Shifting Self, Shifting Memory: Testing the Self-Memory System Model With Hypnotic Identity Delusions

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SHIFTING SELF, SHIFTING MEMORY:
Testing the Self-Memory System Model With Hypnotic Identity Delusions

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Abstract: According to Conway's self-memory system (SMS) model, autobiographical memories may be facilitated, inhibited, or misremembered to be consistent with current self. In 3 experiments, the authors tested this by hypnotically suggesting an identity delusion and indexing whether this shift in self produced a corresponding shift in autobiographical memory. High hypnotizable participants displayed a compelling identity delusion and elicited specific autobiographical events that they could justify when challenged. These memories were reinterpretations of previous experiences that supported the suggested identity. Importantly, autobiographical memories that were no longer consistent with the hypnotically deluded self were less accessible than other memories. The authors discuss these findings in the context of Conway's SMS model and propose 2 accounts of autobiographical remembering during hypnotic and clinical delusions.

Autobiographical memories form the basis of our life story and shape our personal identity, making them inherently linked to our sense of self (Conway, Collins, Gathercole, & Anderson, 1996; Tulving, 1985). Conway and colleagues (Conway, 2005; Conway & Pleydell-Pearce, 2000) proposed a model of autobiographical remembering that highlights this important link between self and memory. According to the self-memory system (SMS) model, there is a strong need for congruency between the self and memory. Aspects of the self, including attitudes and beliefs, may change to be consistent with autobiographical knowledge. Likewise, autobiographical memories may be altered, misremembered, or inhibited to be consistent with the self (Conway & Ross, 1984; McNally, Lasko, Macklin, & Pitman, 1995). One way to test Conway's SMS model is to explore whether a shift in self produces

a shift in autobiographical memory. To do this, we used hypnosis to model a clinical delusion known as reverse intermetamorphosis, which is characterized by a false belief about personal identity. Using hypnosis in this "instrumental" way produces "virtual" patients (Oakley & Halligan, 2009) with temporary, reversible delusions that are remarkably similar to clinical cases (Bortolotti, Cox, & Barnier, 2012; Cox & Barnier, 2009a, 2009b). This technique allowed us to measure whether an experimentally induced shift in self produced a corresponding shift in autobiographical memory.

Self and Memory

According to Conway's SMS (Conway, 2005; Conway & Pleydell-Pearce, 2000), autobiographical memory can be conceived of in terms of principles of correspondence and coherence. Correspondence refers to the need to record experiences as accurately as possible. Coherence refers to the need to maintain a stable, integrated self that is based upon an individual's goals, beliefs, and self-knowledge. Conway (2005) argued that for self and memory to function effectively, a suitable balance between correspondence and coherence must be maintained. Within Conway's model, control processes facilitate and inhibit the accessibility of autobiographical memories; memories that are consistent with current self are facilitated, and memories that are inconsistent with current self are inhibited. In a reciprocal fashion, memories that are most accessible shape the self. Consistent with this view, McAdams and colleagues (McAdams, 1982, 1985; McAdams, Diamond, de Aubin, & Mansfield, 1997) reported clear evidence of selective facilitation (and perhaps inhibition) in individuals with strong "intimacy motivation" or strong "power motivation" who were asked to recall memories of peak experiences. Content analysis revealed that those high in intimacy motivation recalled memories that predominantly contained themes of love and friendship. In contrast, those high in power motivation recalled memories that predominantly contained themes of power and the resulting satisfaction this provided.

Within Conway's SMS model (2005), in the normal working self, there is a balance between coherence and correspondence. A memory retrieval model, which is a control process of the working self, defines the minimum constraints that are required for a memory to be acceptable to the current self. The memory retrieval model is influenced by reality-monitoring processes that monitor the source of remembered material. When a memory is retrieved from the autobiographical knowledge base, it satisfies the constraints of the retrieval model and enters consciousness in conjunction with recollective experience (i.e., the feeling of remembering, described by Tulving as autonoetic

awareness; Tulving, 1985). The retrieved memory will in turn reinforce the working self. Finally, if memories that are consistent with the normal self are repeatedly retrieved, the accessibility of autobiographical knowledge will be altered. As a consequence, autobiographical knowledge that is consistent with normal self will be facilitated, and autobiographical knowledge that is inconsistent with normal self will be inhibited.

Disrupted Self and Memory

According to Conway (2005), without an appropriate balance between correspondence and coherence, both the self and autobiographical memory can be disrupted, as seen in pathological states such as delusions. Delusions are false beliefs based on incorrect inferences about external reality that are firmly sustained despite evidence to the contrary (American Psychiatric Association, 1995). During a delusion, individuals often recall extraordinary and clearly false autobiographical memories. Also, they may hold goals and beliefs that are unconstrained by their autobiographical memories. Baddeley, Thornton, Chua, and McKenna (1996) reported the types of disruptions that occur in the autobiographical memories of individuals with schizophrenia who experience delusions. In one example, a woman known as EN believed she had a (nonexistent) twin sister. EN described this sister saying:

> She was born in Ipswich Hospital in Suffolk. I haven't seen her for 10 years. I only saw her for a week. I was sunbathing in the garden and a car pulled up and she walked in the gate with her suitcase. She only stayed a week.

In another example, a man known as SD believed that he was a rock star and recalled autobiographical memories about recording songs in a studio, despite being unable to play the guitar.

An especially interesting class of delusions is delusions of misidentification, which involve false beliefs about one's personal identity or the identity of other people, places, or objects (Breen, Caine, Coltheart, Hendy, & Roberts, 2000). They include the following: Capgras delusion, the belief that a loved one has been replaced by an impostor; Fregoli delusion, the belief that strangers are actually known people who are in disguise; reduplicative paramnesia, the belief that people and/or places exist in duplicate; mirrored-self misidentification, the belief that one's reflection in the mirror is a stranger; intermetamorphosis, a false belief about another person's identity; and reverse intermetamorphosis, a false belief about one's own identity. These delusions can have profound effects on both self and autobiographical memory.

For example, Breen et al., (2000) reported a case of reverse inter-metamorphosis in a woman known as RZ who believed she was her father. RZ would only respond to her father's name, signed documents as her father and provided his personal history when asked about her life story. When RZ's delusion was challenged by the examiner (Nora Breen), she recalled a "memory" of going to the hospital and having an operation to change her into a woman. She said:

> Dr R gave me injections in the arm to grow breasts and they castrated me about, in the hospital . . . I just remember going with Wayne and whoever is out on the farm, Doug, I remember going with him to C_____ and having an operation and I woke up . . . and I said "oh yes, it's been done". Those were my first words when I woke up. (Breen et al., 2000, p. 96)

From RZ's perspective, these "memories" explained why she had a man's voice but a woman's body. Thus, these memories appeared to support and reinforce her deluded belief that she was her father. Notably, RZ (and Baddeley et al.'s [1996] case of EN above) elicited memories of specific events with contextual, perceptual, and other details. This suggests a range of possibilities including, for instance, that deluded individuals access genuine memories of their past but reinterpret them in light of the delusion or that they fabricate entirely new memories but with similar qualities to genuine memories, which makes them seem real and compelling. Whether such memories should be labeled *confabulation* or *delusional memory* is currently being debated in the literature (for a review, see Langdon & Turner, 2010), since there is substantial overlap in their phenomenology.

One way that a delusion might influence autobiographical memory is by shifting the accessibility (rather than availability) of certain memories; that is, by making memories consistent with the false belief more accessible and memories inconsistent with the false belief less accessible. This is based on Tulving and Pearlstone's (1966) notion that memories can be available in consciousness but not necessarily accessible at a given moment. A number of clinical disorders are characterized by shifting accessibility of autobiographical memories, including dissociative amnesia, dissociative identity disorder (Kihlstrom, 2005), dissociative fugue (Schacter, 1996), and posttraumatic stress disorder, where intrusive memories of trauma are often suppressed (Brewin, 1998, 2001). For instance, Bryant (1995) reported the case of HS, a woman who initially presented to his clinic with memory problems who 28 months later was diagnosed with dissociative identity disorder (DID). Bryant asked HS to recall autobiographical memories in response to cues both pre- and postdiagnosis (28 months later). Prior to diagnosis, the majority of HS's memories were of recent events (71%), but a moderate number were also from childhood (21%). After diagnosis, HS recalled no memories from childhood. Yet, when she switched to a

child alter identity, aged 9, 100% of her memories were from childhood. Bryant suggested that, while suffering from DID, HS could only access memories of her childhood via the 9-year-old's personality, illustrating how a shift in self might shift the accessibility of autobiographical memories (Conway, 2005).

Hypnosis, Self, and Memory

How can we test such shifts in self and memory in the laboratory? Although delusions of misidentification produce profound shifts in self, the complexities associated with clinical cases make them difficult to study in isolation. Fortunately, the instrumental use of hypnosis offers a way to temporarily re-create delusions in healthy individuals in the laboratory. Oakley and Halligan (2009) described this use of hypnosis as a means of creating "virtual patients" where psychological disturbances can be re-created, albeit temporarily, under controlled laboratory conditions. Specific hypnotic suggestions that target and disrupt selected aspects of cognitive processing can be administered, and their subsequent impact on cognitive output can be examined. Using hypnosis to create virtual patients has already been applied to pathological conditions including auditory hallucinations (Szechtman, Woody, Bowers, & Nahmias, 1998), conversion disorder paralysis (Halligan, Athwal, Oakley, & Frackowiak, 2000; Halligan, Bass, & Wade, 2000), hysterical blindness (Blum, 1975; Bryant & McConkey, 1989a, 1989b), functional amnesia (Barnier, 2002; Barnier, McConkey, & Wright, 2004; Cox & Barnier, 2003), and delusions of misidentification (Barnier, Cox, Connors, Langdon, & Coltheart, 2011; Barnier et al., 2008; Connors, Barnier, Coltheart, Cox, & Langdon, 2012; Connors, Cox, Barnier, Langdon, & Coltheart, 2012; Cox & Barnier 2009a, 2009b).

Hypnosis is particularly useful for re-creating delusions because hypnotic suggestions and delusions share a number of features. Both are (a) believed with strong conviction, (b) resistant to rational counterargument, and (c) maintained despite overwhelming evidence to the contrary. Research taking advantage of these similarities confirms that hypnosis can create compelling analogues of selected clinical delusions. For instance, building on the work of McConkey and colleagues (Burn, Barnier, & McConkey, 2001; McConkey, Szeps, & Barnier, 2001; Noble & McConkey, 1995), who successfully used hypnosis to create sex-change delusions, Barnier, Cox, and colleagues developed hypnotic paradigms to model neuropsychological and neuropsychiatric delusions including mirrored-self misidentification (the belief that I see a stranger when I look in the mirror: Barnier et al., 2008, 2011; Bortolotti et al., 2012; Connors, Barnier, et al., 2012; Connors, Cox, et al., 2012), somatopraphrenia (the belief that my limb belongs to someone else:

Cox & Barnier, 2010; Rahmanovic, Barnier, Cox, Langdon, & Coltheart, 2012), erotomania (the belief that I am loved from afar by someone: Attewell, Cox, Barnier, & Langdon, 2012), alien control (the belief that my actions are being controlled by someone else: Cox & Barnier, 2010), and reverse intermetamorphosis (the belief that my personal identity has changed: Cox & Barnier, 2009a, 2009b).

The techniques used in the current set of studies were based on our (Cox & Barnier, 2009a, 2009b) development of a viable hypnotic analogue of reverse intermetamorphosis (hereafter referred to an *identity delusion*). To establish and test this hypnotic paradigm, we (Cox & Barnier, 2009a, Experiment 1) gave 32 high and 32 low hypnotizable participants (hereafter referred to as *highs* and *lows*) a suggestion to become someone similar or dissimilar to themselves. We administered this suggestion either during hypnosis or following imagination instructions without hypnosis. To test the suggestion, we asked participants to provide their name and a self-description. We (Cox & Barnier, 2009a) found that 78% of highs provided a new name and described themselves differently (i.e., they passed the suggestion). Although the pass rate of highs given the hypnotic suggestion and highs given the imagination instructions was similar, highs in hypnosis described a more compelling experience than highs who merely imagined it.

In a follow-up to this study (Cox & Barnier, 2009a, Experiment 2), we explored the resistance of highs' hypnotic identity delusions to challenge. We gave 10 highs a hypnotic suggestion to become a real, same-sex sibling; 90% passed the suggestion. We then challenged their beliefs using a contradiction and confrontation challenge (inspired by research on hypnotic sex-change delusions; Noble & McConkey, 1995). In the contradiction, we asked participants what they would say if their mother entered the room and stated that they were not their suggested identity. In the confrontation, we asked participants to open their eyes, to look at themselves on a monitor, and to describe what they were experiencing. We found that just like clinical delusions, highs could resist challenges to their hypnotically suggested identity delusion.

