Personality and Individual Differences 57 (2014) 48–53

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Hypnotic analogues of delusions: The role of delusion proneness and schizotypy

Michael H. Connors [a,b,*], Peter W. Halligan [a,c], Amanda J. Barnier [a,b], Robyn Langdon [a,b], Rochelle E. Cox [a,b], Jocelyn Elliott [a,b], Vince Polito [a,b], Max Coltheart [a,b]

[a] ARC Centre of Excellence in Cognition and Its Disorders, Australia
[b] Department of Cognitive Science, Macquarie University, Australia
[c] School of Psychology, Cardiff University, United Kingdom

ARTICLE INFO

Article history:
Received 6 December 2012
Received in revised form 5 June 2013
Accepted 9 September 2013
Available online 9 October 2013

Keywords:
Delusion
Delusion proneness
Hypnosis
Hypnotisability
Instrumental hypnosis
Schizotypy

ABSTRACT

There is compelling evidence that hypnotic suggestions can be used to model clinical delusions in the laboratory. In two studies, we investigated the role that personality factors, delusion proneness and schizotypy, played in shaping such hypnotic models. In the first study, 398 participants were screened on measures of hypnotisability, delusion proneness, and schizotypy. Hypnotisability correlated with both delusion proneness and the cognitive–perceptual subscale of schizotypy. In the second study, 22 high and 20 low hypnotisable participants were given suggestions to model two content specific delusions: Frégoli (the belief that strangers are actually known people in disguise) and mirrored-self misidentification (the belief that one's reflection in the mirror is a stranger). Whereas *high delusion proneness* predicted which high hypnotisable participants responded to the suggestion for Frégoli delusion, *hypnotisability scores* predicted which high hypnotisable participants responded to the suggestion for mirrored-self misidentification. No lows responded to either suggestion. We discuss the implications of these findings for hypnotic models of delusions.

1. Introduction

Suggestions in hypnosis have been used to model many clinical symptoms (Kihlstrom, 1979). Researchers, for example, have used suggestions to create hypnotic analogues of clinical delusions and hallucinations in the laboratory with no lasting consequences for participants (for reviews, see Cox & Barnier, 2010; Oakley & Halligan, 2009; Woody & Szechtman, 2011). This approach has allowed researchers to study the putative psychological processes that underlie clinical symptoms with a degree of experimental control not possible with clinical patients. According to Oakley and Halligan (2009), this approach provides for "virtual patients" (p. 266), or clinical analogues, that researchers can study to better understand the clinical disorders themselves. In this paper, we employed this approach and investigated the role of individual differences in shaping analogues of clinical delusions.

The ability to experience hypnotic effects is a relatively stable trait, known as hypnotisability, and is assessed using standardised scales (Laurence, Beaulieu-Prévost, & du Chéné, 2008). Consequently, researchers tend to select high hypnotisable participants (*highs*; i.e., 10–15% of the participant population) to generate hypnotic analogues, as this group will more reliably experience the hypnotic suggestions (Cox & Barnier, 2010). This selection of participants, however, raises two issues when attempting to generate hypnotic analogues of delusions. First, it is unclear whether high hypnotisability is itself associated with traits related to delusions. Second, it is unclear whether individual differences in such traits influence the hypnotic analogue independently of hypnotisability. We examined these two issues in Study 1 and Study 2.

2. Study 1

There is an extensive literature that confirms hypnotisability is not related to broad personality traits, such as extraversion and agreeableness (Laurence et al., 2008). To date, the most reliable personality correlate of hypnotisability is absorption (a tendency to become engrossed in fantasy or experience), but even this trait correlates only moderately (Tellegen & Atkinson, 1974). There is, however, some evidence that hypnotisability could be related to specific traits associated with delusional ideation. A number of studies found that high hypnotisability is associated with greater paranormal experiences and beliefs (Diamond & Taft, 1975; Nadon & Kihlstrom, 1987; Nadon, Laurence, & Perry, 1987; Spanos & Moretti, 1988). Wilson and Barber (1983), for example, found that 92%

* Corresponding author. Address: Department of Cognitive Science, Macquarie University, NSW 2109, Australia. Tel.: +61 2 9385 3098; fax: +61 2 9385 2200.
E-mail address: michael.connors@mq.edu.au (M.H. Connors).

