes (Burgess & Shallice, 1996; Gilboa, Alain, Stuss, Melo, Miller, & Moscovitch, 2006; Moscovitch & Melo, 1997). Supporting evidence for this view comes from the fact that confabulations are equally likely to concern post-injury events as they are distant pre-injury events (implicating retrieval, not encoding). Furthermore, a combination of deficits affecting memory and executive function, typically found in confabulating patients, are seen as critical in the disruption of retrieval processes which lead to confabulatory behaviour (Gilboa et al., 2006).

A line of research particularly relevant to this study is *source monitoring* - the ability to reflect upon and accurately determine the origin of stored representations (Johnson,

Hashtroudi & Lindsay, 1993). A critical aspect of source monitoring involves distinguishing between internally generated mental experiences (e.g. daydreams, imagined scenarios) and perceptions derived from external sources (cf. *reality monitoring*; Johnson & Raye, 1981; Johnson, 1991; Johnson, Hashtroudi & Lindsay, 1993). Importantly, errors of reality monitoring resulting from brain damage, such as confusing previous thoughts with actual past experiences, can lead to confabulatory behaviour (i.e., Johnson, 1991; Johnson, Hayes, D'Esposito & Raye., 2000). However, to date, reality monitoring accounts of confabulation have focussed on how impaired reality monitoring can lead to distortions of the past, rather than the future (Johnson, 1991; Johnson et al., 2000; see also Turner, Cipolotti & Shallice, 2010). Under the Multiple-Entry Modular memory framework (Johnson, 1991) a neurocognitive system was delineated which consists of perceptual and reflective processes. Reflective processes may include using metamemory 'heuristics' (e.g. 'I know it is a memory as it is more perceptually rich than an imagined event' see Johnson, Foley, Suengas & Raye., 1988) as well as judgements of the memory's internal consistency and plausibility. Of interest here, confabulation could represent a disruption of reflective source monitoring processes (Johnson, 1991). Such reality monitoring processes could apply to future events in the same way as for personal memories and the same underlying source monitoring mechanism could underlie remembering the past and imagining the future (Johnson & Sherman, 1990).

Dalla Barba (2002) suggests that confabulation affects all levels of subjective temporality (past, present and future). Unlike dense amnesic patients, his patients were aware of their own subjective temporality (e.g. patient G.A, Dalla Barba et al., 1997). However this invariably corresponded to the patient's life prior to brain injury as opposed to a reality that was currently relevant. In this version of temporality theory, confabulators have a distorted rather than non-existent subjective temporality (see Schnider., 2003 for another variation). Williams & Rupp (1938) stated that 'never has the confabulation been a pure fiction

emanating from the imagination. Much of the vividness of the confabulation arises from the juxtaposition in time of a colourful past contrasted with an uneventful present, and when viewed in its proper time sequence, much of its colour is lost' (p. 401). Following this view, temporal confusion theories can account for both apparently fantastic and non-fantastic confabulations and may explain why some confabulators have an inaccurate view of their past, present and future (e.g. Dalla Barba et al., 1997).

An alternative view that may account for personal biases in confabulation is that of the Self Memory System (Conway & Pleydell-Pearce, 2000; Conway, 2005) whereby autobiographical memory forms the basis for understanding the self. The importance of motivational aspects of confabulation is demonstrated by the inclusion of personal biases in several recent cognitive formulations of confabulation (see Gilboa et al., 2006; Metcalf, Langdon & Coltheart., 2007; Fotopoulou et al., 2007b, 2008). Several experimental studies provide support for the role of the self in autobiographical memories (Rathbone et al., 2008, 2009) and future events (Rathbone et al., 2011). Recent evidence examining how the contents of long term memory are sampled to imagine future events (Szpunar & McDermott, 2008) indicates that inaccurate future plans *could* reflect distorted autobiographical memories. The present or 'working self'- that dynamically evaluates autobiographical knowledge in relation to current goals- may also have an influence in how future selves are envisaged (Conway, Pleydell-Pearce, Whitecross, & Sharpe, 2003; Conway, 2005): Distorted or idealised working self mental models, therefore, could determine the plausibility (or implausibility) of confabulated future events (see Conway & Taachi, 1996 for a case example).

Indeed, a key concept in the study of confabulation is plausibility and this has been used to describe and categorize earlier (Berlyne, 1972; Talland, 1961) and recent (Metcalf, Langdon & Coltheart, 2007) observations of the disorder. Plausible confabulations are typically grounded in the patient's pre-morbid habits and lifestyle. Patients often produce a variety of

reports that reflect this, including underestimating the current year (e.g. patient GT, Berlyne, 1972) and claiming they have recently seen loved ones (e.g. patient SD, Metcalf et al., 2007; patient MB, Dalla Barba, 1993b) or had been performing household tasks (e.g. patient GA, Dalla Barba et al., 1997). Most notably these consist of contextual errors that are derived from genuinely experienced events. Implausible confabulations are narratives that are qualitatively different from the patient's actual memories or are generally bizarre or improbable. Descriptions of implausible confabulations can be traced back to Korsakoff's initial clinical observations (Korsakoff, 1889/1996). There are several examples of highly implausible confabulations resulting from neurological damage. Dalla Barba described a patient who, when asked about a previous trip to the cinema, claimed he had met a famous Italian TV host (Dalla Barba, 1993a) and Kopelman, Ng & Van den Brouke, (1997) described a patient who described her own wedding even though she was unmarried. This notion of confabulation resembles 'fantastic' confabulation characterised by Berlyne (1972) which has been linked specifically with frontal lobe damage (Kopelman, 1987). There are more examples of this type in the confabulation literature (e.g. patient E.S., Fotopoulou et al., 2004; patient A.B., Kopelman et al., 1997), but there are far fewer patients in general who consistently produce *florid* or *fantastic* confabulations. The bizarre content is often produced in severe and acute cases of neurogenic confabulation, although long term confabulators similar to the one reported here, have also been documented (Schnider, Ptak, von Daniken & Remonda, 2000).