We have also used our hypnotic analogue to examine the impact of a hypnotic identity delusion on information processing (Cox & Barnier, 2009b). We gave 29 highs and 29 lows a hypnotic suggestion to become a same-sex friend (with opposite personality characteristics) and asked them to listen to a structured story about two characters. Half the participants encoded the story before the delusion suggestion and retrieved it after the suggestion, and half encoded the story after the delusion suggestion and retrieved it after cancellation of the suggestion. In response to the suggestion, 90% of highs but only 24% of lows changed their name and described themselves differently (i.e., passed the suggestion). In terms of story processing, lows were not influenced by the delusion suggestion or the time of encoding and retrieval. However, highs

who encoded the story after the delusion suggestion identified with the character consistent with their suggested identity and retrieved more information about this character. Thus, among highs, a hypnotic shift in self led to selective information processing consistent with the delusion. Together, these experiments demonstrate striking similarities between hypnotic and clinical delusions in terms of their phenomenological features, their resistance to challenge, and their impact on information processing, highlighting the validity and credibility of our hypnotic paradigm.

Finally, in Cox and Barnier (2009a, Experiment 2), we also started to explore the impact of a hypnotic identity delusion on autobiographical memory. We asked 10 highs to generate two autobiographical memories during a hypnotically suggested identity delusion. We found that highs recalled specific autobiographical memories that were rich in sensory-perceptual detail. Interestingly, these memories were consistent with their suggested identity and were recalled from this identity's perspective. This pilot data suggest that a hypnotic identity delusion can influence autobiographical memory, which means that our hypnotic analogue should allow us to test Conway's predictions of the interrelatedness of self and memory. In this article, we outline a set of three experiments using our hypnotic identity delusion paradigm that tested whether an experimentally induced shift in self produced a corresponding shift in autobiographical memory. Building on our previous work, these experiments used larger subject numbers, suggested a variety of different identities, elicited more autobiographical memories, examined the source of memories and used appropriate control groups to index demand characteristics associated with the hypnotic paradigm.

Experiment 1

In our first experiment, to shift self we gave half of our high and low hypnotizable participants a suggestion to become a real, familiar, same-sex sibling (real-sibling version). We based this suggestion on the clinical case of RZ (Breen et al., 2000), who believed she was her father. RZ recalled specific, detailed memories consistent with this delusion. In this case, and for this version of the suggestion, the shift in identity is a direct one (from being "me" to being someone else) and the suggested identity is a real person. We gave the other half of our high and low hypnotizable participants a suggestion to create a new/extra same-sex sibling (nonexistent-sibling version). We based this suggestion on the clinical case of EN (Baddeley et al., 1996), who believed she had a (nonexistent) twin sister. EN recalled specific, detailed memories consistent with this delusion. In this case, and for this version

of the suggestion, the shift in identity is more indirect (from being "me with no sibling" to being "me with a sibling") and the suggested identity is a nonexistent person. We were interested in whether it might be easier (or more difficult) for participants to experience a direct shift in self to a known person than an indirect shift to a self with an unknown sibling. More importantly, we were interested in whether these different shifts in self would influence the success, quality, or source of autobiographical memories elicited during the delusion suggestion.

Consistent with our previous work (Cox & Barnier, 2009a, 2009b), we indexed response to the delusion suggestion in multiple ways. To index the impact of the suggestion on self, we asked participants what their name was, to provide a self-description, and to make postexperimental reality ratings about their delusional experience.

We were interested in the impact of the hypnotically induced shift in self on personal semantic information and autobiographical memory. To index the impact on personal semantic information, we first asked participants to list their personal likes and dislikes (real-sibling version) or the personal likes and dislikes of their new sibling (nonexistent-sibling version). To index the impact on autobiographical memory, we then asked participants in the real-sibling condition to describe two specific autobiographical events that illustrated their personal likes or dislikes. We asked participants in the nonexistent-sibling condition to describe two specific autobiographical memories that illustrated the personal likes or dislikes of the suggested, nonexistent sibling. We based this on Kopelman, Wilson, and Baddeley's (1990) Autobiographical Memory Interview and their distinction between personal semantic information and autobiographical events (see also Barnier, 2002). We also explored the source of participants' autobiographical memories by asking postexperimentally where they had obtained the information for these events. We were not especially interested in memory accuracy but wondered whether the memories recalled during a hypnotic delusion might be previous experiences or fabrications/imagined events.

We expected that more highs than lows would experience the delusion and that highs would rate the delusion as more real than lows. We also were interested in whether the real-sibling version of the suggestion might be more effective than the nonexistent-sibling version. Most important, in terms of the impact of the shift in self on autobiographical memory, we expected highs to generate more personal semantic information and autobiographical memories consistent with their shift in self than lows. We also expected highs to recall previously experienced events rather than to completely fabricate events. We based this prediction on the confabulation literature, which suggests that confabulating individuals may retrieve personal experiences

that they have misplaced in time or inappropriately conjoined with other experiences (Dalla Barba, Cappelletti, Signorini, & Denes, 1997; Fotopoulou, Conway, Griffiths, Birchall, & Tyrer, 2007; Schnider, von Daniken, & Gutbrod, 1996). A similar process may occur in deluded individuals since both delusions and confabulations involve disruptions of belief and memory.

Experiment 1: Method

Design and Participants

We tested 20 (17 female and 3 male) high hypnotizable participants of mean age 19.65 years ($SD = 2.13$) and 20 (9 female and 11 male) low hypnotizable participants of mean age 19.05 years ($SD = 1.28$) in a 2 (hypnotizability: high vs. low) × 2 (suggestion version: real sibling vs. nonexistent sibling) between-subjects design. Participants were undergraduate psychology students at the University of New South Wales, who received credit toward their psychology course for their involvement. We carefully selected them on the basis of their extreme scores on a modified 10-item version of the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962) and a modified 10-item version of the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C; Weitzenhoffer & Hilgard, 1962).[2] Highs scored 8 to 10 ($M = 8.65$, $SD = 0.76$) on the HGSHS:A and 8 to 10 ($M = 9.60$, $SD = 1.19$) on the SHSS:C. Lows scored 0 to 2 ($M = 1.95$, $SD = 0.97$) on the HGSHS:A and 0 to 3 ($M = 1.35$, $SD = 1.23$) on the SHSS:C.

Procedure

The experiment involved a hypnosis session and a postexperimental inquiry, both of which were conducted by the hypnotist.

Hypnosis session. Following informed-consent procedures, the hypnotist administered a standard hypnotic induction to all participants (based on Weitzenhoffer & Hilgard, 1962) and tested them on the SHSS:C suggestions for hand lowering, finger lock, and eye

[2]The 10-item modified HGSHS:A included: head falling, eye closure, hand lowering, finger lock, moving hands together, communication inhibition, experiencing of fly, eye catalepsy, posthypnotic suggestion, and posthypnotic amnesia; arm rigidity and arm immobilization items were removed to ensure that the procedure could be conducted within the time limits of a 1-hour class. The 10-item modified SHSS:C included hand lowering, moving hands apart, mosquito hallucination, taste hallucination, arm rigidity, dream, age regression, arm immobilization, negative visual hallucination, and posthypnotic amnesia; anosmia and auditory hallucination items were removed to ensure that the procedure could be conducted within the time limits of a 1-hour individual session.

catalepsy. Following this, she attempted to experimentally shift self by suggesting that participants become either a same-sex sibling (real-sibling version, $n = 20$; 10 highs, 10 lows) or to believe that they had an extra, nonexistent sibling (nonexistent-sibling version, $n = 20$, 10 highs, 10 lows).

Real-sibling version. The hypnotist asked participants who had been randomly allocated to the real-sibling version of the delusion suggestion to indicate whether they had a sibling of the same sex (or cousin or close friend if no sibling) and the name of that person. If participants had more than one sibling of the same sex, she asked them to name the sibling closest in age to them. The hypnotist then administered the delusion suggestion (based on Cox & Barnier, 2009a). She suggested to participants that they were becoming the sibling they had nominated. For example, she suggested:

> As you listen to my voice and my words, you can feel yourself becoming [name of nominated sibling], more and more. So that in a moment you will be your [sister/brother], you will be [name of nominated sibling] in every way.

The suggestion continued for 2 minutes. To index participants' experience of the delusion, the hypnotist then asked three questions ("tell me about yourself," "tell me what your name is," and "tell me what you look like"). To index the impact of the shift in self on personal semantic information and autobiographical memory, the hypnotist asked participants to describe their personal likes and dislikes ("tell me about the things you like to do in your spare time" and "tell me some of the things you don't like") and allowed them 30 seconds to elicit as many as possible. Next, the hypnotist randomly selected one like and one dislike (with the constraint that they were "doing" items rather than abstract items; for example, "I like going to the movies" rather than "I like clouds") and asked participants for a specific autobiographical memory to illustrate each one ("give me an example of a particular time you [insert description of personal likes/dislikes]"). She allowed participants 60 seconds to elicit each memory and audio-recorded their responses. Finally, the hypnotist cancelled the delusion suggestion (by suggesting they were reverting back to their real self) and administered a hypnotic deinduction (based on Weitzenhoffer & Hilgard, 1962) before conducting the postexperimental inquiry.

Nonexistent-sibling version. The hypnotist asked participants who had been randomly allocated to the nonexistent-sibling version of the delusion suggestion to indicate whether they had any siblings of the same sex and to name each of them. The hypnotist then administered the delusion suggestion (based on Cox & Barnier, 2009a). She suggested to participants that it would feel like they had an extra sibling, in

addition to the ones they had already named (if any). For example, she suggested:

> As you listen to my voice and my words, you can feel yourself becoming a person who has this (extra) [sister/brother], more and more. So that in a moment you will feel yourself to have a/another [sister/brother], you will feel yourself to have a/an extra [sister/brother] in every way.

The suggestion continued for 2 minutes. To index participants' experience of the delusion, the hypnotist asked three questions ("tell me about your brother/sister," "tell me what his/her name is" and "tell me what he/she looks like"). To index the impact of the shift in self on personal semantic information and autobiographical memory, the hypnotist asked participants to describe the personal likes and dislikes of their suggested sibling ("tell me about the things he/she likes to do in her/his spare time" and "tell me some of the things he/she doesn't like") and allowed them 30 seconds to elicit as many as possible. Next, the hypnotist randomly selected one like and one dislike (with the same constraint as above) and asked participants for a specific autobiographical memory to illustrate each one ("give me an example of a particular time he/she [insert description of sibling's likes/dislikes]"). She allowed participants 60 seconds to elicit each memory and audio-recorded their responses. Finally, the hypnotist cancelled the delusion suggestion (by suggesting they no longer had an extra/nonexistent sibling) and administered a hypnotic deinduction before conducting the postexperimental inquiry.

Postexperimental inquiry. Following the deinduction, the hypnotist asked participants in what ways they felt they had become their sibling (real-sibling version) or felt they had an extra sibling (nonexistent-sibling version). To index the reality of the suggested delusion, she asked participants to rate how much they really felt they were their sibling (real-sibling version) or how much they really felt they had an extra sibling (nonexistent-sibling version) on a 7-point Likert scale (1 = *not at all*, 7 = *completely*). The hypnotist also asked participants to indicate the source of the autobiographical memories they had provided during the suggested delusion. For example, she asked 1 participant in the nonexistent-sibling condition:

> During this suggestion you told me that you went out with your sister Sarah and had coffee and talked about your web-based company. How did you know that? Where did this information come from? How did that information come to mind?

Finally, the hypnotist invited participants to ask questions, debriefed them and thanked them for their time.

Experiment 1: Results and Discussion

The hypnotist and an independent rater (who worked in the Hypnosis Laboratory and was trained in hypnosis but was unaware of participants' hypnotizability) categorized participants' responses to the delusion suggestion; there were only two disagreements that were resolved through discussion. Consistent with previous experiments, we scored participants as passing the delusion suggestion if they changed their name and did not deny they were their sibling when asked "tell me about yourself" (real-sibling condition) or if they provided a name and did not deny they had an extra sibling when asked "tell me about your brother/sister" (nonexistent-sibling condition; Burn et al., 2001; Cox & Barnier, 2009a, 2009b; Noble & McConkey, 1995).

