

Impaired face recognition and the mirrored-self misidentification delusion: Recreating the delusion using hypnosis

Michael Connors (mconnors@maccs.mq.edu.au)

Macquarie Centre for Cognitive Science
Macquarie University, NSW 2109 Australia

Amanda Barnier (abarnier@maccs.mq.edu.au)

Macquarie Centre for Cognitive Science
Macquarie University, NSW 2109 Australia

Max Coltheart (max@maccs.mq.edu.au)

Macquarie Centre for Cognitive Science
Macquarie University, NSW 2109 Australia

Rochelle Cox (rcox@maccs.mq.edu.au)

Macquarie Centre for Cognitive Science
Macquarie University, NSW 2109 Australia

Robyn Langdon (rlangdon@maccs.mq.edu.au)

Macquarie Centre for Cognitive Science
Macquarie University, NSW 2109 Australia

Abstract

Mirrored-self misidentification is the delusional belief that one's own reflection in the mirror is a stranger. Current theories suggest that this delusion can occur when two factors are present: a deficit in face processing which is responsible for the content of the delusion (Factor 1) and a deficit in belief evaluation which accounts for the failure to reject the delusional belief (Factor 2). Previous research has used hypnosis to model this delusion. This research has found that a suggestion in hypnosis either to see a stranger in the mirror (a fully-formed suggestion) or to not recognise the person in the mirror (a suggestion for Factor 1 alone) can produce a hypnotic delusion with features strikingly similar to the clinical condition. The present study sought to directly compare these two approaches to see which best approximated the clinical condition. Fifty-two high hypnotisable participants received a hypnotic suggestion to either see a stranger in the mirror (fully-formed) or to not recognise the person in the mirror (Factor 1 alone). Half of the participants received the suggestion while hypnotised and the other half received the suggestion in their normal waking state. Following the suggestion, participants were asked to look into a mirror and to describe what they could see. Participants who reported seeing someone other than themselves were then given a series of clinically inspired challenges to determine the resilience of their delusion. Results support the idea that both types of hypnotic suggestion can produce a highly compelling mirrored-self misidentification delusion which is resistant to challenge. In particular, results suggest that the Factor 1 suggestion in hypnosis is especially effective at producing the delusion and that the additional information contained in the fully-formed suggestion is unnecessary. Results are discussed in terms of the two-factor theory of delusions.

Keywords: delusion; mirrored-self misidentification; mirror sign; hypnosis; instrumental hypnosis.

Background and Aims

Hypnosis has a long history of being used to model clinical conditions. Hypnosis can be used to create virtual patients, temporary analogues of clinical conditions, which can help us to better understand the conditions themselves (Oakley & Halligan, 2009). In an ongoing program of research, we have applied this approach to the mirrored-self misidentification delusion, the belief that one's reflection in the mirror is a stranger. In this study, we examined whether impaired face recognition in hypnosis can lead to the delusion.

Mirrored-Self Misidentification

Patients with mirrored-self misidentification believe that their reflection is another person. Typically, they believe that this person follows them around everywhere there happens to be a reflective surface. Patients, nevertheless, understand what mirrors are and what they are used for, and many can still recognise other people's reflections in the mirror (Breen, Caine, & Coltheart, 2001).

Some patients may become distressed or suspicious of the reflection (e.g. Gluckman, 1968). Many, for example, cover up all mirrors to avoid seeing the stranger and some have been known to throw objects at their reflection. Other patients remain largely indifferent (e.g. Breen et al., 2001).

This delusion usually occurs in the presence of advanced global dementia. It has been found that between 2-10% of patients suffering from Alzheimer's disease misidentify their own reflection (Burns, Jacoby, & Levy, 1990; Deutsch, Bylsma, Rovner, Steele, & Folstein, 1991; Förstl et al.,

1991; Hyodo et al., 2005; Mendez et al., 1992; Rubin, Drevets, & Burke, 1998).

