

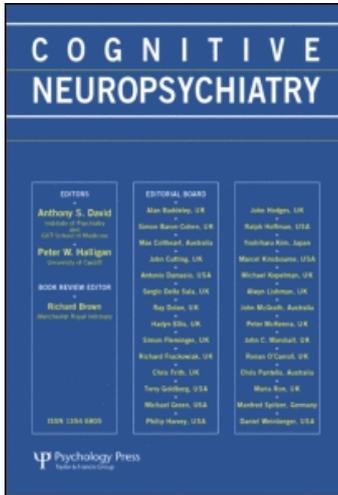
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Developing hypnotic analogues of clinical delusions: Mirrored-self misidentification

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Introduction. Despite current research interest in delusional beliefs, there are no viable models for studying delusions in the laboratory. However, hypnosis offers a technique for creating transient delusions that are resistant to challenge. The aim of this study was to develop an hypnotic analogue of one important delusion, mirrored-self misidentification.

Methods. Twelve high hypnotisable participants received an hypnotic suggestion to see either a stranger in the mirror, a mirror as a window, or a mirror as a window with a view to a stranger. Participants' deluded beliefs were challenged, and following hypnosis, Sheehan and McConkey's (1982) Experiential Analysis Technique was used to explore participants' phenomenological experience of the delusion.

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Results. The majority of participants did not recognise their reflection in the mirror, described the person in the mirror as having different physical characteristics to themselves, and maintained their delusion when challenged.

Conclusions. The hypnotic suggestion created a credible, compelling delusion with features strikingly similar to clinical cases of mirrored-self misidentification. Our findings suggest that Factor 2 within Langdon and Coltheart's (2000) two-factor framework may involve a lowering of the criteria used to accept or reject delusional hypotheses.

Keywords: Delusions; Hypnosis; Cognitive neuropsychology; Mirrored self-identification; Hypnotic analogues.

INTRODUCTION

Understanding delusions has been and continues to be of great theoretical and clinical interest, but studying delusions in isolation is difficult as they frequently occur in association with other clinical symptoms. Despite the prevalence of delusions in schizophrenia, various psychiatric disorders, and following brain injury, no viable models exist for testing delusions in the laboratory. The instrumental use of hypnosis offers researchers an innovative technique to study delusions. During hypnosis, high hypnotisable individuals come to believe that the world is as suggested by the hypnotist. In response to hypnotic suggestions, perceptual and cognitive experiences are altered in ways similar to delusional experiences. For instance, in response to suggestions from the hypnotist, individuals may become temporarily convinced that their arm is floating in the air, that they can no longer say their own name, or that they feel no pain. Indeed, according to Sutcliffe (1961), hypnotised individuals essentially become deluded about the actual state of the world.

Hypnosis is useful for investigating delusions because hypnotically suggested experiences and delusions share a number of features. Both are: (1) believed with strong conviction,¹ (2) maintained regardless of overwhelming evidence to the contrary, and (3) resistant to rational counter arguments. According to Kihlstrom and Hoyt (1988), hypnotic phenomena represent disorders of metacognition. During hypnosis, high hypnotisable individuals appear unaware of their own cognitive processes and the resulting influence of these processes on their behaviour. Thus, their behaviour is influenced by beliefs about themselves and the world that are false, but are nevertheless maintained with conviction. Likewise, deluded individuals

¹ Strictly speaking, the level of conviction or perceived reality associated with both clinical delusions and hypnotically suggested effects (even for highly hypnotisable people) may vary. Not all delusions or hypnotic experiences are believed with absolute conviction, and belief in both may wax and wane.

maintain false beliefs with conviction and lack insight into the cognitive processes that give rise to these beliefs (even if they often have insight that their beliefs are abnormal; Davies, Coltheart, Langdon, & Breen, 2002).

Extensive research indicates that hypnotic techniques and suggestions are effective in modelling a range of clinical phenomena (for review see Barnier & Oakley, *in press*; Oakley, 2006). For instance, in the 1960s, Reyher and colleagues used posthypnotic suggestions to successfully model pathological symptoms, including repression and impulse inhibition (Burns & Reyher, 1976; Perkins & Reyher, 1971; Reyher, 1961, 1962, 1969; Reyher & Basch, 1970). In recent years, hypnosis has been used to model conversion hysteria (Halligan, Athwal, Oakley, & Frackowiak, 2000; Halligan, Bass, & Wade, 2000), auditory hallucinations (Szechtman, Woody, Bowers, & Nahmias, 1998), functional amnesia (Barnier, 2002; Barnier & McConkey, 1999; Barnier, McConkey, & Wright, 2004; Cox & Barnier, 2003), functional blindness (Blum, 1975; Bryant & McConkey, 1989a,b), volitional control (Haggard, Cartledge, Dafydd, & Oakley, 2004), and *déjà vu* (O'Connor, Barnier, & Cox, *in press*).

Given this rich history of the efficacy of hypnotic techniques and, more importantly, that hypnotic phenomena and delusions are both essentially characterised by believed in distortions of reality, hypnosis should be useful for investigating clinical delusions. However, there are few studies of clinically relevant hypnotic delusions (Burn, Barnier, & McConkey, 2001; Cox & Barnier, *in press*; Cox & Bryant, 2008; Noble & McConkey, 1995; Zimbardo, Andersen, & Kabat, 1981) and even fewer contemporary comparisons of hypnotic and clinical cases (Kihlstrom & Hoyt, 1988). This study is part of a larger project that aims to develop a catalogue of compelling hypnotic analogues of clinical delusions and, in doing so, explore the parameters and processes underlying these delusions.