Despite its usefulness as a concept, some hold reservations over plausibility as a reliable measure. This is largely because classifying an account as implausible or bizarre typically relies upon subjective judgements which may be affected by preconceptions held by the researcher (Kopelman, Ng & Van den Brouke, 1997; Johnson et al., 2000). Also, confusion arises in the interpretation of what can be defined as an implausible confabulation. Some

confabulations can be internally consistent and probable but dramatically inconsistent with an individual's autobiography (e.g. patient GA, Dalla Barba et al., 1997). On the other hand, they can be generally improbable and clearly false (e.g. 'my dead friend is in New York', 'I went to have afternoon tea on Mars'). In this study, to overcome these limitations, we used a clear conceptual definition of general plausibility which independent judges used to rate statements (see Method and Appendix A). This definition, adapted from Scoboria Mazzoni, Kirsch & Relyea (2004), specified a plausible event as one that could have occurred or has the potential to occur to people in general. To our knowledge, this case study is the first in the confabulation literature to formally assess plausibility and may provide a novel characteristic with which researchers can assess past and future confabulation.

In sum, the current study attempted to directly assess the plausibility of confabulations produced by a known confabulator. Furthermore, this measure was utilised to assess quantitative differences between past and future events produced by a confabulator and five healthy age-matched controls. If there are overlapping processes in the remembering of past events and the imagining of future events, we might expect to observe equally implausible events produced for the past as for the future. If confabulation results from temporal confusion *or* dysfunctional retrieval monitoring then it would seem to be a deficit which would equally affect future and past events. To address these issues we used a word-cue paradigm (Crovitz & Shiffman, 1974) to elicit past and future personal events to explore these issues with a persistent confabulator, MW. Considering the relevance of emotional valence in confabulation (Fotopoulou, Solms & Turnbull., 2004; Fotopoulou, 2010), we also assessed whether MW's events were more positive than controls' and attempted to replicate the positive emotional bias for future versus past events (e.g. Berntsen & Jacobsen, 2008; Newby-Clark & Ross, 2003).

Patient MW

Case Description

MW, a right-handed 63-year old man, had a long career in the Police Force and became a Detective Chief Inspector in the late 1980s. He had no known psychiatric history. There was no evidence of 'tale spinning' before the onset of his injury, and he was described as a charismatic and well-respected man, according to his wife and a former colleague. In October, 1990 he was found unconscious by his wife. After hospital admission, a CT scan indicated a ruptured aneurysm of the anterior communicating artery. The aneurysm was clipped, but MW suffered a vasospasm five days later, occluding blood flow and resulting in a severe frontal lobe infarction. During subsequent months in the post-operative period, clinical notes indicated he was 'profoundly disoriented in time and place' and spontaneously confabulated. Confabulatory behaviour is not uncommon in the period after an anterior communicating artery aneurysm (Metcalf, Langdon & Coltheart, 2007).

He was discharged to his wife soon after but needed continual care. In the acute stage, medical notes indicated that MW reported visual hallucinations of 'spiders coming out of the skirting board'. Later, MW described these earlier experiences to us with emotional distance and objectivity. Clinical reports described him as socially disinhibited (e.g. telling inappropriate jokes), impulsive, with problems in planning. For these reasons and due to some episodes of verbal aggression, MW attended a rehabilitation unit for several years until entering supervised community accommodation.

Confabulation in Everyday Life

MW's confabulations continued from the time of injury through to when our main assessments took place 17 years post-injury. His confabulations were momentary and spontaneous (Berlyne, 1972). According to carers, MW would confabulate about past happenings and future plans at a rate of approximately 5 per day. For example, MW would claim he had seen a famous person when visiting town that day despite being supervised by the carer the entire time. On one occasion, his wife recalled an incident in which MW said he had 'received a message' that a close friend had died. However, she was aghast to see the friend in question on the high street the week after, especially as she had already sent the condolence letter. MW would also tell rehabilitation staff future plans that were patently false (e.g. 'I'm going on that quiz next month'), sometimes specifying the date when they would occur, similar to other cases reported by Dalla Barba and colleagues (1997, 1999).

Neuropsychological Evaluation

MW's scores on a range of standardised psychometric tests can be seen in Table 1. MW was well oriented to his surroundings and had a Full Scale IQ of 102 on the Wechsler Adult Intelligence Scale (WAIS III; Wechsler, 1997a). Across the subtests of anterograde memory, MW scores were normal or below average (e.g. visual immediate memory), with a significantly reduced Memory Index (84, Wechsler Memory Scale III, 1997b) compared with his normal Verbal Intelligence Score (114) which reached significance at the .01 level. Interestingly, most of his memory scores were reduced by intra-list and extra-list intrusions (often seen as confabulation-like behaviour, e.g. Dalla Barba, 1993b; Fotopoulou et al., 2004; Kopelman et al., 1997; Schnider et al., 1996). In addition, MW had difficulty with memory tests associated with executive function such as the backward digit span (Standard Score=8, 25th %ile). In tests designed to assess executive function, MW was impaired on the Wisconsin Card Sorting Test (WCST; Heaton, 1993), Brixton Test (Burgess & Shallice, 1997) and several subtests of the BADS (Wilson et al., 1996).