Indexing a Shift in Self

All 20 highs passed the delusion suggestion: 10 in the real-sibling condition and 10 in the nonexistent-sibling condition. This 100% pass rate was significantly different from the 40% pass rate of lows, $\chi^2(1, N = 40) = 17.14$, $p < .01$. Only 8 lows passed the delusion suggestion: 5 in the real-sibling condition and 3 in the nonexistent-sibling condition. Consistent with this, highs given both the real-sibling ($M = 5.10$, $SD = 1.10$) and nonexistent-sibling ($M = 5.10$, $SD = 1.45$) versions of the delusion suggestion rated their experiences as quite real, whereas lows given both the real-sibling ($M = 2.80$, $SD = 1.99$) and nonexistent-sibling ($M = 2.60$, $SD = 1.07$) versions of the delusion suggestion rated their experiences as not very real at all. A 2 (hypnotizability) x 2 (suggestion version) between-subjects analysis of variance (ANOVA) confirmed this significant main effect of hypnotizability, $F(1, 36) = 27.36$, $p < .01$, $\eta_p^2 = .43$. Interestingly, there was no main effect or interaction for suggestion version (all $Fs < .05$, all $ps > .80$). Thus, all highs experienced an experimentally induced shift in self irrespective of the suggestion. Even when highs were asked to believe they had a nonexistent sibling, they passed the suggestion and rated their delusional experience as much more real than lows.

Impact of Shift in Self on Autobiographical Memory

Consistent with the analytic strategy of Burn et al. (2001) and Cox and Barnier (2009b), all subsequent analyses focused on the 20 highs who passed the delusion suggestion and the 12 lows who failed the delusion suggestion.[3] Adding together the number of personal likes and dislikes

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[3]This selection of highs and lows in the analysis provides a more pure index of the impact of the delusion suggestion by comparing a genuine hypnotic shift in self with no shift in self. For autobiographical memory data, when analyses were re-conducted with all participants included, it made no difference to the pattern of results.

that participants generated during the suggested delusion, highs given both the real-sibling ($M = 4.90$, $SD = 2.23$) and nonexistent-sibling ($M = 4.90$, $SD = 1.97$) versions of the suggestion tended to provide more personal likes and dislikes than lows given the real-sibling ($M = 3.80$, $SD = 3.90$) and nonexistent-sibling ($M = 2.71$, $SD = 2.36$) versions. A 2 (hypnotizability) x 2 (suggestion version) between-subjects ANOVA yielded a near significant main effect for hypnotizability, $F(1, 28) = 3.20$, $p = .08$, $\eta_p^2 = .10$. Again, there was no main effect or interaction for suggestion version (all Fs < .40, all ps > .50). It is important to note that whereas all of the highs were providing this information for the altered identity, only 40% of lows were doing this. During the postexperimental inquiry, lows confirmed that the personal likes and dislikes they generated were for themselves. For example, when asked how their personal likes and dislikes came to mind, lows made comments such as "they were my own characteristics," "they came from me," and "they were similar to mine." Thus, highs generated more personal semantic information consistent with experiencing themselves either as their real sibling or as having a nonexistent sibling than lows.

Consistent with Cox and Barnier (2009a), we coded autobiographical memories as specific if they were unique, specific events with an identifiable beginning and end. In the absence of these features, we coded a memory as general (based on Conway & Pleydell-Pearce, 2000). All 20 highs generated memories during the suggested delusion but 6 of the 12 lows (50%) generated no memories. A 2 (hypnotizability) × 2 (suggestion version) between-subjects ANOVA of the number of specific memories yielded a significant main effect for hypnotizability, $F(1, 28) = 54.56$, $p < .001$, $\eta_p^2 = .66$. Highs provided more specific autobiographical memories ($M = 1.60$, $SD = 0.60$) than lows ($M = 0.17$, $SD = 0.39$). There were no other significant main effects or interactions, (all Fs < 1.6, all ps > .22). Thus, highs provided specific memories supporting their delusion about both a real sibling and a nonexistent sibling. For example, 1 male high in the real-sibling condition claimed to have become his brother Jamie and recalled: "My father and I were chopping wood on the ranch and building a go-cart." Likewise, a female high in the nonexistent-sibling condition claimed that she had a sibling called Sylvia and recalled: "On the weekend we tidied up our rooms together while listening to music and then we watched videos." Thus, regardless of whether they received the real-sibling or nonexistent-sibling suggestion, highs had no difficulty generating specific memories with sensory-perceptual details, which fit into narratives of everyday events in their lives. In contrast, lows provided general memories. For instance, 1 low in the real-sibling condition who had become her sister said: "I like to read, sew, and listen to music on weekends." Similarly, 1 low in the nonexistent-sibling condition who claimed to have a brother called Michael said, "He usually likes to sit down and read."

In the postexperimental inquiry, we asked participants where the memories they had provided during the suggested delusion came from. We coded the source of participants' autobiographical memories as a fabrication, a previous experience, or a known event (i.e., an event that had been described to participants by someone else). During the suggested delusion, both highs and lows in the real- and nonexistent-sibling conditions tended to draw information from previously experienced events (highs: 60%, lows: 64%), rather than to completely fabricate events that had never occurred (highs: 30%, lows: 36%) or to mention events that had been described to them by others (highs: 10%, lows: 0%). Comments made by highs during the postexperimental inquiry indicated that they reinterpreted previous experiences. For example, the male high in the real-sibling condition who became his brother Jamie and had recalled building a go-cart said, "I was looking at Jamie in a specific instance—I was with him at that time." Likewise, the female high in the nonexistent-sibling condition who claimed she had a sister called Sylvia and had recalled tidying their rooms together said, "When I was on a school camp I did that with my friends." Thus, highs in both conditions wove the suggested delusion into real, previously experienced events.

Experiment 1: Summary

The hypnotic suggestion for an identity delusion produced an experimentally induced shift in self among all of our high hypnotizable participants. Highs provided a new name for themselves (as their real sibling) or for their (nonexistent) sibling and rated their delusional experience as more real and compelling than lows. Notably, highs had no difficulty experiencing a delusion about themselves with a direct impact on self-identity (and based in reality) or a delusion about themselves with a less direct impact on identity (and based in fantasy). The reality or plausibility of the shift in self had no effect. This is consistent with clinical cases where patients can incorporate a range of false beliefs about the self.

Most important, the shift in self had clear consequences for personal semantic information and autobiographical memory. During the suggested delusion, highs described themselves (as their real sibling) or their (nonexistent) sibling in ways consistent with the suggestion. In terms of autobiographical memory, highs, but not lows, generated specific memories with sensory-perceptual and contextual detail, which often were reinterpretations of previous personal experiences woven into the fabric of other memories. This occurred irrespective of whether highs experienced a direct shift in self to a known person or an indirect shift to a self with an unknown sibling. Consistent with Conway's

(2005) predictions, the shift in self appeared to facilitate the recall of specific, detailed autobiographical memories that served the suggested delusion.

<center>Experiment 2</center>

Experiment 1 showed that a hypnotically induced shift in self shifted autobiographical memory at least in the sense that participants recalled memories consistent with and in support of their hypnotically deluded self. In Experiment 2, we aimed for a clearer test of the link between shifting self and shifting memory. Based on our past work on posthypnotic amnesia (Cox & Barnier, 2003), we investigated whether a hypnotic identity delusion could selectively shift the accessibility of autobiographical memories—facilitating memories consistent with the delusion while making memories inconsistent with the delusion less accessible.

To shift self, we gave half of our high and low hypnotizable participants a suggestion to become a friend from high school (school-friend version). We gave the other half a suggestion to become a friend they had met since starting university (university-friend version). Both of these suggestions focused on a direct change in self, since clinical neuropsychologists tend to reserve the label of "reverse intermetamorphosis" for these types of delusions (rather than less direct changes in self; e.g., changes to loved ones such as in Capgras delusion). However, we asked participants to restrict their autobiographical memory recall to the last 2 years of high school (described below) and were interested in how becoming a university friend versus a school friend might influence memory performance.

To explore the impact of the hypnotically induced shift in self on autobiographical memory, we adapted the procedures of our posthypnotic amnesia work (Cox & Barnier, 2003). Posthypnotic amnesia involves suggesting to a hypnotized person that following hypnosis they will be unable to recall certain material until they receive a reversibility cue. In our 2003 study, we asked highs and lows to elicit 10 memories from their first romantic relationship in response to cue phrases (e.g., going out to dinner). We then administered a posthypnotic amnesia suggestion for either the entire relationship (lifetime suggestion) or for the 10 memories just elicited (specific suggestion). Following hypnosis, we tested participants on a cued recall task that included five cue phrases presented at elicitation (old cues) and five cue phrases not previously presented (new cues). Highs who received the lifetime posthypnotic amnesia suggestion had difficulty recalling the specific memories they originally elicited (as indexed by their responses to old cues). However, the suggestion also decreased the accessibility and

quality of new memories that were associated with old cues. Thus, the lifetime suggestion shifted memory in a way that was consistent with the goal to forget by selectively inhibiting the retrieval of particular autobiographical events (for more on posthypnotic amnesia, see Barnier, 2002; Kihlstrom, 1995, 1998; Mendelsohn, Chalamish, Solomonovich, & Dudai, 2008).

In Experiment 2, to index memory before the hypnotic shift in self, we gave participants a hypnotic induction and asked them to elicit 10 memories from their last 2 years of high school in response to cue sentences. We measured latency to generate each memory and memory specificity as a baseline index of memory accessibility. This would also tell us whether highs might simply be more likely than lows to elicit specific memories while hypnotized. To shift self, we then administered a delusion suggestion to become a friend from high school or a friend they had met since starting university. During the suggested delusion, we indexed whether the shift in self produced a shift in explicit memory by asking participants to elicit another 10 memories from their last 2 years of high school in response to five old cues and five new cues. We were interested in whether the hypnotic shift in self (to either a high school friend or to a university friend) shifted the accessibility of the original high school memories.

We also were interested in the impact of a shift in self on implicit memory (Kihlstrom & Schacter, 1995). Implicit memories are memories that are not consciously accessible but continue to influence ongoing behavior, thought, and action (Schacter, 1996; Schacter & Kihlstrom, 1989). To explore this, we gave participants the social judgment task used by Cox and Barnier (2003; see also Barnier, 2002, for a discussion of implicit tasks for autobiographical memories) consisting of 15 possible life events: 10 generic events (taken from the Life Events Inventory; Garry, Manning, Loftus, & Sherman, 1996) and 5 of participants' personal autobiographical memories. This task first measured implicit memory by asking participants to rate how likely they thought it was that each event would happen to someone under the age of 21 ("likelihood" rating). This task then measured explicit memory by asking participants to rate how certain they were that each event had happened to them ("happened to me" rating). In previous work, Cox and Barnier (2003) found that highs were less certain than lows that their personal events had happened to them, indicating impaired explicit memory. However, both highs and lows considered it equally likely that their personal events would probably happen to someone under the age of 21, indicating intact implicit memory. In Experiment 2, we used this social judgment task (with 10 generic life events and five personal autobiographical memories elicited before the delusion suggestion) during the hypnotic identity delusion to examine whether the shift in self differentially influenced implicit and explicit memory.

Based on Experiment 1, we expected that more highs than lows would pass the delusion suggestion and would report a compelling delusional experience (indexed by reality and belief ratings). We also expected the shift in self to shift memory accessibility. Specifically, we expected that highs experiencing the hypnotic delusion would be less likely than lows to access original memories elicited in response to old cues. We also thought the suggestion version might influence memory accessibility. Highs who received the friend from high school version might still recall their original memories during the suggested delusion because these memories might still be congruent with the deluded identity. In contrast, highs who received the friend from university suggestion might prefer to recall new memories, because their original memories should be incongruent with their suggested identity. Also, based on hypnotic studies of posthypnotic amnesia (Barnier, 2002; Cox & Barnier, 2003) as well as memory studies of dissociative identity disorder (Bryant, 1995; Eich, Macaulay, Loewenstein, & Dihle, 1997; Schacter, Kihlstrom, Kihlstrom, & Berren, 1989), we expected the suggested delusion to impair explicit memory but to spare implicit memory, as indicated by performance on the social judgment task. That is, highs experiencing the delusion should not believe that memories from their nondeluded self happened to them, but they should rate these memories as fairly likely to happen to someone under the age of 21.

Experiment 2: Method

Design and Participants

We tested 28 (19 female and 9 male) high hypnotizable participants of mean age 19.54 years ($SD = 2.43$) and 29 (14 female and 15 male) low hypnotizable participants of mean age 18.90 years ($SD = 1.35$) in a 2 (hypnotizability: high vs. low) × 2 (suggestion version: school friend vs. university friend) between-subjects design. Participants were undergraduate psychology students at the University of New South Wales, who received credit towards their psychology course for their involvement. We carefully selected them on the basis of their extreme scores on a modified 10-item version of the HGSHS:A and a modified 10-item version of the SHSS:C. Highs scored 7 to 10 ($M = 8.41$, $SD = 1.36$) on the HGSHS:A and 7 to 10 ($M = 8.57$, $SD = 1.07$) on the SHSS:C. Lows scored 0 to 3 ($M = 1.45$, $SD = 0.86$) on the HGSHS:A and 0 to 3 ($M = 1.83$, $SD = 0.97$) on the SHSS:C.