The Two-Factor Approach

The two-factor approach to delusions, arguably the most influential and comprehensive account, suggests that two factors are involved in the formation and maintenance of a delusion (Langdon & Coltheart, 2000). The first factor is an anomaly affecting perceptual and/or emotional processing which explains the content of the delusion. This is typically neuropsychological in origin but it can be something else (McKay, Langdon, & Coltheart, 2005). The second factor – some deficit in belief evaluation – explains why the delusional belief is maintained and not rejected (Coltheart, 2007; Davies, Coltheart, Langdon, & Breen, 2002).

When applied to mirrored-self misidentification, research suggests that there are two main pathways to the delusion. A deficit in face processing – which makes it difficult for the patient to recognise their own face in the mirror – or mirror agnosia – an inability to use mirror knowledge when interacting with mirrors – can both lead a patient to develop the idea that there is a stranger in the mirror (Breen et al., 2001).

There are, however, many patients with deficits in face processing or mirror agnosia who do not go on to develop a delusion (see, for example, Tranel & Damasio, 1985, for a description of patients with deficits in face processing without the delusion, and Binkofski, Buccino, Dohle, Seitz, & Freund, 1999, for a description of non-delusional cases of mirror agnosia). Hence, there is a need for a second factor – some deficit in belief evaluation (Coltheart, 2007). When both of these factors are present, a patient may develop the delusion.

In this study, we focussed on the deficit in face processing as the Factor 1 responsible for the delusion.

Studying Delusions in the Lab

The complex nature of delusions and their frequent comorbidity makes them particularly difficult to study in the laboratory. Due to the extensive neurological and cognitive deterioration associated with Alzheimer's disease, the mirror delusion is even more difficult to study. The instrumental use of hypnosis – the use of hypnosis to model and study other conditions – however, provides an important empirical approach. There are three main reasons for this.

First, the two-factor theory of delusions is a general cognitive model (Coltheart, 2007). According to this view, it is the cognitive process of generating hypotheses in response to unusual circumstances – rather than the presence or absence of a lesion in the brain – which lead to the delusion and we can disrupt these processes using hypnosis (Oakley & Halligan, 2009; see also Barnier et al., 2008).

A second reason why hypnosis is suited to modelling delusions is that delusions and hypnosis share many features (e.g. Kihlstrom & Hoyt, 1988). Both, for example, are

characterised by distorted beliefs about reality. Indeed, both delusions and hypnotic suggestions are (1) believed with absolute conviction, (2) resistant to rational counter argument, (3) maintained regardless of overwhelming evidence to the contrary, and (4) not shared by others from the same socio-cultural group (see Langdon & Coltheart, 2000). These shared features have, for example, been illustrated in previous work using hypnotic suggestion to model delusions of sex-change (Noble & McConkey, 1995) and delusions of identity distortion (Cox & Barnier, 2009).

Thirdly, hypnosis has a track record of successfully modelling many psychopathologies (Oakley, 2006; Oakley & Halligan, 2009). These include, for example, conversion hysteria (Halligan, Bass, & Wade, 2000), auditory hallucinations (Woody & Szechtman, 2000), paranoia (Zimbardo, Andersen, & Kabat, 1981) and functional blindness (Bryant & McConkey, 1989).

Barnier et al. (2008)

Given the suitability of using hypnosis to model clinical delusions, Barnier and colleagues conducted the first hypnosis study of the mirrored-self misidentification delusion. In this study, Barnier and colleagues hypnotised 12 highly hypnotisable participants and gave them one of three hypnotic suggestions to model the delusion: (1) to see a stranger in the mirror, (2) to see the mirror as a window and (3) to see the mirror as a window with a view to a stranger. After the suggestion, they tested and challenged participants' deluded beliefs.

They found that 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. These features were strikingly similar to clinical cases. They also found the suggestion to see a stranger in the mirror (referred to as a fully-formed suggestion because it is for the full delusional experience of seeing a stranger) to be particularly effective.