(Insert Table 1 about here)

Autobiographical Memory Interview

We administered the Autobiographical Memory Interview (Kopelman, Wilson & Baddeley, 1990). MW's retrograde memory was characterised by errors of commission, not omission: all MW erroneous responses about his personal past were confabulatory. To assess the veridicality of his responses, a transcription of the interview was sent to his wife. She classified his responses as either confabulations or accurate memories, although all responses were given with apparent confidence in their accuracy. A greater amount of memories were retrieved from childhood and early adulthood and conversely a greater amount of confabulations were produced for more recent time periods (Childhood: personal semantic= 10%, autobiographical incidents= 33%; Early adulthood; personal semantic = 20%, autobiographical incidents= 45% Recent life: personal Semantic= 33%, autobiographical incidents= 44%). In terms of confabulations not tied to a specific episode, when asked what qualifications he gained, he stated *'four; GCEs in History, English, Biology, Metalwork'* (his wife confirmed that MW gained none of these). In terms of autobiographical events, MW either produced repeated confabulations that happened to another individual (He would repeatedly re-tell a story of seeing a Lion after a day shift even though he heard this had happened to a friend) or events grounded in an accurate personal context with confabulatory detail. These mirrored the confabulations he produced in everyday life.

Confabulation Battery

To assess his confabulations more formally, the Confabulation Battery (Dalla Barba, 1993a) modified for English speakers (Kopelman et al., 1997) was administered which consisted of

seven sections including two *Don't Know* (DK) sections in which answers are generally unknown (e.g. How many Renault cars were sold in 1985?) which assesses the general propensity to fill gaps with confabulatory responses in the absence of a correct answer. We also included the 'Future Episodic' section used previously (Dalla Barba et al., 1997, 1999). All responses were transcribed and coded according to Dalla Barba's criteria (all responses except 'don't know' were classed as confabulations in *Don't Know* sections). A copy of the transcript was also sent to MW's wife. To corroborate MW's responses the first author consulted rehabilitation staff, medical notes and the transcript returned by MW's wife.

Consistent with his performance on the AMI, MW produced false memories on both the Personal Semantic (15%) and Episodic (33%) sections. In the Episodic Section, when asked his recollection of Princess Diana's death, his response was: "actually, I got up and switched the TV on and I couldn't believe what I was seeing because I had protected her the year before" [actually he had guarded her but before 1990, not in 1996]. It appears that these confidently held beliefs were derived from directly experienced happenings or heard of events. None of the confabulations in these tests could be defined as 'semantically anomalous' (Dalla Barba, 1993b) or 'fantastic' (Berlyne, 1972). In the Future Episodic Section, MW produced plausible future incidents (as confirmed by his wife who gave '7' ('extremely plausible') ratings for all his responses), and MW said 'don't know' when he was unsure of his future plan.

Summary

In short, MW retained average intellectual function for his age but showed clear executive deficits and scored slightly below average on tests of memory function, demonstrating some evidence of confabulatory behaviour under formal testing. MW's test scores on the AMI and Confabulation Battery confirmed a pattern of responses indicative of a confabulating patient.

Past – Future Word Cue Task

Overview of Methods

We administered MW and controls an adapted version of a standard cue-word task (Crovitz & Schiffman, 1974) to elicit (a) eight specific personal memories and (b) sixteen specific plausible, semantically and autobiographically, i.e. in the context of his life, future events. Considering the data amassed regarding MW's confabulatory behaviour related to past events, we decided to double the amount of cues for the future condition to allow a greater understanding of his potential future confabulations. We subsequently asked three independent and naive judges to assess the plausibility and valence of event protocols originating from MW and five non-confabulating controls. We also asked MW for subjective confidence ratings of his own 'future events' and subjective ranking of half of them (those produced in the first week of the *Past-Future Word Cue Task*) in terms of plausibility. Transcriptions of MW's confabulations were sent to his wife to calculate the frequency of confabulation in each temporal direction. Details of these methods are presented below.

Control Participants

In total, five healthy aged participants (2 male) comparable in age (Mean=69.4, SD=4.56, Range = 63-75; MW=63), and intellect (National Adult Reading Test; Mean=42.4, SD=2.97; MW=41) to MW were recruited from the Institute of Psychological Sciences Older Adult Participant Panel and gave written informed consent in accordance with Institute ethical procedures. Participants from the control group had no significant psychological or neurological disorders and all achieved high Mini Mental State Examination (Folstein, Folstein & McHugh, 1975) scores of 29 including MW. Each participant completed past and future components of a *Past-Future Word Cue Task.*

Materials

The same eight common nouns (train, market, money, cinema, hospital, letter, mountain, restaurant) as Dalla Barba et al (1997, 1999) were used for past and future events in addition to a further 8 nouns (house, garden, bar, book, car, gift, bicycle, seaside) which were appended to the list of future event cues. Words were presented in large black type on separate size A5 white cards.

Procedure

Participants were asked to recall plausible personal past events or imagine plausible future events, which were unique in time and place and lasted no longer than a day. In the future condition, participants were instructed to imagine and describe specific events they envisage to *plausibly* happen in their personal future. All participants performed this task individually in a quiet environment. To illustrate the specificity required, participants were given an example of a general and specific past and future event. Participants were allowed to describe events from any temporal period (recent or remote) and tasks in both conditions were participant-paced. To allow participants a chance to practice, two practice trials were provided (using the words 'farm' and 'police station'). If participants understood the task, they were presented with each cue card separately from the experiment proper and asked to describe a past or future event related with that word. If participants appeared to struggle to bring to mind an event, the experimenter encouraged participants to produce events related to autobiographical life-time periods (e.g. school days for past, retirement/travelling for future). Participants were given up to two prompts of the nature 'that's fine but can you imagine a specific incident related to that situation?' to encourage specific descriptions. Prompts were only given until a coherent event was produced or until both prompts were used. All cue words were presented in a pseudo-random order using an online randomiser tool (Urbaniak &

Plous, 2007). The order of conditions was not counterbalanced, because of the single case design: Participants always started with the 'memory' condition. To avoid fatigue and concentration problems, MW was tested in two sessions (eight past and eight future cues presented in Session 1; an additional eight future cues presented in session 2), conducted one week apart. All control participants were tested in a single interview.