Mirrored-self misidentification is one of eight monothematic delusions (delusions specific to one topic) identified by Davies et al. (2002) that may be successfully modelled using hypnosis. Mirrored-self misidentification is characterised by the belief that “the person I see in the mirror is not me” (Breen, Caine, Coltheart, Hendy, & Roberts, 2000). Breen et al. (2000) described two cases of mirrored-self misidentification. In Case 1, patient FE believed his reflection was another person, not himself, who was following him everywhere. FE attempted to communicate with his reflection and was puzzled as to why the person never replied. While looking in the mirror, FE reported the following (from Breen et al., 2000):

- FE: That's not me. It hits me straight away. First of all I didn't like his face at all, but I've got used to his face and I'll have a smile with him if I am in the bathroom for a wash or something, but it's not me.
- Examiner: What does that person look like?

- FE: Well, he looks very much like me. I guess he could pass for F_____ E_____.
- Examiner: He does look like you.
- FE: Yes, I see that. He's not a bad looking fellow.
- Examiner: What colour is his hair?
- FE: I don't think he is as white as I am (*FE has white hair and is balding*).
- Examiner: Is he going a bit bald or does he have a full head of hair?
- FE: Oh I think he's about the same as mine as far as hair covering is concerned (*FE then tilts his head forward so that the top of the head of the reflected image is visible*).

The examiner (Nora Breen) then stands next to FE in front of the mirror with both of their reflections visible to FE.

- Examiner: (*Pointing to her own reflection*). Who is this, next to the person?
- FE: I don't know.
- Examiner: Who does it look like?
- FE: That's you.
- Examiner: Me, here? (*Pointing to herself*). What's my name?
- FE: I don't know, oh yes, it's Nora.
- Examiner: Nora, that's right. So that's me in the mirror?
- FE: Yes.
- Examiner: That's my reflection?
- FE: Yes.
- Examiner: And who is that? (*Pointing to FE's reflection*).
- FE: I don't know what you would call him. It makes me a bit sick because he moves about freely with us. I don't be too friendly because I don't see it does him any good.

In Case 2, patient TH also believed that his reflection was another person, not himself. TH would often talk to his own reflection and thought it rude that the person never spoke back. While looking in the mirror, the examiner (Nora Breen) asked:

- Examiner: At the moment in your bathroom, you have the curtain over the mirror don't you?
- TH: Yes. There is a curtain over all the mirrors in the house.
- Examiner: So when you want to use the mirror, and you pull it up at the corner, pull the curtain up, what happens? What do you see?
- TH: As soon as you lift the corner, you see him (*nodding his head at his reflection*).
- Examiner: What happens when you shave?
- TH: He'll get his razor and he'll be on the other side of the mirror, and I'll be on this side of the mirror, and we'll shave at the same time, sometimes.

- Examiner: When you look in here (*indicating to the mirror*) tell me what you see?
 TH: I can see Tom's reflection.
 Examiner: Tom who?
 TH: I don't know his second name. He's been unable to tell me what his second name is apparently.
 Examiner: Is that because he doesn't talk to you?
 TH: He doesn't talk to anyone.
 Examiner: Doesn't he?
 TH: (*Addressing his own reflection*) Is that right? Do you talk to anyone? Can you talk? Can you talk or have you got trouble talking or you didn't learn to talk, you weren't taught? I don't know.

These examples illustrate the delusional beliefs held by individuals with mirrored-self misidentification. Both FE and TH were convinced that they could see a stranger in the mirror and although they acknowledged that the person they could see looked similar to them, they nevertheless maintained that it was not them. According to Breen et al. (2000), both FE and TH attempted to converse with their reflected image and were perplexed when the person in the mirror did not reply. When the examiner, Nora, appeared in the mirror beside them in an attempt to challenge their beliefs, both FE and TH acknowledged that they could see her reflection in the mirror. However, whereas FE believed that the examiner's reflection was Nora, TH did not. TH believed Nora's reflection to be "the woman who always comes with you". Notably, neuropsychological testing revealed that, for FE, brain damage had disrupted his processing of familiar faces, which led to his inability to recognise his own face. In contrast, for TH, brain damage had disrupted his normal interaction with mirrors (mirror agnosia), which contributed to his belief that the person in the mirror could not have been him, but a stranger who looked just like him (see Binkofski, Buccino, Dohle, Seitz, & Freund, 1999, for further discussion of mirror agnosia). Thus, these two cases of mirrored-self misidentification involved similar delusional beliefs but they stemmed from two different neuropsychological deficits.

Langdon and Coltheart (2000) proposed a two-factor theory to explain how monothematic delusions, such as mirrored-self misidentification, may arise. According to their theory, two factors contribute towards the development of delusional beliefs. Factor 1 involves a neuropsychological anomaly affecting perceptual and/or emotional processing, which is responsible for the content of delusions. For example, FE's neuropsychological anomaly was a problem processing familiar faces and TH's neuropsychological anomaly was mirror agnosia. However, both anomalies can occur without delusional beliefs (Coltheart, 2007), so Factor 1 alone is insufficient to account for the presence of the delusion. Langdon and Coltheart (2000); see also Coltheart, Langdon, & McKay, 2007) argued that a second factor must be involved for the neuropsychological anomaly to result in the

adoption of a delusional belief. The proposed Factor 2 involves damage to a system of belief evaluation, which is responsible for a person's failure to reject delusional beliefs as implausible.

Thus, in mirrored-self misidentification, Factor 1 may involve a problem processing familiar faces or mirror agnosia. As a result, the person interprets their reflection as that of a stranger. And because the system of belief evaluation is impaired, this explanation—of a stranger in the mirror—is not rejected and the implausible thought is adopted as belief. Conceptualised within this two-factor account, hypnosis offers a powerful means to create and investigate delusions such as mirrored-self misidentification. Following an hypnotic induction, an hypnotic suggestion can influence perceptual processing in an analogous way to a (Factor 1) neuropsychological impairment as well as alter normal belief evaluation processes (akin to Factor 2). Hypnotised individuals accept as real seemingly implausible events and, when challenged, they maintain their suggested experiences and process information in a way that supports their beliefs (Burn et al., 2001). Thus, hypnosis has excellent “instrumental” value as a laboratory analogue of clinical delusions.