Materials

Based on procedures used by Cox and Barnier (2003), we used a list of 15 cue phrases to elicit and test autobiographical memories during

the delusion. The list was divided into three 5-item subsets (A, B, C). Subset A included "going to a party," "having an argument," "going shopping," "someone making you feel jealous," and "going out to dinner." Subset B included "a day out with friends," "giving or receiving a gift," "a family event," "talking on the phone," and "an embarrassing moment." Subset C included "doing something outdoors," "sharing a snack," "receiving a surprise visit," "driving somewhere," and "going to the movies." Participants were randomly assigned to one of three combinations of subsets and combinations were counterbalanced across conditions (see the Appendix).

Following the hypnotic induction (before the delusion suggestion), Elicitation 1 consisted of a verbally presented list of 10 cue phrases (e.g., Subsets A and B). Following the delusion suggestion, Elicitation 2 consisted of another verbally presented list of 10 cue phrases; five were phrases presented at Elicitation 1 ("old cues"; e.g., Subset B) and five were phrases not previously presented ("new cues"; e.g., Subset C). Following Elicitation 2, the social judgment task (used to examine the impact of a shift in self on implicit and explicit memory) consisted of a verbally presented list of 15 possible life events (as used by Cox & Barnier, 2003). Ten events were from the Life Events Inventory (e.g., "adopted a lost animal," "found a $10 note in a car park"; Garry et al., 1996), and five were short descriptions of participants' own memories that they had provided during Elicitation 1, before the delusion suggestion (e.g., Subset A). Participants rated the 15 events on an 8-point "likelihood" scale and an 8-point "happened to me" scale (see procedures below for verbatim questions and scale anchors). We assessed the impact of the delusion on implicit and explicit memory by comparing participants' likelihood ratings with their "happened to me" ratings.

Procedure

The experiment involved a hypnosis session and a postexperimental inquiry, both conducted by the hypnotist.

Hypnosis session. Following informed-consent procedures, the hypnotist administered a standard hypnotic induction to all participants (based on Weitzenhoffer & Hilgard, 1962) and tested them on SHSS:C suggestions for hand lowering, moving hands apart, and verbal inhibition. To index autobiographical memory before the shift in self, the hypnotist asked participants to generate specific autobiographical memories from their last 2 years of high school in response to 10 cue sentences (Elicitation 1). She informed participants that a specific event was a unique, single event and gave them an example. She asked participants to think of each memory as quickly as possible and said that she would be timing how long it took them to think of each one. The hypnotist told participants that once they had each memory

in mind they should describe it aloud in one short sentence. The hypnotist measured recall latency for each memory from the offset of the cue phrase until participants indicated verbally they had a relevant memory in mind. Participants' responses were audio-recorded.

Following the SHSS:C suggestion for taste hallucination, the hypnotist attempted to experimentally shift self by suggesting that participants become either a friend from high school (school-friend condition, $n = 29$; 14 highs, 15 lows) or a friend from university (university-friend condition, $n = 28$; 14 highs, 14 lows). The hypnotist asked participants in the school-friend condition to think of and name a same-sex friend they knew in the last 2 years of high school. She asked those in the university-friend condition to think of and name a same-sex friend they had met since starting university.

The hypnotist then administered the delusion suggestion (based on Cox & Barnier, 2009a) to become the friend participants had named. She gave suggestions such as "as you listen to my voice and my words, you can feel yourself becoming [name of nominated person], more and more. So that in a moment you will be [nominated person], you will be [nominated person] in every way." The suggestion continued for 2 minutes. To index participants' experience of the delusion, the hypnotist asked two questions ("tell me about yourself" and "tell me what your name is").

To index the impact of the shift in self on autobiographical memory, the hypnotist asked participants to generate specific autobiographical memories from their last 2 years of high school in response to 10 cue sentences (Elicitation 2). The instructions were identical to Elicitation 1. The hypnotist measured recall latency for each memory from the offset of the cue phrase until participants indicated verbally they had a relevant memory in mind. Participants' responses were audio-recorded.

To index the impact of the shift in self on implicit and explicit memory, the hypnotist administered the social judgment task, which she presented as a test of information-processing speed. The verbatim instructions were:

> As you sit there experiencing yourself as [deluded name], I am going to give you a task to measure how fast you process information because sometimes hypnosis slows this down. I will read you a list of "possible life events" and your job is to rate how likely or unlikely it might be for 95% of people to have had such an experience before the age of 21. Rate each event on a scale of 1 to 8, where 1 means "very unlikely" and 8 means "very likely."

When participants finished their likelihood ratings, the hypnotist said:

> As you continue to experience yourself as [deluded name], I'm going to read the same events back to you quickly and this time I want you to

tell me how certain you are that each event has or has not happened to you. One means it "definitely did not happen to you" and 8 means it "definitely did happen to you."

Following this, the hypnotist cancelled the delusion suggestion and administered a hypnotic deinduction (based on Weitzenhoffer & Hilgard, 1962).

Postexperimental inquiry. In this inquiry, to index the reality of the suggested delusion, the hypnotist asked participants to rate on a 7-point Likert scale how much they really felt they were their friend (1 = *not at all*, 7 = *completely*), and how much they believed they were their friend (1 = *not at all*, 7 = *completely*). To examine whether participants had been attempting to recall the same memories at Elicitation 2 as those they had provided at Elicitation 1, the hypnotist reminded them that half of the sentences presented at Elicitation 2 were the same as half of the sentences presented at Elicitation 1. She asked participants if, when the sentences were the same, they had been trying to recall the same memories they had described at Elicitation 1. To examine memory perspective during the suggested delusion, the hypnotist then read participants' Elicitation 2 memories back to them and asked them to indicate, for each memory, whether they had seen the memory through their own eyes or through their suggested identity's eyes. Finally, the hypnotist invited participants to ask questions, debriefed them and thanked them for their time.

Experiment 2: Results and Discussion

Indexing a Shift in Self

Consistent with Experiment 1, the hypnotist and an independent rater (who was trained in hypnosis but unaware of participants' hypnotizability) categorized participants' responses to the delusion suggestion; again there were very few differences in initial categorization, which were resolved through discussion. As in Experiment 1, we scored participants as passing the delusion suggestion if they changed their name and did not deny they were their friend when asked "tell me about yourself." Twenty-five (89.3%) highs passed the delusion suggestion: 12 (85.7%) in the school-friend condition and 13 (92.9%) in the university-friend condition. This pass rate was significantly higher than lows, $\chi^2(1, N = 57) = 22.25$, $p < .05$. Only 8 (27.6%) lows passed the delusion suggestion: 3 (20.0%) in the school-friend condition and 5 (35.7%) in the university-friend condition. Given that the majority of lows failed the delusion suggestion, we conducted a further chi-square analysis focusing only on highs to examine any differences in passing across suggestion versions, $\chi^2 (1, N = 28) = 0.37$, $p > .05$. This analysis

revealed that highs passed the suggestion irrespective of whether they received the school-friend or university-friend version.

Consistent with this analysis, highs given both the school-friend ($M = 4.71$, $SD = 1.44$) and university-friend ($M = 4.21$, $SD = 1.20$) versions of the delusion suggestion rated their experience as much more real than lows given the school-friend ($M = 2.10$, $SD = 1.26$) and university-friend ($M = 2.11$, $SD = 1.21$) versions. Similarly, highs given both the school-friend ($M = 4.36$, $SD = 1.55$) and university-friend ($M = 3.96$, $SD = 1.50$) versions of the delusion suggestion rated their belief in the delusional experience as much stronger than lows given the school-friend ($M = 1.37$, $SD = 0.69$) and university-friend ($M = 1.71$, $SD = 1.20$) versions. Separate 2 (hypnotizability) x 2 (suggestion version) ANOVAs of reality and belief ratings confirmed these significant main effects of hypnotizability for reality, $F(1, 53) = 48.39$, $p < .001$, $\eta_p^2 = .48$, and belief, $F(1, 53) = 60.21$, $p < .001$, $\eta_p^2 = .53$. As indicated by their ratings, all highs experienced a compelling shift in self regardless of whether they were asked to become a friend from high school or a friend from university.

Impact of Shift in Self on Autobiographical Memory

Memory at Elicitation 1. Consistent with Experiment 1, subsequent analyses focused on the 25 highs who passed the delusion suggestion and the 21 lows who failed the delusion suggestion. At Elicitation 1, prior to the delusion suggestion, participants generated either a specific memory (coded in the same way as Experiment 1), a general memory, or no memory in response to each of the 10 cues. Results indicated that highs given both the school-friend ($M = 9.42$, $SD = 1.00$) and university-friend ($M = 9.08$, $SD = 1.32$) versions of the delusion suggestion as well as lows given both the school-friend ($M = 8.73$, $SD = 1.68$) and university-friend ($M = 9.11$, $SD = 1.27$) versions of the delusion suggestion elicited predominantly specific memories. Also, highs given both the school-friend (Msec $= 6.18$, $SD = 2.88$) and university-friend (Msec $= 5.72$, $SD = 3.85$) versions of the delusion suggestion took a similar amount of time to elicit memories as lows given both the school-friend (Msec $= 7.61$, $SD = 4.30$) and university-friend (Msec $= 5.38$, $SD = 3.38$) versions. Separate 2 (hypnotizability) $\times$ 2 (suggestion version) between-subjects ANOVAs of the number of specific memories provided, the number of general memories provided, and the latency to recall memories yielded no significant main effects or interactions (all Fs < 1.40, all ps $> .25$). As expected, at Elicitation 1, before the shift in self, all participants elicited memories from high school to almost all of the cues in approximately 5 to 10 seconds.

Memory at Elicitation 2. During the suggested delusion, we examined the number of specific and general memories elicited in response to

the 10 cues and latency to generate memories. Similar to Elicitation 1, highs and lows given both the school-friend and university-friend versions of the suggestion had no difficulty eliciting specific memories in response to the 10 cues and they elicited memories in approximately 5 to 10 seconds. At Elicitation 2, we were particularly interested in comparing participants' memories in response to the five old cues and the five new cues. Separate 2 (hypnotizability) × 2 (suggestion version) × 2 (cue type: old vs. new) repeated-measures ANOVAs of the number of specific memories, number of general memories, and latency to recall memories yielded only a significant main effect of hypnotizability for the number of general memories, $F(1, 42) = 6.20$, $p < .02$, $\eta_p^2 = .13$, but no significant main or interaction effects for the number of specific memories (all $Fs < 2.80$, all $ps > .10$), or for latency (all $Fs < 3.0$, all $ps > .09$). Therefore, at Elicitation 2, following the shift in self, highs and lows recalled a similar number of specific memories and elicited memories in a similar amount of time, but lows recalled slightly more general memories ($M = 1.26$, $SD = 1.37$) than highs ($M = 0.55$, $SD = 0.79$).

Although the suggested delusion had no impact on the number of memories—highs could elicit specific memories from high school in response to the cues—it did influence the accessibility of some memories. We coded participants' memories to old cues at Elicitation 2 in terms of whether the memories matched those elicited to the same cues at Elicitation 1 (original memories where the majority of details were the same) or were entirely new memories (the majority of details were different), or no memory. A 2 (hypnotizability) × 2 (suggestion version) between-subjects ANOVA of the number of original memories provided in response to old cues at Elicitation 2 yielded a significant main effect for hypnotizability, $F(1, 42) = 24.92$, $p < .01$, $\eta_p^2 = .37$. Highs given both the school-friend ($M = 0.57$, $SD = 0.76$) and university-friend ($M = 0.79$, $SD = 1.48$) versions of the suggestion elicited fewer original memories to old cues than lows given both the school-friend ($M = 2.07$, $SD = 1.53$) and university-friend ($M = 2.29$, $SD = 1.98$) versions. Thus, highs tended to provide almost all new memories to old cues, whereas lows did not. This suggests that for highs, during the shift in self, new memories were facilitated compared to memories they provided prior to the shift.

We asked participants postexperimentally whether they had been aware that some of the cue sentences presented at Elicitation 2 were the same as some presented at Elicitation 1. All lows and 84% of highs indicated that they had been aware of this fact. We asked those who were aware whether they had been trying to recall the same memories that they had provided at Elicitation 1. Sixty percent of lows and 40% of highs said they had tried to recall the same memories, $\chi^2(1, N = 45) = 1.78$, $p > .18$. Their low number of original memories suggests that highs

were unlikely to recall their original memories while experiencing their deluded identity, even though they may have tried to.