Subjective Ratings

To assess MW's subjective experience of the events, two measures were taken. Firstly, after each event description, MW was asked to rate how confidently he thought the events did happen or would happen in the future (1-7, 1 =no confidence, 7 = extremely confident). Secondly, considering only his future events, in the second session, he was represented with 8/16 of his future events on separate cards (arranged randomly on the interview table) and asked to rank them in order of general plausibility (i.e. the likelihood that the event could happen to someone in general). This was included because a rigid adherence toward his implausible future events may indicate a more sever disorder concerning MW's ongoing perceptions about his future. On the other hand, acknowledging the improbability of his future events would indicate a moderate disorder limited to wilful event generation.

Corroboration of MW's Responses

Transcriptions of MW's confabulations were sent to his wife to calculate the frequency of confabulation in each temporal direction. Past events were classed as confabulations if they were incorrect in content or context (or both). Partial errors and inconsistencies were not classed as confabulations. Future confabulations were defined as events unlikely to occur to MW personally considering his probable future activities (see Dalla Barba et al., 1997).

Judges' Plausibility and Valence Scoring

A questionnaire was constructed containing all of MW's statements and a randomly selected subset from the five controls participants (10 past, 20 future). Specifically, two events from each control participant were included in the past section (30 total ratings) and four from each control in the future section (60 total ratings). Statements were randomly intermixed and presented in two parts (past, future; same order for each judge).

Three judges were selected who were all postgraduate students at the University of Leeds. Judges were unaware that any statement originated from neurological patient/s and were blind to the hypotheses of the study. They were told they would be required to rate a series of statements oriented toward either the past or the future. Judges were told that each statement was from a different individual and had to rate each statement separately (any common information such as location was removed so that judges would not link the origin of statements via inter-event consistency).

To assess the qualities of statements, each judge rated each on a continuous 1-7 scale for event plausibility (1=extremely implausible, 7=extremely plausible) and valence (1=negative, 4=neutral, 7=positive). The definition of plausibility was based on Scoboria et al's (2004) definition of general plausibility. That is, the likelihood that an event will occur in the general population. This can be dissociated from personal plausibility: The likelihood a certain event could have or will occur to oneself (Scoboria et al., 2004). In line with procedures defined by Fotopoulou et al (2007b), valence was rated in terms of the self-representation described in each statement. See Appendix A for scorer instructions for both scales

Results

Inter-rater Reliability

Intraclass correlations (one-way random effects) calculated for both measures indicated a moderate to high inter-rater reliability between the three judges (Valence: + .62; Plausibility: +.82). Although inconsistency did exist in that a small proportion of statements rated on opposite sides of the mid-point of each scale by different judges (plausibility, .15; valence, .15), in these circumstances the mean difference between ratings was only 2.9. Furthermore, no statement was rated on opposite extremes of either scale (i.e. 1 and 7).

Event Production and Corroboration Scores

On average, healthy controls produced 7.8 (*SD*=0.5) past events and 14.6 (*SD*=1.1) future events. MW produced 7 past events (z score = -1.6) and 16 future events (z score = 1.3). In terms of confabulation frequency, MW's wife identified as confabulations fewer past events (57%) than future events (95%).

Qualities of Past and Future Events

Judges' ratings of Plausibility of Past and Future Events

The different pattern in ratings associated with the past and future statements produced by MW and controls are illustrated in the frequency distributions presented in Table 2. To illustrate the type of events produced by MW, a sample of representative past and future events are presented in Appendix B. To explore whether MW's mean plausibility rating differed significantly from the control group, two modified t-tests for single case designs were conducted separately for past and future events (Crawford & Garthwaite, 2002). This method is preferable to *z* scores as it uses a *t* distribution based on the control statistics rather than estimated population parameters (Crawford & Garthwaite, 2002). Furthermore, to provide more conservative probability estimates of MW's performance, two-tailed (rather than one-tailed) tests were applied. This analysis showed that past events produced by controls and MW did not differ in their plausibility, $t(4)= -0.29$, $p = .79$ [*z* score = -.31] (see

Table 3 for mean and SD results). When MW's responses were split into confabulations and true memories (4 confabulations, 3 corroborated events), only confabulated events differed somewhat from past events produced by healthy controls, but this difference was not significant as assessed by this small number of events (confabulations, M=3.5, SD=1.8, z = -1.13, $t(4)$ = -0.91, p = .41; verified, M=6.0, SD=0.9, z = .56, $t(4)$ = 0.51, p = .64, Crawford & Garthwaite (2002)'s t-test).

(Insert Table 2 about here)

(Insert table 3 about here)

For future events, MW's statements were significantly less plausible than those produced by controls, $t(4)$ = -3.65, $p < .05$, two-tailed [z score = -4.0]. Although around 85% of MW's future events were rated on the implausible side of the scale, this was only the case for 3% of all events produced by controls. Subdividing future events into plausible and implausible events as judged by MW's spouse (providing an analogue to the analysis with past events) was unfeasible as only 1/16 of these was classed as personally likely ('Most likely to happen to me in the future is that I'll go into hospital and probably die there').

It was also optimal to directly assess whether the difference in plausibility between MW's past and future events was statistically significant. Following the recommendations for testing for dissociations between two tasks in single case studies when the N of the control group is small, the Bayesian Standardized Difference Test was applied (Crawford, Garthwaite & Howell, 2009). This test showed that the difference in MW's scores could be classed as a classic dissociation ($p < .05$) as a difference was exhibited in the future but not past condition (verifying the above analyses) and there was a sufficiently large standardized difference between the past and future when compared with the control sample scores. Furthermore, it

was estimated that 1.3% (95% CI, 0.00 – 13.8) of the normal population would be expected to exhibit a greater degree of dissociation between past and future scores than MW.