The primary aim of this study was to create a viable hypnotic analogue of mirrored-self misidentification as part of a larger catalogue of hypnotic delusions. A group of carefully screened, talented high hypnotisable participants received one of three versions of an hypnotic suggestion: (1) to see a *stranger in the mirror*, (2) to see the *mirror as a window*, or (3) to see the *mirror as a window with a view of a stranger on the other side*. The first suggestion was based on the case of FE who had problems with face processing and thus saw his reflection as a stranger. The latter two suggestions were based on the case of TH, who had mirror agnosia and thus believed that a mirror functioned like a window and that his reflection was a stranger on the other side. These different suggestions were used to explore the different forms of initial thoughts that might “seed” the delusion (see Langdon, McKay, & Coltheart, 2008, for discussion of the various implausible thoughts that might initially seed persecutory delusions).

Based on previous hypnotic sex-change studies (Burn et al., 2001; Noble & McConkey, 1995), participants were expected to experience a subjectively compelling mirrored-self misidentification delusion. Given that delusions are extremely resistant to challenge, this study also examined the circumstances under which an hypnotic delusion can be breached. During the suggested delusion, participants were administered two challenges, a contradiction and a confrontation, based on techniques used by Noble and McConkey (1995) and Burn et al. (2001). Following a suggestion to become the opposite sex, Noble and McConkey and Burn et al. administered a contradiction by asking participants what they would say to a hypothetical doctor who can find no reason for them to be the suggested sex. They also administered a confrontation by asking participants to open their eyes, look at themselves

on a monitor, and describe what they were experiencing as they did so. The present study modified these challenge techniques in an attempt to breach the suggested delusion. Given that delusions are typically resistant to challenge and that hypnotised individuals develop strong belief in the genuineness of their suggested experiences, participants were expected to maintain their deluded belief in response to these challenges.

Finally, given that Factor 2 in the two-factor model is thought to involve the failure to reject implausible beliefs, this study also asked participants to comment on their thoughts, experience, and reasoning at various stages throughout their suggested delusional experience. To do this we used an hypnotic procedure known as the Experiential Analysis Technique (EAT; Sheehan & McConkey, 1982). Whereas hypnotic responding is typically indexed only by observable, behavioural responses, the EAT allows the private experience of the individual to be explored. To implement the EAT, the hypnosis session is videotaped and, after hypnosis, the participant and a second, independent experimenter watch the videotape. While watching the videotape, the participant is invited to comment on their experience and thoughts concerning particular suggestions. The EAT provides in-depth information on affect, imagery, intensity, effort, strategy, and volition associated with hypnotic responding (Barnier & McConkey, 2004).

METHOD

Participants

Twelve high hypnotisable participants (six male and six female) of mean age 22.82 ($SD = 11.87$) years participated in the experiment. Participants were undergraduate psychology students at the University of New South Wales, who received credit towards their psychology course for their involvement. They were carefully selected on the basis of their extremely high scores on a 10-item modified version of the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962) and a 10-item tailored version of the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C; Weitzenhoffer & Hilgard, 1962).² All participants scored in the

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 immobilisation items were removed to ensure that the procedure could be conducted within the time limits of a 1 hour class. The 10-item tailored SHSS:C included: hand lowering, moving hands apart, mosquito hallucination, taste hallucination, arm rigidity, dream, age regression, arm immobilisation, 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.

range 8–10 on the HGSHS:A ($M=9.42$, $SD=0.79$) and 9–10 on the SHSS:C ($M=9.67$, $SD=0.49$).

Apparatus

We used a video camera, focused on the participant throughout, and a DVD recorder to record both the hypnosis and EAT inquiry sessions onto DVD. We used a DVD player and a colour monitor to play the recording of the hypnosis session to participants during the EAT inquiry session and later to transcribe hypnosis and inquiry sessions for analysis. During the suggested delusion we used a square mirror (approx 28.5 cm \times 28.5 cm framed with a 2.5 cm wooden border), which was mounted on a wall adjacent to the left side of the participant's reclining chair. The mirror was positioned such that participants could look easily into it when instructed to do so by the hypnotist. Before and after the delusion item, the mirror was covered with a white screen of similar colouring to the wall. This screen was removed during the suggestion.

Procedure

We tested participants individually in 2-hour sessions, which involved an hypnosis procedure, a posthypnotic interview, and an EAT inquiry. The hypnosis procedure and posthypnotic interview were conducted by the first experimenter (the hypnotist) and the EAT inquiry was conducted by a second, independent experimenter (the inquirer). The experiment involved two independent experimenters in either the experimental or the EAT session.

Experimental session. Following informed consent, the hypnotist told participants to make themselves comfortable and asked them about their favourite suggestion from their previous (SHSS:C) hypnosis session. She then administered a standard induction procedure (approx 10 min, based on the SHSS:C induction), which instructed participants to close their eyes, to relax, to listen to the hypnotist's voice, to become more and more deeply hypnotised, and to enter a "deep state of hypnosis" as the hypnotist counted from 1 to 20. The induction was followed by a hand-lowering suggestion, a favourite food hallucination, an identity delusion, and the previously determined favourite suggestion. Participants were then randomly assigned to receive one of three versions of the delusion suggestion: (1) *stranger in the mirror* ($n=4$), (2) *mirror as a window* ($n=4$), or (3) *mirror as a window with a*

view of a stranger ($n = 4$). Participants in the *stranger in the mirror* condition were told:

In a moment, I am going to ask you to open your eyes, and when you do, I would like you to lean forward and to look to your left. When you look to your left, you will see a mirror. The mirror you will see will have properties of a normal mirror, with one major difference. The person you see in the mirror will not be you, it will be a stranger. When you open your eyes and turn your head to your left, whilst remaining as deeply relaxed and comfortably hypnotised as you feel now, you will see a stranger reflected in the mirror. I would now like you to slowly open your eyes, turn your head to the left, and look into the mirror.