Connors et al. (in preparation)

My colleagues and I extended this study by seeing if we could recreate the delusion from its Factor 1 and Factor 2 components (Connors, Barnier, Coltheart, Cox, & Langdon, in preparation). We gave separate hypnotic suggestions for the two component factors to see if it would produce the delusion. The Factor 1 suggestion was: "You will not recognise the person you see in the mirror" to create the deficit in face processing. The Factor 2 suggestion was: "You will accept any explanation that comes to mind." This was based on a model of the second factor by Turner and colleagues, which proposes that delusional patients do not check unusual beliefs as much as non-delusional controls (Turner, Coltheart, Metcalf, & Langdon, 2006).

Half the participants received the Factor 1 alone suggestion and half the participants received both Factor 1 and Factor 2 suggestions. We were also interested to see if the hypnotic state – itself known to disrupt belief evaluation

(e.g. Bryant & Mallard, 2005) – might act as a Factor 2. We examined this by giving the suggestions to participants both in and out of hypnosis.

We found that many subjects who received suggestions for both Factor 1 and Factor 2 during hypnosis developed the delusion and reported seeing a stranger in the mirror. Notably, however, a suggestion for Factor 1 alone in hypnosis was even more effective at producing the delusion than the combined suggestion. This finding suggests that the hypnotic state, which itself disrupts belief evaluation, might act as a Factor 2.

Aims

Given these earlier findings, our current study sought to directly compare the fully-formed suggestion from Barnier et al. (2008) and the Factor 1 suggestion from Connors et al. (in preparation), both with and without hypnosis, to see which best approximated the clinical condition. In addition, our study sought to replicate the finding from our previous experiment which showed that a Factor 1 suggestion in hypnosis can generate the delusion, and to examine the effectiveness of the fully-formed suggestion in a wake condition.

Summary of Experiment

Design

There were 52 highly hypnotisable participants in our study. Half received a formal hypnotic induction and half did a puzzle task. Half received a fully-formed suggestion and half received the Factor 1 suggestion.

The fully-formed suggestion to see a stranger – used in Barnier et al. (2008) – specifies directly to participants what they are to experience. In contrast, the Factor 1 suggestion to not recognise the face in the mirror – used in Connors et al. (in preparation) – gives participants a lot less information. People have to interpret the suggestion and work up to the idea that their reflection is a stranger. Given that the fully-formed suggestion contains more information than the Factor 1 suggestion, we thought the fully-formed suggestion would be more effective in producing the delusion than the Factor 1 suggestion in both the hypnosis and wake conditions. We also expected that more people in the hypnosis conditions would experience the delusion than in the wake condition.

Procedure

The procedure for the experiment was as follows.

First, we gave participants in the ‘hypnosis’ condition a hypnotic induction. We gave those in the ‘wake’ condition a puzzle task to complete (see Nogrady, McConkey, & Perry, 1985, for details).

We then surreptitiously marked the participant’s face under the guise of tickling the participant’s cheek. This was used later on as an implicit measure of self-recognition, to see if participants instinctively wiped the mark when they saw their reflection.

We then gave participants a suggestion. We gave those in the fully-formed condition the suggestion that they would see a stranger in the mirror. We gave those in the Factor 1 condition the suggestion that they would not be able to recognise the person they saw in the mirror.

We then asked participants to look into a mirror and describe who they saw. We scored as a ‘pass’ those who identified the person as someone other than themselves. We scored as a ‘fail’ those who identified their reflection as themselves.

For those who passed the suggestion, we gave them a series of challenges to determine the resilience of the delusion. These challenges were designed to contradict or confront the participant’s delusional experience. There were six challenges and these are reported below. After each challenge, we noted whether the delusion was breached or maintained.

After the challenges, we cancelled the suggestion. We then gave a deinduction to those in the hypnosis condition; those in the wake condition completed a counting task. If the delusion was breached at any point during the test or challenges, we stopped the challenges and moved straight to the cancellation and deinduction or counting task.

Summary of Findings

Response to Suggestion

Participants were scored as passing the suggestions if they identified their reflection in the mirror as someone other than themselves as per Barnier et al. (2008). Participants who recognised their reflection were scored as a fail. The percentage of participants who passed the suggestion – that is, they reported seeing a stranger – is shown for each condition in Figure 1.