Judges' ratings of Valence of Past and Future Events

Two separate, modified *t*-tests were also calculated for emotional valence (Crawford & Garthwaite, 2002). These indicated no significant differences between the emotional valence of MWs events compared to the control group for past [$t(4) = -0.43$, $p = .69$] or future statements [$t(4) = 0.30$, $p = .78$]. These findings were confirmed when *z* scores were computed for past (z = -.47) and future (z = .33) events, showing only small deviations from the sample means. Dividing MW's past events into accurate and confabulatory responses led to similarly non-significant findings (confabulations, M=3.2, SD=1.5, $t(4) = -0.55$, $p = .61$; verified, M=3.8, SD=2.3, $t(4) = -0.23$, $p = .83$, Crawford & Garthwaite (2002)'s *t*-test). The Bayesian Standardized Difference Test showed that the pattern of MW's valence ratings could not be defined as a dissociation ($p = .56$) with an estimated 28% (95% CI, 5.2% - 62.8) of the population exhibiting a greater past-future discrepancy than MW.

As can be observed in Appendix B, many of MW's future events rated as implausible were prima facie wishful. To explore the emotional characteristics of his future confabulations, a correlation between emotional valence and plausibility ratings (on MW's 48 future event ratings) was conducted. This revealed a significant relationship between valence and plausibility such that implausible future events were more likely to be given positive ratings, Spearman's $r = -.37$, $p < .01$. This was not the case however for healthy controls, Spearman's $r = -.20$, $p = .14$.

Generally, results indicated that past events were rated around the neutral scale point (MW and controls combined, M=3.86, SD=1.82; 95% confidence intervals, 3.35 - 3.38), whereas future events were rated as somewhat positive (MW and controls combined, M=4.90,

SD=1.26; 95% confidence intervals, 4.66 - 5.14). Thus some evidence demonstrating a positivity bias was found for future versus past events for MW and healthy controls (see Table 3).

Subjective Awareness

Confidence in Past and Future Events

Following each event description, MW was asked to report the extent to which he believed the event occurred in his personal past and to what extent he believed each future event was likely to occur some time in the future. On a scale from 1-7 (1 indicating no confidence, 7 indicating certainty), MW responded 7 to all his past and future events. These ratings reflected the confident tone with which MW described past and future events.

Perception of Future Events

Although independent ratings were analysed, it was also important to gain an understanding of the future events from MW's perspective. In contrast to immediate responses made after each event, when asked to rank the events in terms of plausibility, MW placed 75% of his own future events (6/8) on one side of the table and stated that they were implausible. He then indicated that only two imaginings were plausible, i.e. 'Most likely to happen to me in the future is that I'll go into hospital and probably die there.' and 'Trains will become supersonic [SNC: where will you be?] I will be flying one.': The former example coinciding with his wife's categorisation of this future event as personally plausible and the latter example was clearly personally and generally implausible. MW therefore correctly identified one plausible future event from 7 options. Interestingly, he also stated that many events were 'merely wishful'. When the researcher asked directly whether his future events were a 'wish,

dream or desire', MW answered 'Yes' in response to all future events except: 'I will most likely die in hospital'[1].

Discussion

Neuropsychological investigations have found parallel deficits in episodic future thinking and episodic memory (e.g. Hassabis et al., 2007b; Levine et al., 1998; Tulving, 1985, 2000). The current investigation focussed on the *distortion* of mental time travel into the past and future in a known confabulator. Patient MW persistently confabulates in everyday life after suffering prefrontal damage (verified by neuropsychological and medical data). On testing, MW confabulated across all domains of autobiographical knowledge (except for orientation to the present), but performed normally on tests of general semantic knowledge and intelligence. When asked to generate past and future events in a cue-word paradigm, a positive bias was found; future events were more emotionally positive than past events. This finding was consistent across MW and controls. However, MW's future (but not past) events were dramatically more implausible than those produced by age-matched healthy controls. The theoretical implications in relation to confabulation and mental time travel are discussed.

Turning first to emotional valence, it is noteworthy that the current study replicated a common finding in the mental time travel literature. That is, although past and future events are generally positive, future events display an additional positive bias (Berntsen & Jacobsen, 2008; Newby-Clark & Ross, 2003). Furthermore, Newby-Clark & Ross (2003) found that individuals take longer to generate negative (versus positive) future happenings, whereas latencies for positive and negative past events were equivalent. In the current study, a positive future bias was demonstrated across the valence ratings for healthy controls and MW. Even though this study used independent valence ratings, it further demonstrates the human tendency toward perceiving the future as favourable, positive or even idealised (Newby-Clark & Ross, 2003)[2].

Considering recent formulations of episodic memory, can the present findings regarding plausibility be interpreted in the context of the *constructive episodic simulation hypothesis* (Schacter & Addis, 2007), which assumes that the generation of past and future events relies on a core neuro-cognitive network (see Addis, Wong & Schacter, 2007)? Intriguingly, the fact that temporal direction (past or future) determined the plausibility of MW's statements suggests that future event construction may be more sensitive than episodic memory to damage extending to the prefrontal lobes. Taking a broader perspective, this difference might be explained by specific differences between episodic memory and episodic future thinking. Namely, although episodic memory does not represent an exact mental replay of experience (Bartlett, 1932; Schacter & Addis, 2007), memory retrieval has a single 'destination': That is, a memory search is conducted to elicit *a single* experienced event which is re-activated at retrieval (Moscovitch et al., 2005). Future event construction is more flexible: The future has not happened and multiple permutations can be envisaged. This makes classifying confabulations concerning a future especially difficult as judgements must depend on likelihood rather than memorial evidence (see below for further discussion).