Memory perspective. We asked participants postexperimentally about the perspective of each memory they had generated at Elicitation 2 (during the delusion). We asked them whether they had seen each memory through their own eyes or through the eyes of their suggested identity. A 2 (hypnotizability) × 2 (suggestion version) between-subjects ANOVA of the number of memories seen through the eyes of the suggested identity yielded a significant main effect for hypnotizability, $F(1, 41) = 30.49$, $p < .01$, $\eta_p^2 = .43$, and a significant main effect for suggestion version, $F(1, 41) = 4.92$, $p < .04$, $\eta_p^2 = .11$. Highs described seeing more memories through their suggested identity's eyes ($M = 4.44$, $SD = 3.48$) than lows ($M = 0.50$, $SD = 1.57$). Interestingly, participants given the school-friend version of the suggestion described seeing more memories through their suggested identity's eyes ($M = 3.43$, $SD = 3.53$) than participants given the university-friend version of the suggestion ($M = 1.91$, $SD = 3.16$). In sum, following the shift in self, highs and participants who received the school-friend version of the suggestion viewed their memories from their suggested identity's perspective. In contrast, lows and participants who received the university-friend version of the suggestion viewed their memories through their own eyes. Highs made a number of postexperimental comments consistent with these findings. For instance, 1 high said, "I thought about the things he was into . . . .I put myself in his shoes," and another said, "I remember thinking about how intelligent she is. I felt like all her knowledge came into me when I was her."

Implicit versus explicit memory. We examined the impact of the shift in self on implicit versus explicit memory by comparing participants' likelihood ratings (i.e., how likely they thought it was for 95% of people to have had such an experience) with their "happened to me" ratings (i.e., how certain they were that the event had happened to them) for their personal events (all memories to old cues provided at Elicitation 1). A 2 (hypnotizability) × 2 (rating: happened to me vs. likelihood) repeated-measures ANOVA of these data yielded a significant main effect for rating, $F(1, 44) = 6.63$, $p < .02$, $\eta_p^2 = .13$, and a significant interaction between hypnotizability and rating, $F(1, 44) = 13.34$, $p < .01$, $\eta_p^2 = .23$. Highs and lows made similar likelihood ratings (highs: $M = 6.11$, $SD = 1.01$; lows: $M = 5.96$, $SD = 1.13$), suggesting that the shift in self did not influence implicit memory for their personal events. However, highs' "happened to me" ratings ($M = 5.90$, $SD = 1.51$) were significantly lower than lows' "happened to me" ratings ($M = 7.18$, $SD = 1.28$) indicating that the shift in self altered explicit memory. That is, the shift in self made highs less certain that they had experienced their nondeluded personal memories. In other words, among highs, the hypnotic shift

in self produced a corresponding shift in explicit memory but spared implicit memory for events no longer consistent with the deluded self.

Experiment 2: Summary

Consistent with Experiment 1, more highs than lows passed the delusion suggestion and reported a compelling delusional experience. The delusion suggestion was equally effective for the school-friend and university-friend versions of the suggestion, demonstrating the effectiveness of the hypnotic paradigm at shifting self in a variety of ways.

At Elicitation 1, prior to the experimentally induced shift in self, the autobiographical memory performance of highs and lows was similar; their memories were specific rather than general and they were generated in a similar amount of time. Thus, highs do not appear to be simply more likely than lows to elicit specific memories. However, at Elicitation 2, during the suggested shift in self, lows recalled more general memories than highs. Importantly, the shift in self also shifted autobiographical memory. At Elicitation 2, highs recalled fewer original memories to old cues than lows. This occurred even though some highs were attempting to recall the original memories they elicited. Thus, during the suggested delusion, highs may have had limited access to the memories they had originally elicited. It is possible that when self is shifted, such as during a delusion of misidentification, autobiographical memories that are no longer consistent with the deluded self may be inhibited. Notably, during the suggested delusion, highs viewed their memories through their suggested identity's eyes whereas lows viewed their memories through their own eyes. This change in perspective is consistent with the findings of Experiment 1, which indicated that highs were reinterpreting autobiographical events from the perspective of their suggested identity. On the social judgment task, highs were less certain than lows that their nondeluded personal events had happened to them providing further support that the shift in self shifted explicit memory. However, highs and lows found it equally likely that their events would happen to 95% of people under the age of 21, indicating that the shift in self did not influence highs' implicit memory. Although highs said that their nondeluded personal events had not happened to them, their memories of these events were not completely lost. Rather, these memories may have been temporarily inaccessible.

Although Experiments 1 and 2 suggest that an experimentally induced shift in self produces a corresponding shift in autobiographical memory, an alternative explanation for these findings is that our high hypnotizable individuals were simply responding to the

demand characteristics associated with the hypnotic setting. Therefore, in Experiment 3, we addressed the possibility that hypnotic shifts in self and memory may simply be due to experimental demands.

Experiment 3

A number of theorists (e.g., Orne, 1959, 1962, 1971; Spanos, Burnley, & Cross, 1993) have suggested that hypnosis experiments may be influenced by social and motivational factors inherent in the hypnotic setting. Thus, it can be argued that participants' responses to a hypnotic delusion suggestion and any resulting shift in memory are due to socially motivated compliance with perceived experimental demands. To rule out this possibility, in Experiment 3, we implemented Orne's (1959, 1962, 1971) real-simulating paradigm of hypnosis. This paradigm involves two experimenters who test real, hypnotized participants (reals) and participants who are instructed to simulate or fake hypnosis (simulators). The first experimenter, who is aware of participants' real or simulating status, informs reals that they have just the right sort of abilities for the current research and they should respond during hypnosis as they normally would. In contrast, the first experimenter tells simulators that they must fool the hypnotist into believing they are excellent hypnotic subjects and to use whatever they know about hypnosis and any cues they pick up from the hypnotist to figure out how to respond. To motivate simulators to completely engage with the task of faking hypnosis, they are informed that all intelligent participants have been able to do the task successfully and if the hypnotist realizes that they are faking she will stop the experiment immediately.

Following these instructions, participants are introduced to the hypnotist who conducts the hypnosis session. Finally, participants return to the first experimenter who conducts a postexperimental inquiry. Simulators are a quasi-control condition as their responses are an indication of experimental demands. If reals and simulators respond similarly, we cannot rule out an explanation of reals' behavior in terms of demand characteristics. However, if reals and simulators respond differently, we can infer that reals are not responding to social cues alone. For instance, in work on hypnotic sex change, Noble and McConkey (1995) reported that, although simulators initially responded to a suggestion to become the opposite sex, only reals maintained their hypnotic delusion in the face of strong challenges, indicating that demand characteristics were not sufficient as an explanation for the responding of reals (see also Burn et al., 2001).

In Experiment 3, we shifted self by giving participants a hypnotic suggestion to become a friend's sibling of the same sex. This allowed

us to explore whether our hypnotic delusion paradigm extended to someone who was presumably less familiar than a sibling. Consistent with Experiment 1, we indexed response to the delusion suggestion in multiple ways. First, to index a shift in self, we administered Kuhn and McPartland's (1954) "I am" task before and after the delusion suggestion. Second, during the suggested delusion, we asked participants what their name was and to provide a self-description. Third, we asked participants to make postexperimental reality and belief ratings about their delusional experience. To examine the impact of the shift in self on autobiographical memories, we asked participants to generate specific memories that illustrated two of the characteristics they provided in the "I am" task during the delusion (as used by Cox & Barnier, 2009a). To investigate the source of these memories, we also asked participants postexperimentally where the information they provided had come from.

The second aim of Experiment 3 was to examine the impact of challenging both identity and autobiographical memories elicited during the suggested delusion. To challenge identity, we used a contradiction and a confrontation as used by Cox and Barnier (2009a) and adapted from Noble and McConkey (1995). During the contradiction, we asked participants what they would say if their mother came into the room and said that they were not their suggested identity. During the confrontation, we asked participants to open their eyes, to look at themselves on a monitor, and to describe what they were experiencing as they did so. To challenge autobiographical memory, following elicitation of each memory, we asked participants how they knew that the event they just described was something they actually experienced. We were interested in whether participants would provide justification for experiencing their autobiographical events.

We expected both reals and simulators to pass the delusion suggestion and provide high ratings of reality and belief to the hypnotist. We expected these ratings to remain high for reals during the postexperimental inquiry (conducted by the first experimenter) but to decrease for simulators. In terms of autobiographical memories, based on the findings of Experiment 1, we expected reals to recall specific, previous experiences consistent with their shift in self. In contrast, we expected simulators to recall more general autobiographical events. In terms of the challenge procedures, Cox and Barnier (2009a) found that their hypnotic delusion of misidentification could be maintained in the face of challenge. Likewise, we expected reals to maintain their suggested identity when challenged to a greater extent than simulators and to provide justification for experiencing their "deluded" autobiographical memories. In brief, we expected reals to differ from simulators on more subtle dimensions in their response to the delusion suggestion.

Experiment 3: Method

Design and Participants

We tested 18 real, high hypnotizable participants (5 male and 13 female) of mean age 20.94 years ($SD = 3.32$) and 19 simulating, low hypnotizable participants (7 male and 12 female) of mean age 22.05 years ($SD = 4.79$). Participants were undergraduate psychology students at the University of New South Wales who received credit towards their psychology course for their involvement. We carefully selected them on the basis of their extreme scores on a modified version of the 10-item HGSHS:A and a modified 10-item version SHSS:C. Reals scored in the range of 7 to 10 ($M = 8.56$, $SD = 0.82$) on the HGSHS:A and 8 to 10 ($M = 9.56$, $SD = 0.86$) on the SHSS:C. Simulators scored in the range of 0 to 3 ($M = 1.45$, $SD = 1.04$) on the HGSHS:A and 0 to 2 ($M = 1.16$, $SD = 1.01$) on the SHSS:C.

Procedure

The experiment involved the administration of real-simulating instructions, a hypnosis session (including a posthypnotic inquiry), and a postexperimental inquiry session. The first experimenter administered the real-simulating instructions and the postexperimental inquiry, and the second experimenter (the hypnotist) conducted the hypnosis session and the posthypnotic inquiry. The hypnotist was kept strictly unaware of participants' real or simulating status until the entire experiment was completed.

Real-simulating instructions. Following informed consent, the first experimenter gave all participants instructions according to Orne's (1959, 1971) procedures for the real-simulating paradigm (and as used in Burn et al., 2001; Noble & McConkey, 1995). The first experimenter informed reals that their performance in previous hypnosis sessions had been excellent and that they had just the right sort of abilities for the current research. She informed reals that they would be taken to the hypnotist who would conduct the hypnosis session and afterwards they would return to her to discuss their experiences. The first experimenter informed simulators that they would be taken to the hypnotist and would have to fool her into believing they were excellent hypnotic subjects. To motivate simulators, the first experimenter told them that the hypnotist would stop the experiment if she realized they were faking and that intelligent participants can complete the task successfully. The first experimenter informed simulators that they should continue to fake hypnosis until they returned to her, after the hypnosis session.

Hypnosis session. The first experimenter introduced participants to the hypnotist who was unaware of their real or simulating status.

The hypnotist began by rating her perception of participants' real or simulating status. Next, to index current (nondeluded) self, the hypnotist asked participants to complete Kuhn and McPartland's (1954) "I am" task (Time 1) where she asked them to "generate five sentences beginning with the words "I am . . . " that describe who you are, the kind of person you are." The hypnotist then administered a standard hypnotic induction (based on Weitzenhoffer & Hilgard, 1962) and tested participants on SHSS:C suggestions for hand lowering, finger lock, and verbal inhibition. Following this, to experimentally shift self, the hypnotist asked participants to think of and name a friend's sibling of the same sex as themselves. She then administered the delusion suggestion to become the person they had named. She gave suggestions such as "as you listen to my voice and my words, you can feel yourself becoming [name of nominated person], more and more. So that in a moment you will be [nominated person], you will be [nominated person] in every way." The suggestion continued for 2 minutes, after which the hypnotist indexed participants' response to the suggested delusion ("tell me about yourself" and "what is your name?"). To index the shift in self following the delusion suggestion, she administered another "I am" task (Time 2). The instructions at Time 2 were identical to those at Time 1.

To index the impact of the shift in self on autobiographical memory, the hypnotist selected two sentences that participants completed in the "I am" task at Time 2, which portrayed personality traits (rather than physical characteristics). For example, she selected words such as *generous* or *competitive* rather than words such as *tall* or *brunette*. She read each sentence back to participants and asked them to "describe a specific time when you did something, or something happened, which illustrates this about yourself." Upon elicitation of each memory, the hypnotist prompted participants for more information ("tell me more about where you were . . . your physical surroundings," "tell me more about the people you were with," and "tell me more about how you felt"). She then challenged each autobiographical memory by asking, "How did that memory come to mind? How do you know that is something you have experienced?"