Participants in the *mirror as a window* condition were told:

In a moment, I am going to ask you to open your eyes, and when you do, I would like you to lean forward and to look to your left. When you look to your left, you will see a window through to another room. When you open your eyes and turn your head to your left, whilst remaining as deeply relaxed and comfortably hypnotised as you feel now, you will be able to see what is on the other side of the window. I would now like you to slowly open your eyes, turn your head to the left, and look through the window.

Participants in the *mirror as a window with a view of a stranger* condition were told that:

In a moment, I am going to ask you to open your eyes, and when you do, I would like you to lean forward and to look to your left. When you look to your left, you will see a window and through the window, you will see a stranger. When you open your eyes and turn your head to your left, whilst remaining as deeply relaxed and comfortably hypnotised as you feel now, you will be able to see the stranger on the other side of the window. I would now like you to slowly open your eyes, turn your head to the left, and look through the window.

Following the suggestion, participants in the *stranger in the mirror* condition were first asked:

1. Please tell me what you see in the mirror.
2. I would like you to tell me (more) about the person you can see in the mirror.

Participants in the *mirror as a window* and the *mirror as a window with a view of a stranger* condition were first asked:

1. Please tell me what you see through the window.
2. I would like you to tell me (more) about the person you can see on the other side of the window.

Then everybody was asked:

3. (*If not specified*) Is the person you can see male or female?
4. What do they look like?
5. Have you ever seen this person before?
 - (*if yes*) Who is this person?
What is it about the person in the mirror/through the window that makes you think they are ...?
 - (*if no*) Do they remind you of anybody and if so, who do they remind you of?
What is it about the person in the mirror/through the window that reminds you of ...?
6. In what ways does the person you see look like you?
7. In what ways does the person you see look different to you?
8. How is it possible that you and the person you see look so similar?

The delusion was then challenged with a contradiction and a confrontation based on techniques used by Noble and McConkey (1995) and Burn et al. (2001). In the contradiction, participants were asked:

If a close friend or member of your family came into the room now, how would they be able to tell you apart from the person you see?

In the confrontation, participants were asked:

I would like you now to touch your nose ... [*wait for participant to touch their nose*] ... What did the person in the mirror/window do? Why did they do that?

Finally, participants were also asked why the person they could see always did what they did. Following this, the suggestion was cancelled with the following instructions:

The mirror to your left is turning back into what it has always been, a normal mirror that reflects things exactly as they are. In a moment, I would like you to open your eyes, and look to your left and tell me what you see. Just slowly open your eyes, lean forward, and look to your left and tell me what you see ...

That's right, it's a normal mirror and you can see your reflection in it. Everything is back to normal. It is just a normal mirror and you are becoming more and more relaxed. Comfortably relaxed and deeply hypnotised.

Participants then received a standard hypnotic deinduction (based on Weitzenhoffer & Hilgard, 1962). The first experimenter then left the room and a second experimenter entered to conduct the EAT.

EAT session. The second experimenter (who was not aware of participants' hypnotisability) informed participants that she would show them the videotape of the hypnosis session they had just completed, stop the videotape at various points, and ask them about their experiences. After watching a replay of the delusion suggestion, the second experimenter asked the following questions:

1. What went through your mind as you listened to the suggestion?
2. What did you expect to happen?
3. How did you go about having this experience?

Participants then watched a replay of themselves looking into the mirror for the first time following the suggestion. Following this, they were asked:

4. What thoughts did you have when you looked in the mirror?
5. How did that make you feel?

Next, participants watched a replay of the questions they were asked during the delusion including the challenge procedures. They were asked:

6. What thoughts did you have when you were being asked these questions?
7. What feelings did you have when you were being asked these questions?
8. How did you go about seeing what you saw in the mirror?

Finally, participants watched a replay of the cancellation and were asked:

9. What was it like when the hypnotist said this to you?
10. How did you feel about what you had experienced?

At the completion of the EAT session, participants were invited to ask questions, debriefed, and thanked for their time.

RESULTS

Response to the suggestion

Participants were scored as passing the suggestion if they did not recognise their own reflection in the mirror. This was based on Noble and McConkey (1995) who scored participants as passing an hypnotic sex-change suggestion if they did not deny their suggested sex. Table 1 presents the number and percentage of participants in each delusion condition who passed the suggestion. In the following discussion, the data from all three delusion conditions are collapsed such that numbers quoted are out of 12 (unless

TABLE 1
Number and percentage of participants experiencing the delusion

	Suggestion		
	<i>Stranger</i>	<i>Window</i>	<i>Window + Stranger</i>
Passed	3 (75%)	1 (25%)	4 (100%)
Physical differences	2 (50%)	4 (100%)	3 (75%)
Third person	3 (75%)	3 (75%)	4 (100%)

“Stranger” refers to the *stranger in the mirror* condition, “Window” refers to the *mirror as a window* condition, and “Window+Stranger” refers to the *mirror as a window with a view of a stranger* condition. “Passed” refers to the number of participants who passed the suggestion, “Physical differences” refers to the number of participants who described their reflection as having characteristics that were physically different to themselves, and “Third person” refers to the number of participants who referred to their reflection in the third person.

otherwise stated). Overall, eight (66.7%) participants passed the suggestion. The *stranger in the mirror* version and the *mirror as a window with a view of a stranger* version appeared to be more successful than the *mirror as a window* version.³

When participants initially looked in the mirror and were asked who they could see, the majority described another person in the mirror. The following is a transcript of one participant’s compelling experience:

- Hypnotist: Tell me, what do you see?
 Participant: (*Participant looks in the mirror and then looks behind him*). Who’s that?
 Hypnotist: Tell me about what you see.
 Participant: Another person.
 Hypnotist: Tell me about the person.
 Participant: They’re wearing a purple shirt, they’ve got a big nose, got a mole on their neck.
 Hypnotist: Is the person you see a male or a female?
 Participant: Male (*Participant looks behind him*).
 Hypnotist: Tell me more about what they look like.
 Participant: They’ve got short, curly hair, brown eyes, brown hair.
 Hypnotist: Have you ever seen this person before?
 Participant: No (*Participant looks behind him*).
 Hypnotist: Does this person remind you of anyone?
 Participant: I think I’ve seen him before at school.
 Hypnotist: Tell me about that . . . where you might have seen him.
 Participant: I think he was in the year below me . . . yeah I knew there was something.