In support of this idea, in a recent fMRI study, Addis et al. (2009) found that flexibly combining details into a novel event was associated with greater activity in the medial PFC and anterior hippocampus when contrasted with remembering a personal event. This replicated previous findings which associated future thinking with additional activity in prefrontal regions (Addis, Wong & Schacter, 2007; Okuda et al., 2003). Although mnemonic details are sampled when constructing the future, it is most likely the intensive combination of details that place additional demands upon executive processes. Subsequently, differential activity in prefrontal regions has been attributed to processes specific to imagination rather than prospection per se (Addis et al., 2009). As a result of using additional executive resources, imagined events often take longer to generate and result in less specific

representations (Conway, Pleydell-Pearce, Whitecross, & Sharp, 2003; D'Argembeau & Van der Linden, 2004; Anderson & Dewhurst, 2009). Thus, where executive processes are limited in MW, it is possible that the additional reconstruction processes may disproportionately reduce monitoring of future events (although still affecting past event monitoring to a moderate extent), hence why less plausible events were observed when they were imagined in the future rather than remembered. The contrasting plausibility of MW's past and future events may reflect specific differences between processes involved in remembering and imagining events. Of course, semantic memory may also have a role in generating and monitoring past and future-oriented thoughts (see Klein, Loftus & Kihlstrom, 2002). However, a satisfactory examination of differences between episodic and semantic thoughts about the past and future (in healthy and brain damaged populations) was beyond the scope of this paper.

The temporality account described by Dalla Barba and colleagues (1997) implies that confabulation can affect past, present and future. MW's pattern of responses appears concordant with this view. In particular, his claim to have protected Princess Diana on the AMI was derived from MW's actual experience as a police officer but was temporally displaced by around 7 years. However, several points counter the view that all temporal domains are similarly affected by confabulation. MW confabulated when asked about his personal past and future (on the Confabulation Battery and Cue-word Task), but provided an accurate account of his present circumstances (orientation sections of Confabulation Battery and RBMT). Also, in a recent study of Alzheimer's patients, past and future confabulations correlated positively, whereas present orientation failed to correlate with either (Lee et al., 2007). Thus, there may be differences between present orientation and other forms of subjective time which involve mental time travel (Tulving, 1985).

The case described here is more consistent with a deficient executive function explanation of confabulatory behaviour as MW demonstrated clear impairments on classic tests of executive function (e.g. WCST, see Table 1) and displayed everyday behaviours (see DEX scores) and a pathology consistent with a dysexecutive syndrome. Furthermore, MW failed to display florid confabulations on memory tests with greater experimenter-cues (e.g. Confabulation Battery), which was in stark contrast to his responses on word-cue tasks in which strategic searches are self-guided: In the Cue-word task MW produced 57% past and 95% future confabulations compared with a 30% for the Autobiographical Memory Interview and Confabulation Battery, as verified by his wife and rehabilitation staff. Therefore the data presented here lends itself to an explanation of confabulation by which strategic retrieval dysfunction (Burgess & Shallice, 1996; Gilboa et al., 2006; Metcalf et al., 2007; Moscovitch & Melo, 1997) leads to errors in distinguishing the sources of mental representations (Johnson, 1991; Johnson et al., 2000; Turner et al., 2010). In fact, bizarre or fantastic confabulations are associated with disruption of the executive reflective component of source monitoring (Johnson, 1991). In Johnson's words, 'without the past and the reality-checking processes that evaluate imagined futures against the backdrop of the past people could make up and visualise any future' (p. 514, Johnson, 1990). This is consistent with the idea of a mechanism of deficient reality checking underlying confabulation which normally constrains and monitors images the future.

Although MW's fantastic future simulations did not differ in valence from the similar productions of controls, both were positive in valence. A range of research indicates that confabulation can be modulated by motivation (Conway & Taachi, 1996; Fotopoulou et al., 2004; 2007b; 2008; 2010). According to the *affective impulsivity hypothesis* (see Fotopoulou, 2008; 2010), false constructions become self-enhancing as a consequence of reduced executive control over confabulatory content. This hypothesis offers an explanation of the

positive emotional bias observed in confabulatory content compared with responses derived from non-confabulators (e.g. Fotopoulou et al, 2004; 2007a & b) and, specifically, why MW's more implausible future events were more likely to be emotionally positive. Although the case presented here did not replicate the particular emotional bias found in these studies because there was not a difference between MW and controls, some of the repeated confabulations of MW seem consistent with this hypothesis. The majority of MW's future events were characterised by holding powerful positions (e.g. owning a bicycle shop, Mount Kilimanjaro, and a beach resort, see Appendix B). It is possible that a lack of cognitive control increased the prevalence of wished-for, implausible future events. Furthermore, the cognitive bias toward wished-for events could have resulted from MW's distorted working self model (see Conway, 2005) of unrealistic, limitless possibilities. Several researchers have acknowledged the relation between confabulations and personal biases (Metcalf et al., 2007), habits (Dalla Barba, 2002) or goals/wishes (Conway & Taachi, 1996; Conway, 2005). In MW, it was speculated that the relatively rare (implausible) distortions of past and future produced by MW may have represented MW's underlying pattern of preferences and personal goals.