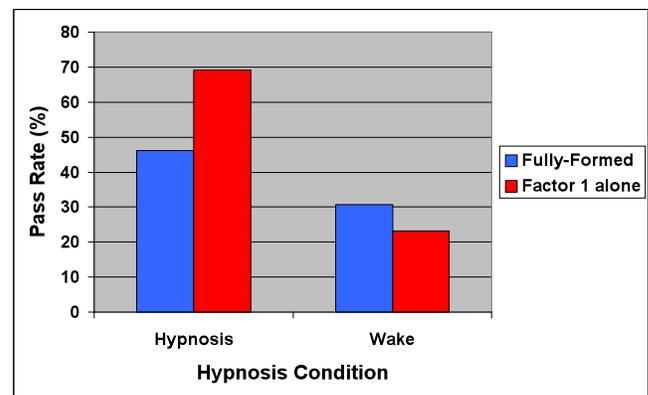


Figure 1: The pass rate for each condition

If we look at the first column, we can see that 46% of people receiving the fully-formed suggestion – to see a stranger in the mirror – while in hypnosis reported seeing a stranger in the mirror. This pass rate is similar to previous studies.

The second column shows the percentage of participants who saw a stranger in the mirror after receiving the Factor 1

suggestion – to not recognise their face in the mirror – while in hypnosis. This shows that more people saw a stranger in the mirror when given the Factor 1 suggestion than when given the fully-formed suggestion. This is important because it replicates the findings from our last study which showed that a Factor 1 suggestion alone in hypnosis is effective in producing the delusion (Connors et al., in preparation). These findings support the idea that hypnosis can act as a Factor 2 to generate the delusion from a Factor 1 suggestion. The findings also suggest that the extra information in the fully-formed suggestion, specifying that one will see a stranger, is unnecessary and may even interfere.

The third column shows the pass rate of participants who received the fully-formed suggestion in the wake condition, outside of hypnosis. As Figure 1 shows, they did not do as well as those receiving the suggestion in hypnosis. Nevertheless, a considerable proportion – around 31% – developed the delusion even without hypnosis. This is consistent with previous research, which suggests that much of the variance in hypnotic experience is due a person’s level of hypnotisability, rather than the presence or absence of a formal hypnotic induction (Lawrence, Beaulieu-Prévost, & du Chéné, 2008).

The final column shows those in the wake Factor 1 condition. These participants showed a pass rate of 23%. This is much less than the hypnosis Factor 1 group. This difference replicates what we found in our previous study. It shows that we need hypnosis to impair critical evaluation for participants to develop the delusion from the Factor 1 suggestion.

Overall, then, the findings confirm that a Factor 1 suggestion to not recognise one’s face in the mirror, when combined with hypnosis acting as Factor 2, can produce the delusional belief that there is a stranger in the mirror. In addition, the extra information contained in the fully-formed suggestion seems unnecessary and may even interfere in the hypnosis condition.

Response to Challenges

The 22 participants who passed the suggestion received a series of six challenges to determine the resilience of the delusion. There were no differences between the four conditions in response to the challenges, so the results are presented for the four groups combined. Figure 2 shows the total number of participants who received and passed each challenge.

In the first challenge, subjects were asked to describe the person they saw in the mirror and to explain why the person looked so similar to themselves. In response to this challenge, 5 participants breached the delusion – they indicated that they recognised themselves in the mirror. This left 17 participants who maintained the delusion.

In the second challenge, the experimenter asked participants to describe what a close friend or family member would say if they looked in the mirror and saw the stranger. Of the 17 highs, all 17 maintained their delusion.

In the third challenge, we asked participants to look into the mirror, touch their nose and to explain what they saw. All participants maintained the delusion in the face of this challenge

In the fourth challenge, the experimenter held a tennis ball over the participant’s shoulder and asked the participant to touch the tennis ball as they looked in the mirror. This challenge knocked out three participants.

In the fifth challenge, the experimenter gave the participant a small hand-held mirror and asked them to compare what they saw in it to what they saw in the mirror on the wall. This challenge knocked out two participants.