³ We do not use inferential statistics since the subject numbers in each cell are less than five.

- Hypnotist: What do you think his name is?
 Participant: Anthony (*Not the participant's name*).
 Hypnotist: In what ways does this person look like you?
 Participant: Same coloured hair. I've got hazel eyes.
 Hypnotist: And what colour eyes does he have?
 Participant: Brown.
 Hypnotist: In what ways does the person you can see look different to you?
 Participant: Different coloured eyes. I think my nose is smaller . . . got bigger lips.
 Hypnotist: He has or you have?
 Participant: I have . . . and I've got more freckles.
 Hypnotist: What is he doing at the moment?
 Participant: Looking into the mirror. I don't know where he is though (*participant looks behind him and around the room*).
 Hypnotist: Is he doing anything in particular or saying anything in particular?
 Participant: Just looking at me. He's saying something but I can't understand.
 Hypnotist: Why can't you understand?
 Participant: Because I can't lip read.
 Hypnotist: Can you hear him?
 Participant: No.
 Hypnotist: How come?
 Participant: Because I can only see him.

This participant appeared to experience a subjectively real and compelling delusion. He displayed initial surprise at seeing the person in the mirror and appeared so convinced that it was a stranger that he frequently looked behind him in an attempt to find the person in the room.

Table 1 also presents the number and percentage of participants who described different physical characteristics for the person in the mirror. Collapsed across delusion conditions, nine (75.0%) participants described the person in the mirror as having different physical characteristics (even though some participants initially acknowledged that the reflection was themselves and thus failed the suggestion). When asked in what ways the person looked different to them, participants made comments such as "she looks different from me because her face is sort of a bit collapsed and her hair is longer" and "her eyes are different, her nose is bigger, her face is round". These embellishments can be considered secondary confabulations generated to justify the belief concerning a stranger in the mirror/other room.

Although four participants did recognise themselves in the mirror, two of these participants nevertheless referred to their reflection in the third person, as did the eight who passed the suggestion (10 in total; 83.3%; see Table 1). For instance, when describing what they saw in the mirror/through the window, participants said "she looks a bit sad", and "he has the same hair". When asked whether they had seen the person in the mirror/through the window before, five (41.7%) said they had not seen the person before (two

said the person reminded them of a friend and three said the person didn't remind them of anyone). Seven (58.3%) participants said they had seen the person before (four identified the person as themselves, one identified the person as a relative, and two said they'd seen the person before but didn't know who they were).

During the EAT inquiry, participants were asked how they went about having the suggested experience. Eight (66.7%) described using some type of strategy; of these, four reported focusing on particular features and altering their perception of those features. For example, one participant in the stranger in the mirror condition said "I think I mainly concentrated on the features . . . they seemed a bit exaggerated like pieces cut out of a magazine." Another in the same condition said "Just to pick out things that were different from what I thought I would look like. Some people think they look skinnier or fatter or whatever so I picked those things out, accentuated them, and then said that's where the difference was." Of the eight participants who used a strategy, the remaining four reported using visual imagery such as "I was trying to picture somebody there" and "I pictured an office through the window and I was watching what was going on inside of an office."

During the EAT, participants were also asked how they had felt when looking into the mirror. Ten (83.3%) participants described the experience as strange and/or uncomfortable. They made comments such as "it felt strange and almost disbelief that this person could look like me but not be me", and "I felt quite tense . . . I was thinking why should this stranger look like my mother? It was a bit scary." One participant in the stranger in the mirror condition said "I just thought he was an idiot. He just kept looking at me from the corner of the mirror . . . I just wanted him to go away. He didn't really look like anyone you could make a friend with because he just stared at me."

Response to challenges

We considered participants' responses to the challenge procedures only for those eight who passed the suggestion. During the contradiction, participants were asked how a close friend or a member of their family would tell them apart from the person the participant reported they could see. In response to this question, all eight participants continued to state that they saw a different person in the mirror/through the window. Five (62.5%) of these eight participants said that a close friend or family member would be able to tell them apart by their different features. Two (25.0%) said that their friends and family would just know that the person in the mirror was someone else, and only one (12.5%) said they did not know how their friends and family would tell them apart. The following transcript illustrates one participant's response to the contradiction:

- Hypnotist: If a close friend or family member came into the room how would they be able to tell you apart from the person you see?
- Participant: They would know by the quality of my skin and my features . . . and the colour and style of my hair and my voice.

During the confrontation, six participants who passed the suggestion were asked to touch their nose while looking in the mirror.⁴ All six participants claimed that the person they could see was also touching their nose. More importantly, all six continued to maintain that they could see another person in the mirror/window. When asked why the person they could see also touched their nose, four (66.7%) participants said that the person was copying them, one (16.7%) said the person touched their nose because they did, and one (16.7%) said they did not know why the person touched their nose. The following excerpt illustrates one participant's response to the confrontation:

- Hypnotist: I'd like you to touch your nose with your finger.
- Participant: He's copying me (*participant laughs*).
- Hypnotist: What did he do?
- Participant: He touched his nose (*participant laughs and looks behind him*).
- Hypnotist: What do you think he did that?
- Participant: Maybe he's trying to make me seem like I'm crazy or something.

Thus, in response to both the contradiction and confrontation procedures, all participants who passed the delusion suggestion continued to maintain that they could see a stranger in the mirror/through the window. Participants' EAT comments highlight their conviction in their suggested experience. When asked what they had been thinking and feeling during these challenge procedures, participants made comments such as "I remember thinking I wanted her [the hypnotist] to ask me more questions so I could work out what I was feeling and why it felt so bizarre" and "It was as if you were sitting there and you don't like someone and somebody gets a big photo of them and sticks it right in front of you and then makes you answer questions about it and you think oh I'd rather it was someone else." When describing her experience of touching her nose, one participant said "It made it more immediate because the hands were going up at the same time and it wasn't as if it was a picture . . . it was like a real person."