Next, the hypnotist challenged participants' identity with a contradiction and a confrontation. During the contradiction, she asked participants, "if your mother came into the room now and said that you were not [suggested identity's name], then what would you say to her?" During the confrontation, the hypnotist said:

> In a moment, as you sit there relaxed and deeply hypnotized, I'll ask you to open your eyes, not yet, but in a moment. When I ask you to open your eyes I'd like you to look at the television screen that's directly in front of you. When you open your eyes I want you to focus just on the

> television screen and look at yourself. All right, now remaining relaxed
> and hypnotized, just open your eyes and look at the monitor. Tell me now,
> what are you experiencing as you look at yourself on the screen?

Following this, the hypnotist cancelled the suggestion, administered a
standard deinduction (based on Weitzenhoffer & Hilgard, 1962) and
made another rating of her perception of participants' real or simulating
status.

Posthypnotic inquiry session. After hypnosis, the hypnotist asked par-
ticipants to rate the reality of their experience, the belief that they
were their suggested identity, and the sense of their actual identity
during the delusion: "Did you really feel you were [deluded name]?"
(1 = *not at all*, 7 = *completely*), "How much did you believe you were
[deluded name]?" (1 = *not at all*, 7 = *completely*), and "How much of
your actual identity did you sense at the time?" (1 = *none*, 7 = *a lot*).
She also asked participants where they had obtained the information
for the two autobiographical memories they described: "During this
experience you described a memory about [remind subject of a mem-
ory they described]. Where did this information come from?" Finally,
the hypnotist thanked participants, summoned the first experimenter
and left the room.

Postexperimental inquiry session. The first experimenter began by
inquiring about participants' interpretation of the delusion suggestion:
"What did you think you should do in response to this suggestion?"
and "What was your strategy for this suggestion? What did you actually
do?" Once again, participants rated on 7-point Likert scales the reality
of their experience, the belief that they were their suggested identity,
and the sense of their actual identity during the suggested delusion.
The first experimenter also explored the source of participants' autobi-
ographical memories by reading each memory back to participants and
asking: "Where did the information come from for this event?" She then
explored participants' reaction to the challenge procedures: "What did
you think you should do in response to this?" and "What was your
strategy for this suggestion?" Finally, she invited participants to ask
questions, debriefed them and thanked them for their time.

Experiment 3: Results and Discussion

Indexing a Shift in Self

   Consistent with Experiment 1, we scored participants as passing the
delusion suggestion if they changed their name and did not deny their
suggested identity when asked "tell me about yourself." Chi square

analysis indicated that the majority of both reals (94.4%) and simulators (94.7%) passed the delusion suggestion, $\chi^2(1, N = 37) < .01$, $p > .96$. We also examined the mean number of different descriptions provided (from a total of five) in the "I am" task at Time 2 (during the delusion) compared to the "I am" task at Time 1 (before the delusion). The greater the number, the greater the shift in self during the delusion. Reals ($M = 4.61$, $SD = 0.70$) and simulators ($M = 4.42$, $SD = 1.26$) provided a similar number of different self-descriptions during the delusion compared to before the delusion, $t = 0.56$, $p > .50$.

Reals and simulators were expected to display similar patterns of responding on these two measures because simulators were attempting to convince the hypnotist that they were experiencing the suggested delusion. However, differences emerged in the ratings of reality, belief, and sense of own identity that reals and simulators provided during the postexperimental inquiry (to the first experimenter) after simulators had stopped simulating. These differences are illustrated in Table 1. Separate 2 (group: real vs. simulating) × 2 (rating occasion: posthypnotic vs. postexperimental) mixed-model ANOVAs of participants' reality, belief, and sense of own identity ratings yielded significant main effects of rating occasion for all three variables: reality $F(1, 34) = 160.37$, $p < .01$, $\eta_p^2 = .83$; belief $F(1, 34) = 178.52$, $p < .01$, $\eta_p^2 = .84$; sense of own identity $F(1, 34) = 84.77$, $p < .01$, $\eta_p^2 = .71$. There were also significant interactions between group and rating occasion for all three variables: reality $F(1, 34) = 131.92$, $p < .01$, $\eta_p^2 = .80$; belief $F(1, 34) = 115.50$, $p < .01$, $\eta_p^2 = .77$; sense of own identity $F(1, 34) = 123.66$, $p < .01$, $\eta_p^2 = .78$. Reals' posthypnotic and postexperimental ratings of reality and belief in their deluded self were high whereas their ratings about their sense of true identity were low. In contrast, simulators' posthypnotic ratings of reality and belief were high, and their sense of true identity ratings were low. However, postexperimentally simulators' reality and belief ratings about their deluded self decreased and their sense of true identity ratings increased. This sharp change in simulators' ratings when they stopped simulating indicates that their responses to the delusion suggestion were based on their interpretation of how they should respond, rather than a genuine experience. This is further supported by simulators' comments during the postexperimental inquiry, which included "I just tried to pretend like I was acting—as if I'm in an acting class. I felt a bit bad at times because I don't like deceiving people" and "I didn't get the fact that I had to be this person so I made it up." One simulator described her experience as similar to "faking a sickie at work." In contrast, reals described a compelling, believed-in, delusion-like experience, making comments such as "I felt I was her and I looked like her completely" and "I felt like her in appearance, perspective and her feelings."

Table 1

Reals' and Simulators' Mean Ratings of Reality, Belief, and Sense of Own Identity Provided to the Hypnotist and First Experimenter

	Reals	Simulators
Ratings Provided to Hypnotist		
Reality	4.83 (1.10)	5.78 (1.06)
Belief	4.67 (1.37)	5.72 (1.32)
Sense of Own Identity	3.67 (1.57)	2.00 (1.24)
Ratings Provided to First Experimenter		
Reality	4.61 (1.50)	1.21 (0.42)
Belief	4.17 (1.50)	1.11 (0.32)
Sense of Own Identity	3.22 (1.70)	6.74 (0.73)

Note. Standard deviations appear in parentheses. Reality ratings were made on a scale of 1 to 7 (1 = *not at all real*, 7 = *completely real*). Belief ratings were made on a scale of 1 to 7 (1 = *no belief*, 7 = *complete belief*). Sense of Own Identity ratings were made on a scale of 0 – 7 (0 = *none*, 7 = *a lot*).

Figure 1 illustrates participants' responses to the contradiction and confrontation challenges. During the contradiction, we asked participants what they would say if their mother came into the room and said that they were not the suggested identity. Consistent with Cox and Barnier (2009a), we scored participants as maintaining the delusion if they continued to claim that they were their suggested identity. We also scored some participants as "confused" if they expressed confusion about how they should respond. However, only 2 highs expressed confusion. Of the remainder, 94.1% of reals and 100.0% of simulators maintained their suggested identity, $\chi^2(1, N = 35) = 1.09$, $p > .05$. Comments made by those who maintained include "It's a pretty silly thing to say so I'd ask her what she's talking about" and "she's just joking—always saying funny stuff."

During the confrontation, we asked participants to open their eyes, to look at themselves on a monitor, and to describe what they were experiencing. Consistent with Cox and Barnier (2009a), we scored participants as maintaining the delusion if they claimed that the person on the monitor was their deluded identity or if they referred to the person on the monitor as themselves in the third person (e.g., if a participant named Lynette looked at the monitor and said "that's Lynette"). We also scored some participants as "confused" if they expressed confusion during the confrontation. We found that 9 participants expressed confusion. Of the remainder, 92.3% of reals but only 46.7% of simulators maintained their suggested identity, $\chi^2(1, N = 28) = 4.09$, $p = .04$. Thus, significantly more reals than simulators maintained their suggested identity when challenged with a confrontation (see Figure 1). Comments made by reals during the confrontation included "I feel trapped . . . sort of like what's
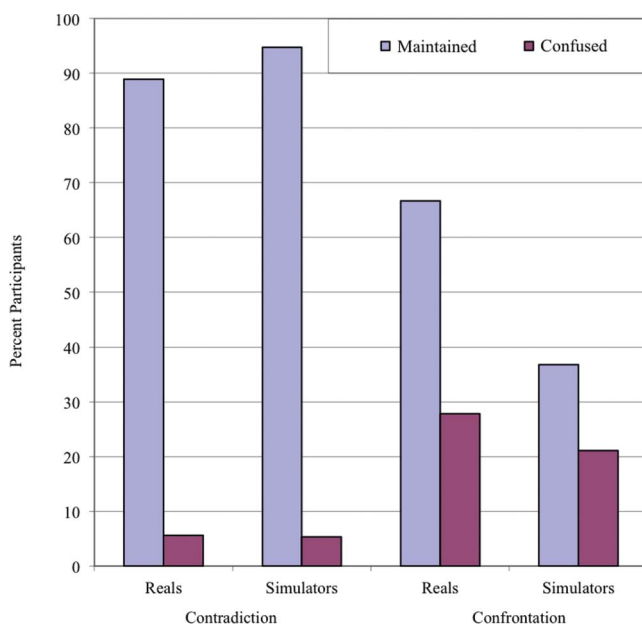
Figure 1.   **Reals' and simulators' response to the contradiction and confrontation (color figure available online).**

inside of me isn't the same as what I'm looking at. I don't feel that's me. That's not me is it?" and "I'm looking at my mouth trying to work out whether it is my mouth. If I look at the top of my face and eyes I don't feel like her. If I look at my posture, that's more of how I really feel."

Postexperimentally, reals and simulators described quite different reactions to the challenge procedures. Reals described how surprising and unusual the challenge procedures had been and made comments such as "when I first opened my eyes it was quite unfamiliar to look at myself." In contrast, simulators had difficulty knowing how to respond to the challenges. One simulator said: "That was tricky. I didn't really know what to do so I acted shocked and just sat there." Another said: "The trickiest bit was seeing the screen and trying to act like it wasn't me." These comments highlight the reality of the delusional experience for reals and the role-playing that influenced simulators' responses.

Impact of Shift in Self on Autobiographical Memory

To index the impact of the shift in self on autobiographical memory, we asked participants to generate two autobiographical memories that illustrated characteristics from their "I am" task at Time 2. Memory specificity and source were coded in the same way as Experiment 1.

In terms of specificity, of the two memories generated, reals provided significantly more specific memories (83.3%) than simulators (47.4%), $t = 3.35$, $p < .01$. In terms of source, a similar majority of reals (57.7%) and simulators (53.8%) described previously experienced events, $t = 0.25$, $p = .80$, and a similar number of reals (42.3%) and simulators (23.1%) described known events, $t = 1.61$, $p = .12$. Notably, whereas some simulators (23.1%) fabricated events, no reals did this, $t = 2.14$, $p < .05$. As in Experiment 1, reals had no difficulty recalling autobiographical memories during the suggested delusion that were consistent with their shift in self.

We challenged participants' autobiographical memories by asking them how they knew that the events they described were events they had actually experienced. In response to the challenge to their first memory, 83.3% of reals and 73.7% of simulators provided justifications for having experienced their memory, $\chi^2(1, N = 37) = 0.51$, $p > .05$. However, in response to a challenge to their second memory, significantly more reals (100.0%) than simulators (57.9%) provided justifications for having experienced their memory, $\chi^2(1, N = 37) = 9.67$, $p < .01$. When challenged, reals tended to describe emotional details surrounding the event, such as "Whenever I feel happy I always think back to that day as being the best," or they cited physical evidence, such as "My picture was in the paper." In contrast, simulators could not provide any evidence that they experienced the events they described. Thus, following the shift in self, reals had no difficulty justifying the memories they claimed to have experienced.

Experiment 3: Summary

Overall, reals given a hypnotic suggestion for an identity delusion showed behaviors and reported experiences quite different from simulators who were instructed to fake. Although reals and simulators were equally likely to pass the suggestion initially, more reals than simulators maintained their delusion in the face of two challenges, and more reals than simulators recalled specific memories consistent with their delusion, which they justified experiencing. These findings are consistent with previous research on hypnotic delusions (e.g., Burn et al., 2001; Noble & McConkey, 1995) and also indicate that we successfully implemented the real-simulating paradigm in this experiment. More importantly, these findings imply that highs' responses to identity delusion suggestions are not due merely to compliance or social cues and demands. Rather, the deluded experiences of highs in Experiment 3, and by extension Experiments 1 and 2, represent a genuine, compelling analogue of clinical identity delusions.