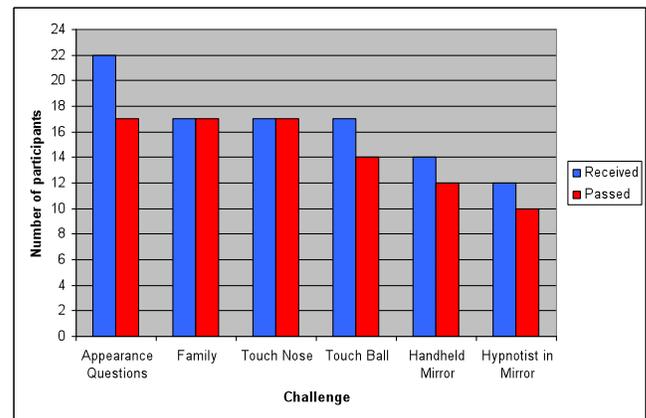


Figure 2: Response to Challenges

In the sixth and final challenge, the experimenter stood next to the person in the mirror and asked them to identify who was in the mirror and then to identify who was in the room. This challenge knocked out two participants.

This left 10 participants (45% of those who passed the suggestion) who were able to maintain the delusion in the face of very strong challenging. This kind of persistent challenging is very unusual in hypnosis research, and is more like the tests used in a neuropsychological context. The fact that many participants were able to maintain the delusion in the face of this challenging is interesting because it illustrates how compelling the hypnotic delusion can be.

Qualities of the Delusion

Participants who passed the suggestion showed features strikingly similar to the clinical condition. Irrespective of the suggestion, participants identified their reflection in the mirror as someone other than themselves. Many of these participants described themselves as different to the person they saw in the mirror and identified specific physical differences between themselves and this person. In addition, many also expressed shock, amusement and sometimes even discomfort at seeing someone else in the mirror.

Importantly, though, there were no qualitative differences between the fully-formed suggestion – where participants were given the experience directly – and the Factor 1 suggestion – where participants had to build up to the

experience. There was, for example, no difference between the Factor 1 and fully-formed conditions in terms of how participants responded to the challenges. This is important because it shows we can create the delusion from components and it shows the value of the two-factor approach.

Conclusions

There seem to be three main conclusions from this study. First of all, the study replicates the findings of earlier experiments in showing that the Factor 1 suggestion – to not recognise one’s face in the mirror – with hypnosis as Factor 2 is especially effective in producing the delusion. In particular, the suggestion does not require any additional information, as contained in the fully-formed suggestion, for participants to develop or maintain the delusion.

Second, it shows we can recreate the delusion from its components and shows that the hypnotic state itself can act as a Factor 2 to disrupt belief evaluation. This suggests the possibility that there could be something about hypnosis that is similar to the reality monitoring disruption in clinical cases.

Finally, this work adds to earlier work from our team in suggesting that we can use hypnosis to model clinical delusions such as mirrored-self misidentification. More generally, it adds to research in other areas demonstrating the value of hypnosis as an analogue for clinical conditions.

Future Directions

There are a number of future directions for our research.

Mirror agnosia, an inability to use mirror knowledge when interacting with mirrors, has also been implicated as an alternative Factor 1 in some clinical cases. Research we are currently conducting is focusing on using hypnosis to model this pathway to the delusion.

Another issue for future research is that of demand characteristics. We are currently conducting a study which investigates this issue. This experiment compares low hypnotisable participants faking hypnosis with high hypnotisable participants who are hypnotised in order to rule out role-playing in the hypnotised participants.

Future research might also examine in more detail hypnotically-induced prosopagnosia (or face blindness) and use more implicit measures, such as skin conductance response. Research, for example, could see whether hypnotised participants, like patients with prosopagnosia, show an autonomic response to familiar faces in the absence of overt recognition (Tranel & Damasio, 1985). Such research could test the two-factor approach we have taken here by examining if it is possible to create a Factor 1 impairment in hypnosis without also producing the delusion.

Future research could also compare hypnotic and clinical delusions in more detail and examine the underlying processes in both. Hypnotic delusions share a number of features with their clinical counterparts. There are, however, several important differences. These include, for example,

differences in aetiology, longevity and behavioural consequences. These are issues which need to be addressed in future work.

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