Cancellation

To cancel the suggestion, the hypnotist told participants that the mirror had returned to a normal mirror. Following this cancellation, all 12

⁴ The first two participants did not receive the confrontation suggestion.

participants saw their own reflection in the mirror. During the EAT they were asked to describe their reactions to the cancellation instructions. One participant said "It was so good because I knew in the mirror I'd see myself and I could relax." Another said "I didn't recall the past times when I saw a different person . . . I didn't want to remember it because I would've seemed like an idiot." Participants also described their thoughts and feelings as they looked into the mirror after the suggestion had been cancelled. Participants made comments such as "I just felt kind of relieved that there was no stranger staring back", "I looked in the mirror and I was expecting to see this other guy again but that other guy was actually me and I kind of realised that there wasn't another guy before" and "it made sense again. It was kind of a relief. I had a bit of understanding about what I was seeing in the last one too."

DISCUSSION

This study suggests that hypnosis is a useful analogue for creating a subjectively compelling mirrored-self misidentification delusion in high hypnotisable individuals. This study lays the groundwork for a larger project that aims to develop hypnotic analogues of a variety of monothematic delusions. Findings from this study indicate that the features of hypnotic mirrored-self misidentification are strikingly similar to clinical cases. The majority of participants did not recognise their reflection in the mirror, described the person in the mirror/through the window as having different physical characteristics and referred to themselves in the third person. When their suggested delusion was challenged, all of the participants who passed the suggestion continued to maintain that they did not recognise their reflection in the mirror. Finally, after the hypnotist cancelled the suggestion, a number of participants expressed relief at no longer seeing a stranger.

These findings suggest many parallels between the features of clinical mirrored-self misidentification and its hypnotic analogue. Both are characterised by strong conviction that the person they see in the mirror is not them. During the EAT inquiry, a number of participants in this study commented on the compelling nature of their experience and expressed strong belief that they were really seeing a stranger in the mirror. One participant in the *window to a view of a stranger* condition said, "I thought wow there's an actual person behind that window . . . I didn't know who she was and why she kept looking at me." Another participant, in the *stranger in the mirror* condition looked around the room a number of times for the "stranger" during the suggested experience. During the EAT he said "I really thought it was someone else in the mirror. That's why I looked behind

me . . . I thought someone was standing there and hence their reflection was in the mirror.”

In response to questions about whether, and in what ways the person they could see looked different to them, the majority of participants described physical differences. Such “secondary confabulations” are also frequently produced by clinical patients to justify their deluded belief that the person in the mirror is not them (Breen et al., 2000). Interestingly, in other clinical delusions such as Capgras delusion, which involves the belief that one’s relatives have been replaced by impostors, individuals will also point out subtle physical differences between the “impostors” and their relatives. For example, a woman suffering from Capgras syndrome in relation to her son said that the impostor differed from her son in that her son “had different-coloured eyes, was not as big and brawny, and her son would not kiss her” (Frazer & Roberts, 1994, p. 557). This highlights the potential similarities between clinical and hypnotic delusions and the capacity of hypnosis to model the features of such delusions in the laboratory (we return to the discussion of surface features vs. processes later in this Discussion; see also Kihlstrom & Hoyt, 1988; Oakley, 2006).

Although both clinical patients and hypnotic participants often point out physical differences between themselves and the person they see in the mirror, both groups also appear willing to acknowledge that the person they see looks similar to them. A number of hypnotic participants made comments such as “he probably looks a bit like me” and “she looks like me . . . because of the face and structure of her cheeks.” When describing these similarities, both clinical patients and hypnotised individuals display elements of covert recognition (Breen et al., 2000). For example, when FE was asked what colour hair the person in the mirror had, he tilted his head forward to examine his hair in the mirror before replying that the person was not as white as him. Similarly, when TH was asked if the person he could see in the mirror was bald he replied, “yes, he’d have to be”. This indicates that FE and TH may have had some (implicit) awareness that the person in the mirror was actually their own reflection. Likewise, a number of hypnotic participants displayed some level of covert recognition, making comments such as “he’s not me but there are bits and pieces. I can see bits and pieces . . .” Notably, patient TH believed that the person he could see in the mirror had the same first name as he did and likewise, one hypnotic participant said the person she could see was not her but had the same first name as her, indicating awareness of a connection between herself and the “stranger”.

Another similarity between clinical cases of mirrored-self misidentification and our hypnotic version are the attempts that deluded individuals make to converse with the person in the mirror. Both of Breen et al.’s (2000) clinical patients, TH and FE, expressed frustration at not being able to

converse normally with the person they saw in the mirror. In this study, one hypnotic participant described a similar experience during the suggested delusion saying, “he’s saying something but I can’t understand”. When asked why he couldn’t understand he said, “because I can’t lip read”. During the EAT inquiry, one participant said “I could hear my voice but I could see him in the mirror moving his lips . . . I couldn’t connect that to him being me.” Another participant described how he had completely focused on the eyes and said “I’m sure if I had focused on something else I would’ve noticed the mouth was moving and stuff and I would’ve been like, he’s talking but I can’t hear him.”