Some apparent paradoxical findings in terms of MWs future statements deserve attention. The fact that MW probably retained knowledge of the task instructions throughout testing sessions (on commencing the second testing session, MW was asked to tell the experimenter the instructions of the future event task. He responded *"you want me to give you some details of the future which are plausible"* (verbatim)), and indeed accurately described his future events as 'merely wishful' - whilst being unable to produce more than one plausible future event - may appear somewhat surprising. However, it is plausible that MW could not apply that awareness specifically *at the time of event construction*. Firstly, it is largely agreed that confabulation is beyond conscious manipulation but is a by-product of reduced cognitive

control at retrieval (Conway, 2005; Moscovitch & Melo, 1997): As such, the concept of confabulation as 'lying' or filling gaps in memory have been largely discarded (see Schneider, 2008 for a review). Secondly, a recent study which explored patterns of event-related potentials in a group of confabulating amnesic patients indicated an early top-down monitoring process beyond conscious awareness (Gilboa, Alain, He, Stuss & Moscovitch, 2009). Lastly, if MWs confabulations were conscious 'lies' or fabrications, MW would have remained consistent in this lie throughout testing (e.g. repeating his fantastical plans) but this was not the case. According to Crosson and colleagues (1989) it is possible to have *intellectual awareness* (the knowledge *that* one has certain aberrant behaviours associated with organic deficits) without awareness of a deficit *when it occurs*. Similarly, with reference to the Multiple-Entry Modular framework (Johnson, 1991), MW's confabulatory deficit may be traced to a dysfunction of habitual reflective processes (i.e. mistaking wishful thoughts or intentions for likely future events) which was not correctly rectified by reflective processes typically under wilful executive control. In a particular way though, presenting MW with a set of his own future plans caused recognition of their implausible content. In this context, MW may have had an abstract awareness of his confabulations, without an ability to apply this to his confabulatory behaviour *spontaneously*. A possible avenue for researchers of confabulation might be to elucidate if confabulators are necessarily unaware of their false accounts, memory defects and the other disorders.

In this case study of 'future confabulation' we chose a dimension – general plausibility – to distinguish MW's future events from controls. This proved useful as a marker of confabulation as future events could not be verified by relatives/rehabilitation staff as with memories. Also, it is acknowledged there is some circularity in considering implausible future events confabulatory *per se* and that plausibility is orthogonal to the clear classifications that can be obtained for past confabulations (see also Berryhill et al., 2010).

There are of course other ways in which confabulations could be conceptualised apart from their general plausibility and it may be interesting to explore its link with personal plausibility as Scoboria and colleagues (2004) had done in healthy adults. We would encourage the consideration of a coherent and reliable method of distinguishing confabulated from plausible future events.

In conclusion, MW's case provides an interesting insight into past and future thinking and confabulation. Case studies can be extremely insightful in cognitive neuropsychology, especially in the recent literature on mental time travel (see Schacter & Addis, 2007). The data from MW indicates that dimensions of past and future event construction may be dissociated. Although past and future event construction involves overlapping processes, the unknown nature of the future may increase the implausible nature of confabulations. However, systematic group studies will be necessary to assess the generality of this finding to other confabulating patients.

Footnotes

1.No control data is available for comparison.
2.It is noteworthy that the positivity bias could have been due to the more advanced age of MW and the control participants. However, to our knowledge, the future positivity bias has only been investigated in young healthy adults (e.g. Berntsen & Jacobsen, 2008; Newby-Clark & Ross, 2003). Therefore to answer the question of whether this particular bias exists in older age requires further empirical investigation, possibly comparing the bias in young and old participants.

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Table 1: Scores on Standard Neuropsychological Measures

Note: RBMT = Rivermead Behavioural Memory Test – II (Wilson, Cockburn & Baddeley, 2003) BADS = Behavioural Assessment of the Dysexecutive Syndrome (Wilson et al., 1996), DEX Questionnaire = Dysexecutive Questionnaire measuring the frequency of dysexecutive behaviours on a 0-4 likert-type scale, WCST =Wisconsin Card Sorting Test (Heaton, 1993)

Psychometric Tests	**Score**	**Description**
Tests of Intelligence	*Index Scores*	
WAIS III		
Verbal	114	High Average
Performance	87	Low Average
Tests of Memory		
WMS-III		
Visual Immediate	68	Extremely Low
Auditory Immediate	102	Average
Auditory Delayed	105	Average
Visual Delayed	75	Borderline
Delayed Recognition	75	Borderline
Working Memory	96	Average
General Memory	84	Low Average
	Raw Scores	
RBMT Orientation	14/14	Normal
RBMT Total Screening Score	7/12	Poor Memory
RBMT Profile Score	16/24	Moderately Impaired
Tests of Executive Function		
Hayling & Brixton Tests	*Scaled Scores*	
Hayling Total	5	Moderate Average
Hayling 2 Errors	4	Low Average
Brixton Test	2	Impaired
BADS		
DEX Questionnaire	*(0=never ,4=very often)*	
DEX MW self-report ratings	*M*=0.95 (*SD*= 1.36)	
DEX Spouse ratings	*M*=3.50 (*SD*= 1.15)	*Z Scores*
	Scaled Scores	
Rule Shift	3	-0.75
Action Programme	4	0.44
Key Search	4	1.06
Temporal Judgement	1	-2.36

Zoo Map	2	-0.48
Modified Six Elements	2	-1.90
Age-corrected Standard Score	88	Low Average
WCST		
Categories completed	1	Impaired (10%ile)
Perseverative errors	58%	Impaired (<1%ile)
Non-perseverative errors	5%	Impaired(<1%ile)

Table 2: Distribution of Plausibility Ratings (in percentages)

Note: Percentages were used as each condition varied in the absolute amount of ratings recorded (see Results). CG = Control Group

Response	**Past**		**Future**	
	MW	**CG**	**MW**	**CG**
1/implausible	10.0	3.3	60.4	0.0
2	10.0	6.7	16.7	0.0
3	10.0	3.3	8.3	3.3
4	10.0	13.3	4.2	5.0
5	25.0	26.7	10.4	18.3
6	20.0	26.7	0.0	48.3
7/plausible	15.0	20.0	0.0	25.0

Table 3: Mean (SD) ratings for Past and Future Events

Note: For *plausibility*, the 1-7 scale was unidirectional 1=extremely implausible, 7 = extremely plausible, whereas for *emotional valence*, the scale was bi-directional, 1=negative, 4 = neutral, 7 = positive.