General Discussion

These three experiments confirm and build upon our previous work to develop a viable hypnotic analogue of misidentification. In other words, they confirm that we can shift self experimentally (and temporarily) with a hypnotic suggestion. As in our previous work (Cox & Barnier, 2009a, 2009b, 2010; Cox & Bryant, 2008), in these three experiments, high hypnotizable participants given a suggestion to become a different identity changed their name, described themselves differently, resisted challenges to their suggested identity and rated their experience as real and believable. The particular identity that we suggested to participants did not influence the success of the analogue. It did not matter whether it was a real or nonexistent sibling, a friend from high school or university, or even a friend's sibling. Highs were still able to experience the suggested delusion and described a compelling believed-in shift in self.

Notably, the suggested identity delusions were resistant to challenge. Building on our initial test of resistance to challenge with a smaller group of 10 highs (Cox & Barnier, 2009a), in Experiment 3, we gave contradiction and confrontation challenges to larger groups of both reals and simulators. Whereas reals maintained their suggested identity in the face of these two challenges and had no difficulty generating evidence to defend their beliefs, most simulators did not. This resistance to challenge is consistent with other hypnotic analogues of delusions such as hypnotic sex change (Burn et al., 2001; Noble & McConkey, 1995), mirrored-self misidentification (the belief that when I look in the mirror I see a stranger, not me; Barnier et al., 2008, 2011), erotomania (the belief that I am loved from afar by someone; Attewell et al., 2012), and somatoparaphrenia (the belief that one of my limbs belongs to someone else; Rahmanovic et al., 2012). This adds to a picture of striking similarities between clinical delusions and their hypnotic analogues, where hypnotic re-creations capture their flavor of strong conviction in the face of contradictory evidence (Bortolotti et al., 2012).

These three experiments also add to our understanding of autobiographical memory during disrupted beliefs about the self. As mentioned earlier, this has been neglected in both theory and research. When we shifted self, our high hypnotizable participants elicited autobiographical memories with particular qualities. In Experiment 1, we found that highs generated specific memories during the suggested delusion that were rich in sensory-perceptual details and consistent with the suggested delusion. This is consistent with work by Baddeley et al. (1996), who examined the autobiographical memories of deluded and nondeluded people with schizophrenia. Although these groups of patients recalled equivalent amounts of personal semantic information, deluded people with schizophrenia recalled twice as many specific

autobiographical memories as nondeluded people with schizophrenia. This suggests that in both clinical and hypnotic delusions individuals are not impaired in their ability to access specific autobiographical events. Instead, if such events are consistent with the delusion they may inadvertently provide evidence to support it.

In Experiment 2, we found that highs' memories appeared to be reinterpretations of previous experiences, viewed from the perspective of the suggested identity. And in Experiment 3, we found that whereas simulators admitted to fabricating autobiographical memories, reals never did this. During the suggested delusion, highs appeared to draw on existing autobiographical knowledge to support their belief. This is similar to Conway's (2002) observation that the autobiographical memories of many deluded individuals can be labeled "honest lies" (a term coined by Moscovitch, 1989). These honest lies involve memories of events that have not occurred but that contain information drawn from the autobiographical knowledge base.

One qualitative feature of memory that differed between our high and low hypnotizable participants was memory perspective. During the suggested delusion, highs viewed their memories from the perspective of their suggested identity whereas lows (who failed the suggestion) did not. This change in perspective may have contributed to highs' conviction that their autobiographical memories were self-experienced. According to Johnson and colleagues' source-monitoring framework (Johnson, 1998; Johnson, Hashtroudi, & Lindsay, 1993; Johnson, Kahan, & Raye, 1984), particular qualitative details associated with mental experiences increases one's belief that they were self-experienced. It is possible that some individuals with delusions may have a source-monitoring deficit, where the criteria they use to judge whether an event was self-experienced are altered (Johnson, 1998; Johnson et al., 1984, 1993). For instance, when determining memory source, certain qualitative features (e.g., memory perspective) may be given more weight than they deserve. In the current experiments, a similar source-monitoring failure encouraged by the hypnotic state (which is known to disrupt reality monitoring; Bryant & Mallard, 2005) may have contributed towards highs' conviction that their memories were self-experienced and thus valid evidence for their delusion.

Shifting Memory Accessibility—Implications for the Self-Memory System

Critically, our most important reason for using hypnosis to re-create identity delusions was to test the basic premise of Conway's (2005) self-memory system. We predicted that a shift in self would lead to a shift in autobiographical memory. Across our three experiments, we found two types of evidence to support this. First, the shift in self appeared to facilitate the recall of specific, detailed autobiographical memories

that served the delusion. In all three experiments, high hypnotizable participants remembered events consistent with their deluded self. In Experiment 3, when the veracity of these memories was challenged, reals could provide detailed justifications for having genuinely experienced the events. Second, the shift in self selectively shifted the accessibility of autobiographical memories. That is, memories consistent with the suggested delusion were facilitated and memories inconsistent with the suggested delusion appeared to be less accessible. In Experiment 2, we found that high hypnotizable individuals were less likely to recall memories they had elicited prior to the suggested delusion (as their normal self). These memories were no longer consistent with their suggested identity and may have been inhibited.

Thus, our findings support predictions made by Conway's (2005) model, where executive control processes facilitate autobiographical memories consistent with the self and decrease accessibility of autobiographical memories inconsistent with the self. Similar shifts in memory accessibility are often seen in clinical disorders of memory such as functional amnesia (Schacter, 1996) and dissociative identity disorder (Bryant, 1995). For example, patient HS, who was diagnosed with dissociative identity disorder, failed to generate any memories from childhood while recalling as her adult identity, presumably because her childhood memories were inconsistent with and threatening to her adult self (Bryant, 1995).

Our work suggests that during an experimentally induced shift in self, the locus of autobiographical memory impairment is on accessibility rather than availability. This is consistent with Tulving and Pearlstone's (1966) notion that at any given moment, autobiographical memories may be (a) unavailable, (b) available but not consciously accessible, or (c) available and consciously accessible. Our findings, and most theorizing about the impact of hypnosis on memory, indicate that changes in self alter the accessibility, not the availability of memories. Although the shift in self impaired the accessibility of explicit autobiographical memory, implicit memory was spared (as indicated by the social judgment task in Experiment 2). This sparing of implicit memory has been observed in both clinical disorders of memory and experimental paradigms such as posthypnotic amnesia (Barnier, 2002; Schacter, 1996). For example, Cox and Barnier (2003) reported a dissociation between impaired retrieval of explicit autobiographical memories following a suggestion for posthypnotic amnesia but spared implicit memory (see also Barnier, 2002). Patients with functional amnesia and other dissociative disorders also often spontaneously recover previously forgotten autobiographical memories (Schacter & Kihlstrom, 1989), again suggesting that memories can be available but temporarily inaccessible.

Two Accounts of Autobiographical Remembering

Based on the findings from this series of experiments, we suggest two related accounts of autobiographical memory: (a) for the hypnotically deluded self, which builds on Conway's self-memory system, and (b) for the clinically deluded self, which incorporates elements of Langdon and Coltheart's (2000) two-factor theory of monothematic delusions.

Autobiographical memory for the hypnotically deluded self. As indicated in Figure 2, a hypnotic suggestion temporarily creates a deluded working self (see Figure 2, #1). Results from these experiments suggest that a hypnotic alteration in self reverberates throughout the self-memory system and influences autobiographical memory retrieval. The hypnotic delusion also alters reality monitoring (see Figure 2, #2). Bryant and Mallard (2005) noted that during hypnosis, beliefs about the reality of hypnotic suggestions are not simply due to a vividly imagined experience. Rather, reality during hypnosis involves an alteration of reality-monitoring criteria. In this account of autobiographical memory for the hypnotically deluded self, we suggest that there is a reality-monitoring bias or failure resulting in coherence with hypnotic experience being prioritized over correspondence with reality. This is consistent with work indicating that hypnotized individuals focus on information that confirms rather than disconfirms their suggested experiences (McConkey, 1991; Orne, 1959; Sutcliffe, 1961). Hypnotized individuals also prioritize their internal experiences and develop strong commitment to the reality of the hypnotist's suggestions as opposed to external reality (Sheehan & McConkey, 1982; Sutcliffe, 1961). Thus, changes in reality monitoring during a hypnotic identity delusion will influence the working self directly and convince hypnotized individuals of the reality of their experiences.

A change in reality monitoring during a hypnotic identity delusion also influences the retrieval model (see Figure 2, #3). The experimental work presented here (e.g., Experiment 2) indicates that the hypnotically deluded self prioritizes autobiographical memories that are coherent with deluded self. Rather than monitoring whether retrieved information corresponds with self-experienced events, hypnotically deluded individuals reinterpret memories from their actual identity into memories for their deluded identity. When an autobiographical memory is retrieved it is accompanied by recollective experience (see Figure 2, #4). In Experiments 1 and 2, our hypnotically deluded participants indicated that they were viewing their memories from the perspective of their suggested identity, which suggests that they were associated with recollective experience. This may have contributed towards their conviction that they actually experienced these events.

The hypnotically deluded self retrieves autobiographical memories that are consistent with the suggested identity (see Figure 2, #5).
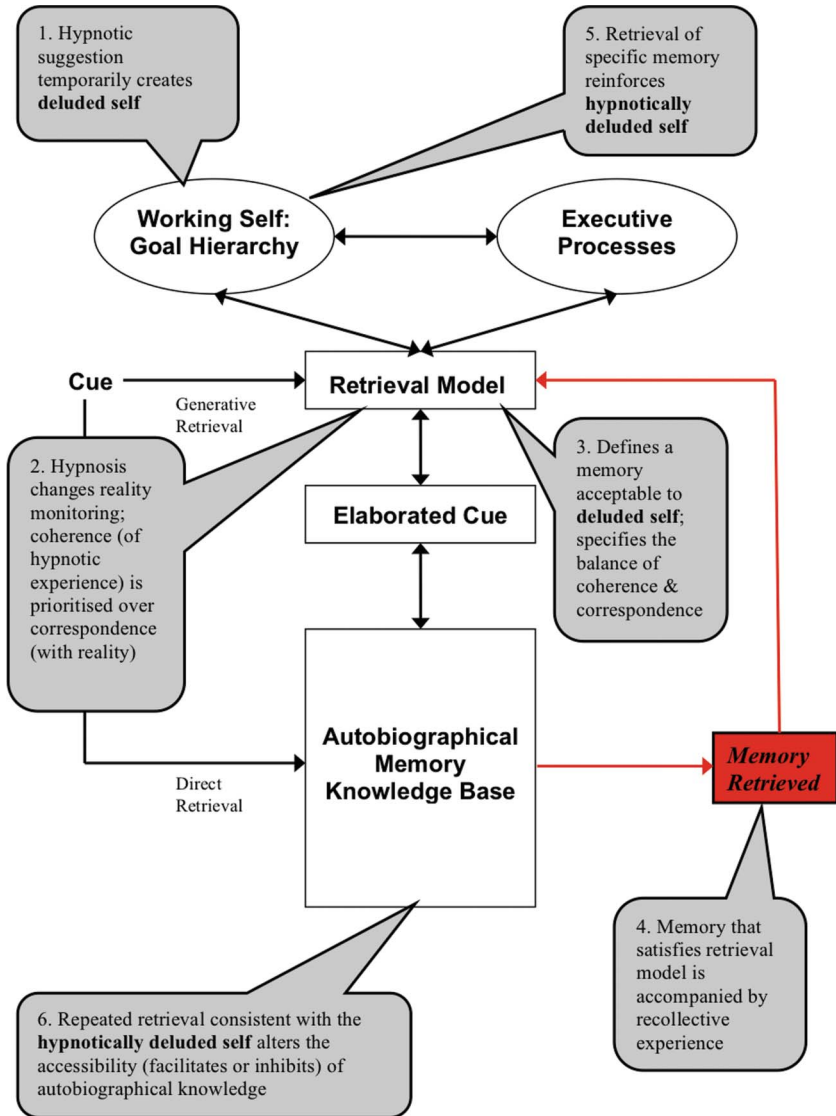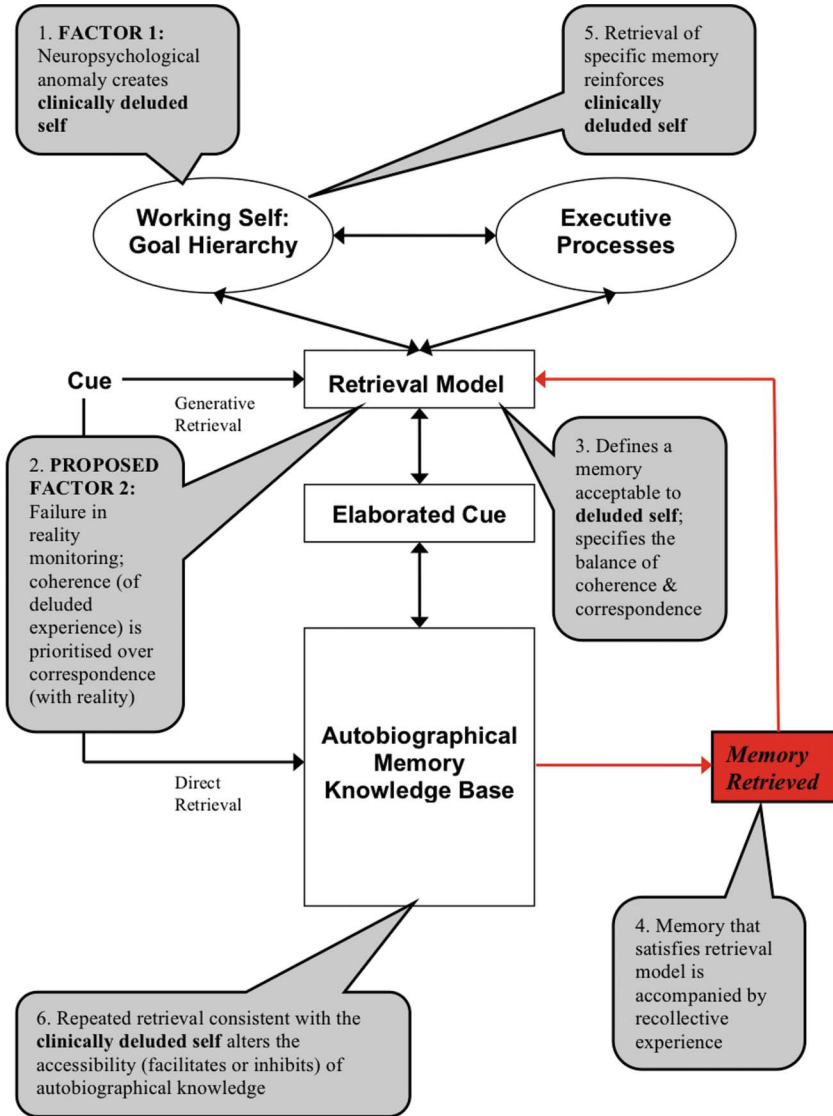
Figure 2. Autobiographical memory for the hypnotically deluded self. Adapted with permission from "Memory and the Self" by M. A. Conway, 2005, *Journal of Memory and Language, 53*(4), p. 617. Copyright 2005 by Elsevier Inc. (color figure available online).