Hypnotised individuals, like their clinical counterparts, often expressed discomfort at seeing a stranger in the mirror staring back. The clinical patient TH had a curtain covering all the mirrors in his house and he said that whenever he lifted up the corner of a curtain he could see the stranger peering out at him. One hypnotised participant in this study commented, “I was poking my head around as if I was sort of looking at someone secretly.” The clinical patient FE mentioned that the stranger made him feel a bit sick because he moved about so freely with him. A number of hypnotised participants in this study made comments such as “I felt kind of weird seeing someone just stare at me that close”, and “I didn’t trust the other person.” The level of suspicion displayed by some hypnotically deluded participants in this study is reminiscent of the suspicion displayed by Capgras patients who often believe the impostors may have murdered their relatives. For instance, in this study, one participant in the *stranger in the mirror* condition said “the more I looked the more I saw someone else just looking back at me and I just thought it was a weirdo”. Another participant, in the *window with a view of a stranger* condition, said “It was a stranger and the features reminded me of my mother . . . and just the sort of feeling of dread, you know . . . what’s she going to do? Break through the window?” These similarities between the phenomenology of clinical and hypnotic delusions further support the potential of hypnosis to model a variety of monothe-matic delusions.

It is worth noting here and remembering during this discussion that the comments of these hypnotised subjects were essentially spontaneous. The suggestions they were given, for instance to see a stranger in the mirror, provided very little information about how to react and what such an experience might be like. These subjects, first-year undergraduate students, were most unlikely to have ever learned about mirrored-self misidentification. So their reactions, which parallel in quite remarkable ways those of clinically deluded individuals, suggest that one relatively small change in perceptual experience may be sufficient, when coupled with the application of less stringent criteria for evaluating beliefs (more on this later), to create a complex and compelling delusional experience.

An important final similarity is that hypnotised individuals, like clinical patients, maintained their mirrored-self misidentification delusion in the face of challenge. Even when presented with evidence and rational counter-arguments contrary to their beliefs, clinically deluded individuals continue to believe that they are seeing a stranger. When TH and FE were challenged by the examiner (Nora Breen) appearing in the mirror alongside them, TH did not recognise her and, although FE did recognise her, he continued to claim that his own reflection was a stranger. In very similar ways, during the contradiction and confrontation procedures in the current study, hypnotised individuals maintained their belief that they were seeing a stranger. They claimed that their friends and family would have no trouble distinguishing them from the stranger and that the stranger was simply copying their actions (e.g., touching their nose). These hypnotically deluded individuals easily generated reasons to maintain and justify their (temporary) deluded beliefs. For instance, when asked to touch his or her nose and to explain what the person in the mirror did, one participant said “she’s outside and wants to come in so she’s imitating me so I’ll feel closer to her”. This ability to explore the persistence of (laboratory) delusions in the face of increasingly confronting challenges should advance the knowledge base that informs clinicians as they work to challenge and resolve the delusional beliefs of their clinical patients.

Whereas our hypnotic version of mirrored-self misidentification appears able to model many features of clinical cases, there are important differences between clinical delusions and hypnotic delusions, which we must acknowledge and address in future research. First, the type of hypnotic suggestion used influenced participants’ delusional experiences. We used three versions of the suggestion in an attempt to mimic the outcome of proposed different pathways from neuropsychological impairment to clinical cases of mirrored-self misidentification. The suggestions to see a stranger in the mirror and the mirror as a window with a view of a stranger were more successful than the mirror as a window suggestion. The suggestion to see the mirror as a window may have been less successful because our questions following the suggestion did not match the suggested experience. For example, we suggested that participants view the mirror as a window into another room but instead of asking them about the room we asked them about “who” they could see. This lack of correspondence between suggestion and questions may have contributed towards the ineffectiveness of this suggestion.

Second, differences exist in the longevity of clinical mirrored-self misidentification and hypnotic mirrored-self misidentification. For the most part, hypnotic effects, including hypnotic delusions, are confined to the hypnotic setting. In contrast, clinical delusions persist over time, and often in the face of much stronger challenges (e.g., persistent challenges from family and friends). However, some hypnotic effects can continue outside of

the hypnotic context. For instance, Barnier and McConkey (1998) gave participants a posthypnotic suggestion that they would feel compelled to mail a postcard every single day to the experimenter and indeed, some high hypnotisable individuals mailed postcards everyday for up to 16 weeks! It remains to be tested whether hypnotically elicited beliefs, especially self-related beliefs, can be maintained outside the hypnotic context and over long periods of time.

Third, the intensity and behavioural consequences of hypnotic and clinical delusions are markedly different. Clinical delusions are intense and have extensive behavioural consequences (Kopelman, 2007). For instance, in mirrored-self misidentification, the belief that one's reflection is that of a stranger might be so overwhelming that the person avoids looking in the mirror and covers up all the mirrors in the house (as in the case of TH). In the Capgras delusion, the belief that someone emotionally close, such as a family member, has been replaced by an impostor is not infrequently accompanied by acts of violence towards the person wrongly believed to be an impostor (Bourget & Whitehurst, 2004; for discussion of the classic case of a son who decapitated his father in the belief that the father was a robot, see Stone & Young, 1997). However, the extent of behavioural responses to the Capgras delusion is variable (for discussion, see Davies et al., 2002). Although we think it unlikely that hypnotic suggestions will engender beliefs that lead to such extreme or criminal behaviour, there is strong evidence from clinical applications of hypnosis that hypnotic suggestions can lead to significant and long-lasting cognitive and behavioural changes, at least until they are cancelled and perhaps even after they are cancelled (Nash & Barnier, 2008).

Laying aside these issues for future research, our temporary hypnotic analogue of mirrored-self misidentification gives us the chance to refine theoretical accounts of monothematic delusions. As noted earlier, a deficit in processing familiar faces is one (Factor 1) pathway to mirrored-self misidentification (as in the case of TH). Interestingly, during the EAT in this study, a number of participants talked about changes in the sense of familiarity for their own face as a result of the specific suggestion. One participant said "I felt I didn't know that person . . . or I didn't think that it was familiar", and another said, "usually when I look in the mirror I perceive myself as a whole but when I was looking at this . . . it was just like key bits that didn't really seem to fit together". After the suggestion was cancelled, one woman said "I had a great feeling of relief . . . it was familiar." Thus, as in some clinical cases, a specific hypnotic suggestion may alter feelings of familiarity for one's own face, leading to a delusional hypothesis that the person they see in the mirror is a stranger. According to Langdon and Coltheart (2000), delusional hypotheses such as this are accepted due to a deficit in belief evaluation (Factor 2).