	Past		**Future**	
	MW	**CG**	**MW**	**CG**
Plausibility	4.6 (1.9)	5.1 (1.6)	1.9 (1.3)	5.9 (1.0)
Valence	3.4 (1.9)	4.2 (1.7)	5.1 (1.3)	4.7 (1.2)

Appendix A.

Instructions given to Independent Judges:

Instructions for Scoring Past Events

You will be shown some memories from a number of different individuals. I would like you to judge the valence (pleasantness/unpleasantness) and plausibility of each event.

Valence

For each event below, consider the following: Is there anything in the way the memory is described which suggests this was a positive (e.g. 'I bought a house for my son, which made me very happy'), neutral (e.g. 'I went to the shops and bought a fridge-freezer') or negative event (e.g. 'I was dragged to a wedding last month and I had to speak to people I really didn't like')? Please rate the statement for valence on a 7-point scale (4=Neutral).

Plausibility

Then, in terms of plausibility, consider the degree you believe that the event could have occurred or has the potential to occur to people in general. In other words: Is there anything in the way the memory is described (e.g. the setting or time) which indicated it is an implausible (e.g. 'In 1880 I went go on holiday with my family' *or* 'I went to Mars for my last birthday') or extremely plausible memory (e.g. 'Last year I went to buy a ticket at Kensington Station before boarding the tube train')? Please rate the statement for plausibility on a 7-point scale (1=Not at all Plausible, 4=Moderately Plausible, 7=Extremely Plausible).

Instructions for Scoring Future Events

You will be shown some personal future events from a number of different individuals. I would like you to judge the valence (pleasantness/unpleasantness) and plausibility of each event.

Valence

For each event below, consider the following: Is there anything in the way the plan is described which suggests this will be a positive (e.g. 'I will buy a house for my son, which will make me very happy') neutral (e.g. 'I will go to a shop to buy a fridge-freezer') or negative (e.g. 'I will get dragged to a wedding next month and I will have to speak to people I really don't like'). Once you have considered these points, please rate the statement for valence on a 7-point scale (4=neutral).

Plausibility

Then, in terms of plausibility, consider the degree you believe that the event could occur or has the potential to occur to people in general. In other words, is there anything in the way the future event is described (e.g. the setting or time) which indicates it is an implausible (e.g. 'In 2600 I will go on holiday with my family' *or* 'I will go to Mars for my next birthday') or

extremely plausible plan (e.g. ‘Next year I will go to buy a ticket at Kensington Station before boarding the tube train’)? Please rate the statement for plausibility on a 7-point scale (1=Not at all Plausible, 4=Moderately Plausible, 7=Extremely Plausible).

Appendix B.

Representative Examples of Past and Future Statements

MW's Past Statements	MW's Future Statements
Accurate Memory	***Cue Word: Mountain***
Cue Word: Train	MW: I will buy mount Kilimanjaro and Mount Fuji
MW: I remember when I was a kid going to Cornwall with my parents and we got straight through tickets and I was entrusted to keep the tickets, and when we got to King's Cross station I'd lost the tickets on to Cornwall…so we had to pay again.	[prompt for a specific event]
Mean Plausibility Rating: 6.00	MW: Rent them out, if Sir Anthony Hopkins can own Snowdon, and Sean Connery can own Ben Nevis, I can own Kilimanjaro!
Mean Valence Rating: 1.67	[prompt for a specific event]
Confabulation	MW: I would live right on the summit of mount Fuji. I would have one there and one on Kilimanjaro
Cue word: Hospital	*Mean Plausibility Rating:1.33*
MW: I came home from work one night…I said to the wife 'I've got a terrible headache C' and went to bed. The next thing I know I wake up in Intensive Care in the Royal Infirmary…and I died twice…and the Professor that saved me went mad…he turned up at work one day unshaven in pyjamas..and the sister said to him 'Professor, you're supposed to be operating Today', and he looked at her and said 'Sister, I am doing no more operations', and he walked out the hospital and nobody's seen him since.	*Mean Valence Rating: 5*
Mean Plausibility Rating: 2.33	***Cue word: Train***
Mean Valence Rating: 2.67	MW: Trains will become supersonic. I will be driving one.
	Mean Plausibility Rating: 1.00
	Mean Valence Rating: 6.33
	Cue word: Garden
	MW: I own a garden on the moon and all the other planets.
	[prompt for a specific event]
	MW: I will have them on all the planets and I will grow plants indigenous to the planets
	Mean Plausibility Rating: 1.00
	Mean Valence Rating: 4.33
Comparison Past Event	**Comparison Future Event**
Cue word: House	***Cue word: House***

Control Participant: "Yeah I suppose it was looking at our son who was getting married, was looking for houses and we went to look at one somewhere in the Shipley area because his wife had got a job teaching there, and we went to look round this house with her parents as well and we all sort of gave our little bit of opinions, kitchen floor looked a bit damp but on the whole for the price it seemed ok and then as we drove away my son suddenly realised although most of the houses were privately owned..." *Mean Plausibility Rating: 5.67* *Mean Valence Rating:2.67*	Control Participant: "It's back, my daughter, her big house, family house is on the market and she'll be looking for a new one um I imagine it will be smaller perhaps three bedrooms (PROMPT) yeah, um yep no doubt I shall be helping to clean it whilst she moves in um and saying 'does that look right there or does that look right there?' and probably weeding the garden. Don't think I'll offer to do any decorating this time, I might tidy the garden um and help make the beds up." *Mean Plausibility Rating: 5.67* *Mean Valence Rating: 4.67*