Retrieval of autobiographical memories that are consistent with the deluded self reinforces this sense of self and contributes to the maintenance of the hypnotic identity delusion. This may explain why the hypnotic identity delusion was resistant to challenge in Experiment 3. Finally, a hypnotic identity delusion results in selective memory processing and alters the accessibility (not availability) of information in the autobiographical knowledge base (see Figure 2, #6). As indicated by these experiments, memories consistent with the suggested delusion appear to be facilitated whereas those inconsistent with the suggested delusion are less accessible.

Autobiographical memory for the clinically deluded self. To extend Figure 2 to an account of autobiographical remembering during clinical delusions of self, we considered Langdon and Coltheart's (2000) cognitive neuropsychological theory of delusions. According to Langdon and Coltheart, there are two factors that contribute towards delusional beliefs. Factor 1 explains why the delusion arises in the first place and is responsible for the content of the delusion and Factor 2 explains why the delusional belief is not rejected as untrue and involves a deficit in hypothesis/belief evaluation. To illustrate Langdon and Coltheart's theory, consider an individual with mirrored-self misidentification delusion who believes that the person they see when they look in the mirror is a stranger. In this delusion, Factor 1 is thought to involve a disorder of face processing where the individual has difficulty recognizing their own face. Because of this deficit in face processing, an individual may develop delusional hypotheses. One delusional hypothesis may be that the person in the mirror is a stranger. Factor 2 involves a failure to reject this delusional hypothesis as untrue.

Figure 3 extends hypnotic delusions of self to clinical delusions of self by incorporating this two-factor account of delusions. In Figure 3, a neuropsychological anomaly (i.e., Factor 1) creates a clinically deluded self (see Figure 3, #1). We propose that Langdon and Coltheart's Factor 2 involves a failure of reality monitoring that is similar to the alteration in reality monitoring that occurs during hypnosis. Thus, during an identity delusion, a failure in reality monitoring will result in coherence of deluded experience being prioritized over correspondence with reality (see Figure 3, #2). This may help explain why deluded individuals do not access information that would refute their delusional hypotheses.

In terms of autobiographical memory, the retrieval model will prioritize memories that are coherent with deluded self over memories that correspond with reality (see Figure 3, #3). When a memory is retrieved that is coherent with deluded self, it is accompanied by recollective experience making it seem very compelling and real (see Figure 3, #4). This recollective experience may provide strong evidence that an event was self-experienced. The specific memories that are retrieved reinforce

Figure 3. **Autobiographical Memory for the Clinically Deluded Self. Adapted with permission from "Memory and the Self" by M. A. Conway, 2005, *Journal of Memory and Language, 53*(4), p. 617. Copyright 2005 by Elsevier Inc. (color figure available online).**

the clinically deluded self and are therefore likely to contribute towards delusion maintenance (see Figure 3, #5). Finally, if autobiographical memories that are consistent with the clinically deluded self are repeatedly retrieved, the accessibility of autobiographical knowledge alters. Autobiographical memories that are consistent with the clinically deluded self are facilitated and autobiographical memories that are inconsistent with the clinically deluded self may become inhibited (see Figure 3, #6).

Limitations and Future Directions

There are a number of questions concerning these proposed accounts of autobiographical memory for the hypnotically and clinically deluded self that need to be resolved. First, the nature of the working self needs to be explained in greater detail. It is unclear exactly how the goal hierarchy of the working self is structured and how the working self coordinates goal processing. Research also needs to explore how the working self prioritizes information, keeps track of goal progress and maintains goals that are coherent with the self.

Second, the nature of the proposed reality-monitoring failure also requires further explanation. There are at least two possibilities. One possibility is that there is a source-monitoring deficit where the heuristics (e.g., clarity, vividness) that are typically used to distinguish autobiographical memories from other mental representations are not functioning correctly (Johnson et al., 1993). Another possibility is that an identity delusion may facilitate access to imagined events, whose qualitative features are boosted in a process similar to imagination inflation. Research has shown that imagining a false event can make people later believe that the event actually occurred (Garry et al., 1996). Imagination inflation during an identity delusion may result in the inability to distinguish between fantasy and reality.

Third, our proposed account of clinically deluded autobiographical remembering provides more information about delusion maintenance than about how an identity delusion initially arises. Our accounts suggest that accessing memories that are consistent with a delusion reinforces and maintains deluded identity. However, they provide little indication of the circumstances and processes involved in creating an identity delusion. In hypnotic delusions, the false belief is created via top-down processing (e.g., via combination of cognitive and social/motivational processes). However, in clinical delusions, the false belief is often created via a Factor 1 neuropsychological impairment combined with faulty belief evaluation. Although a Factor 1 deficit is thought to be necessary for creating a delusion, it alone is not sufficient. For instance, individuals may have Factor 1 deficits but not develop delusions. Given that a second factor must also be involved, and if this

second factor involves a reality-monitoring failure, it remains unclear how this reality-monitoring failure arises.

Despite these unanswered questions, these proposed accounts of autobiographical memory during hypnotic and clinical delusions open new avenues for research. For instance, future research can expand the hypnotic paradigm to encompass different types of delusions, particularly those that do not have a clearly defined Factor 1, such as delusions of grandeur or persecutory delusions. Future studies may also compare the features of deluded autobiographical memory with confabulation. Given that confabulation is known to occur in clinically deluded individuals, it may be useful to compare hypnotically deluded memories with the memories produced by hypnotic participants who have been instructed to confabulate autobiographical events. Finally, future work can explore the role of implicit memory during delusions of self. Although we have found that implicit memory remains intact during a hypnotic identity delusion, future work is required to better understand the impact of these implicit memories and whether they may have a role in successfully challenging delusions of self.

In summary, this article has integrated convergent theoretical perspectives and methodological techniques to investigate autobiographical memory during an identity delusion. Our findings lend support to Conway's Self-Memory System model, which suggests that when there is a shift in self, there is a corresponding shift in the accessibility of autobiographical memories. This article also highlights the instrumental value of hypnotic techniques for studying clinical phenomena that are traditionally difficult to investigate in the laboratory. Finally, and most importantly, this research provides a framework to guide future investigations of shifts in self and memory.

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Appendix

Combinations of Cue Phrase Subsets Across Memory Tasks

	Cue Phrase Subsets Used		
Combination	Elicitation 1 (before delusion)	Elicitation 2 (after delusion)	Social Judgment (after delusion)
1	A, B	B (old) C (new)	A
2	B, C	C (old) A (new)	B
3	C, A	A (old) B (new)	C

Das Selbst verändern, die Erinnerung verändern : Die Testung des Selbsterinnerungs-System-Modells mit hypnotischen Täuschungen

Rochelle E. Cox und Amanda J. Barnier

Abstrakt: Conway´s Selbsterinnerungs-System Modell (SMS) zufolge können autobiographische Erinnerungen erleichtert, inhibiert oder falsch erinnert werden, um mit dem aktuellen Selbst konform zu gehen. In drei Experimenten testeten die Autoren dies, indem sie in Hypnose eine Selbsttäuschung suggerierten und markierten, ob diese Veränderung im Selbst eine korrespondierende Veränderung in der autobiographischen Erinnerung nach sich zog. Sehr hypnotisierbare Teilnehmer zeigten eine überwältigende Identitätsäuschung und riefen spezifische autobiographische Begebenheiten, die sie rechtfertigen konnten, wenn es sein mußte, hervor. Diese Erinnerungen waren Reinterpretationen früherer Erfahrungen, die die suggerierte Identität unterstützten. Noch wichtiger war, daß autobiographische Erinnerungen, die nicht länger im Einklang mit dem durch Hypnose getäuschten Selbst waren, weniger abrufbar waren als andere Erinnerungen. Die Autoren diskutieren diese Ergebnisse im Kontext mit Conway´s SMS Modell und schlagen zwei Darstellungen autobiographischer Erinnerung während hypnotischer und klinischer Veränderungen vor.

STEPHANIE REIGEL, MD

Modification du moi, modification de la mémoire : Examen du modèle de système de mémoire autobiographique avec illusions d'identité sous hypnose

Rochelle E. Cox et Amanda J. Barnier

Résumé: Selon le modèle de mémoire autobiographique de Conway, les souvenirs autobiographiques peuvent être facilités, inhibés ou modifiés, afin de correspondre au soi actuel. Au cours de trois expériences, les auteures ont examiné cette hypothèse en suggérant par l'hypnose une illusion d'identité

et en vérifiant si cette modification du soi produisait une modification correspondante de la mémoire autobiographique. Des participants hautement hypnotisables ont affiché une illusion d'identité frappante et ont relaté des évènements autobiographiques précis qu'ils pouvaient justifier lorsqu'ils étaient interrogés à ce sujet. Ces souvenirs consistaient en des réinterprétations d'expériences antérieures justifiant l'identité suggérée. Fait important, les souvenirs autobiographiques qui ne correspondaient plus au soi illusionné sous l'effet de l'hypnose étaient moins accessibles que les autres souvenirs. Les auteures abordent ces résultats dans le contexte du modèle de mémoire autobiographique de Conway, et proposent deux récits de souvenirs autobiographiques impliquant des illusions hypnotiques et cliniques.

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Cambiando al yo, cambiando la memoria: Evaluando el Modelo del Sistema de Memoria del Yo con delirios hipnóticos de identidad

Rochelle E. Cox y Amanda J. Barnier

Resumen: Según el modelo de Conway del sistema de memoria del yo (SMS), las memorias autobiográficas pueden facilitarse, inhibirse, o recordarse erróneamente para ser consistentes con el Yo actual. En tres experimentos, los autores evaluaron esto al sugerir hipnóticamente un delirio de identidad e indizar si este cambio en el Yo producía un cambio correspondiente en la memoria autobiográfica. Los participantes altamente hipnotizables mostraron delirios de identidad convincentes y produjeron eventos autobiográficos específicos que podían justificar cuando se les cuestionaba. Estos recuerdos eran reinterpretaciones de experiencias anteriores que respaldaban la identidad sugerida. Importantemente, las memorias autobiográficas que ya no eran consistentes con el Yo hipnóticamente delirado estuvieron menos accesibles que otras memorias. Los autores discuten estos resultados en el contexto del modelo SMS de Conway y proponen dos explicaciones sobre los recuerdos autobiográficos durante hipnosis y delirios clínicos.

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