In our view, hypnosis and hypnotic suggestion lead to a more general effect that corresponds to Langdon and Coltheart's (2000) Factor 2. Hypnotised individuals appear to uncritically accept their hypnotic experiences based on poor quality evidence (which suggests that they use less stringent criteria for evaluating their hypnotic experiences). They also actively avoid information that contradicts their explanations (Burn et al., 2001; McConkey, 1991, 2008; Sheehan, 1991, 1992; Shor, 1959; Sutcliffe, 1961). Shor (1959) once referred to this as a "shift in the generalised reality orientation". For instance, in this study, when participants were asked why they thought the person they could see always did what they did, the majority said that the stranger they could see was copying them. This somewhat simplistic explanation appeared to satisfy participants, we assume because of this shift in generalised reality orientation. In fact, during the EAT one participant said that whilst listening to the suggestion he kept thinking that it wouldn't be effective. When he initially looked in the mirror he actively tried to convince himself that he was looking at his own reflection. However, when he touched his nose and saw the person in the mirror do the same, he immediately thought the person was copying him and this thought appeared to confirm that it could not be his own reflection in the mirror. In other words, the idea that the person in the mirror was copying him appeared sufficient to convince him that he was looking at a stranger. This is consistent with findings indicating that delusional individuals exhibit data-gathering biases in their reasoning processes and often jump to conclusions (Bentall, Kinderman, & Kaney, 1994; Garety & Freeman, 1999; Stone & Young, 1997). These biases have been conceived of as personality/individual difference variables that either act as Factor 2 or influence Factor 1 (McKay, Langdon, & Coltheart, 2005; Metcalf, Langdon, & Coltheart, 2007).

So thinking about our hypnotic analogue within Langdon and Coltheart's (2000) two-factor theory, for a highly hypnotisable person, the specific suggestion provides the content of their (hypnotic) delusional experience, much as the specific neuropsychological anomaly provides the content of a clinically deluded experience (Factor 1). Then, regardless of the content of the hypnotic suggestion, the overall hypnotic context influences the evaluation and acceptance of beliefs and explanations about these experiences, much as the impaired belief evaluation system leads to the acceptance of delusional hypotheses in clinical cases (Factor 2). Specifically, in both clinical and hypnotic delusions, Factor 2 may involve a lowering of belief evaluation criteria such that poor quality evidence is accepted as sufficient justification for a deluded belief, whatever its source. Researchers could look to the extensive memory source monitoring literature in cognitive psychology to help specify what these criteria are and the factors that influence them (e.g., Johnson, 2006).

This analogue assumes not only a match between the features of clinical and hypnotic delusions, but also in their underlying processes. We recognise,

however, that the aetiology of deluded beliefs across clinical and hypnotic cases may be quite different. In clinical cases the aetiology is often a neuropsychological impairment; there is no such impairment in hypnotic delusions. Whereas the neuropsychological impairment presumably produces a “bottom-up” disruption to cognitive processing (e.g., disruptions in primary perception for faces), hypnotic delusions are created by strategic, “top-down” processes (influenced by hypnotic ability, social factors, and motivation; Barnier & Oakley, in press). Consistent with this, of our 12 participants, 8 showed what has been described in the hypnosis literature as a “constructive” cognitive style, where the hypnotised subject actively works on the suggestions he/she receives, deciding how to go about experiencing them (in contrast to those who show a “concentrative” cognitive style, where the hypnotised subject simply listens to the suggestions and waits for the effects to happen; Sheehan & McConkey, 1982). Such active construction of hypnotic delusions is a natural consequence of the context of hypnosis and the desire of high hypnotisable people to be “good hypnotic subjects”. But such conscious (or unconscious) strategies and motivation may be far less prevalent in clinical delusions of a neuropsychological origin.

Notably, however, Langdon, Coltheart, and colleagues have acknowledged that some clinical delusions may involve a motivated or functional disruption in information processing (McKay et al., 2005), rather than a neuropsychological impairment. Hypnosis may be best suited to modelling these sorts of delusions. This is supported by research on hypnotic analogues of conversion disorder paralysis. Halligan, Oakley, and colleagues reported that the patterns of brain activation in a clinical case of conversion disorder paralysis were remarkably similar to the patterns in a laboratory analogue using hypnotic paralysis. They argued that these clinical and hypnotic versions shared the same neural underpinnings (Halligan, Athwal, et al., 2000; Oakley, 2006; see also Barnier & Oakley, in press).

Despite the potential process differences between hypnotic delusions and some forms of clinical delusions—which are important to identify—we note that Coltheart (2007) has proposed that the two-factor theory is a general cognitive model. By this view, anything that “breaks” normal cognitive processing involved in the generation of beliefs and their normal evaluation should have similar effects. Hypnotic suggestions can “break” these processes, which makes hypnotic analogues of delusions valuable as a means to examine the parameters of normal and abnormal belief formation.

In summary, this study is the first in a series of experiments that will develop a catalogue of hypnotic analogues of clinical delusions. This initial study suggests that our hypnotic methods are effective—participants’ hypnotic delusions of mirrored-self misidentification were credible, compelling, and resistant to challenge. In developing our catalogue, we will examine the features and parameters of hypnotic delusions, the impact of challenging

them, and whether role-playing participants display the same behaviour as genuinely hypnotised participants. We will identify the cognitive processes that occur during a delusion. For instance, we will explore the impact of a suggested delusion on information processing and memory, with a particular focus on selective facilitation and inhibition of information. Most importantly, this programme of research will provide the scope to explore and refine theoretical accounts of delusions, such as the two-factor model. We will aim to operationalise and index the separate and combined influences of Factor 1 and Factor 2 in our hypnotic versions. Thus, we hope to establish hypnosis as a new empirically based framework for investigating and understanding delusions.

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