0191-8869/$ - see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.paid.2013.09.012

of their sample of very high hypnotisable women believed they had psychic abilities, 88% had out-of-body experiences, and 73% had experiences with apparitions. In contrast, only 16% of low and medium hypnotisable participants reported similar experiences and beliefs. Other research has found that high hypnotisability is associated with a tendency to make source monitoring errors, or to confuse imagined events with real memories (Heaps & Nash, 1999; Wilson & Barber, 1983). Such reality-monitoring errors have been implicated in delusions (Johnson, 1988).

Individuals in the non-clinical population are known to vary in their level of delusion-like ideation or 'delusion proneness' (Peters, Joseph, Day, & Garety, 2004). They can vary in the number of implausible beliefs they might entertain, and in the associated conviction, preoccupation, and distress (Peters et al., 2004). Given the previous findings, it is possible that hypnotisability could be related to delusion proneness. Research in recent years has tended to focus on cognitive correlates of hypnotisability, such as attention and automaticity, rather than personality traits (Laurence et al., 2008). However, the success of the hypnosis paradigm in modelling delusions (Cox & Barnier, 2010) has made the possibility of a relationship between hypnotisability and delusion proneness more salient.

Delusion proneness is related to the broader personality trait of 'schizotypy.' Schizotypy is conceptualised as an attenuated form of clinical psychosis present to varying degrees in the general population (Claridge, 1985). Research suggests three key facets of schizotypy: (i) cognitive–perceptual traits (unusual perceptual experiences and magical thinking), (ii) interpersonal difficulties (social anxiety and blunted affect), and (iii) disorganisation (odd behaviour and speech; see Raine & Benishay, 1995). Of these three schizotypal factors, Jamieson and Gruzelier (2001) proposed that the cognitive–perceptual traits could be related to hypnotisability as both involve a similar tendency to report unusual experiences and beliefs. In support of their proposal, Gruzelier and colleagues found that a number of individual items on a self-measure of schizotypy, the *Personality Syndrome Questionnaire*, correlated with hypnotisability (Gruzelier et al., 2004; Jamieson & Gruzelier, 2001; Laidlaw, Dwivedi, Naito, & Gruzelier, 2005). However, none of the psychometrically validated subscale scores, traditionally used in schizotypy research, correlated with hypnotisability. In addition, the particular individual items that correlated with hypnotisability varied across different samples. Therefore, the authors noted that their findings could have been due to Type I error. Nevertheless, the possibility remains that cognitive–perceptual traits of schizotypy could be related to hypnotisability.

In Study 1, we investigated the relationship between hypnotisability, delusion proneness, and schizotypy. We administered the *Harvard Group Scale of Hypnotic Susceptibility: Form A* (HGSHS:A; Shor & Orne, 1962) to a large group of participants and also gave them measures of delusion proneness (Peters et al., 2004), schizotypy (Raine & Benishay, 1995), and absorption (Tellegen & Atkinson, 1974). Following previous research, we expected that hypnotisability would correlate with delusion proneness, the cognitive–perceptual subscale of schizotypy, and absorption.

2.1. Method

2.1.1. Participants

Participants were drawn from a pool of 439 first and second year psychology students who participated as part of their course requirements. Participants were asked not to participate if they had any ongoing psychological condition, problems with substance abuse, or if they had ever suffered a serious head injury or neurological illness. Research was approved by the Macquarie University Human Research Ethics Committee. From the original sample of participants, 398 participants (98 males, 298 females, 2 undisclosed) of mean age 22.01 years ($SD = 6.18$) completed all measures.

2.1.2. Measures and procedure

Following informed consent procedures, the following measures were administered to participants in counterbalanced orders.

2.1.2.1. Hypnotisability. Hypnotisability was assessed using a 10-item modified version of the HGSHS:A (Shor & Orne, 1962). Instructions were presented on an audio recording and participants scored their own responses. Arm rigidity and arm immobilization items were removed to ensure that the procedure could be conducted within a 1 h session. Scores range from 0–10.

2.1.2.2. Delusion proneness. Delusion proneness was assessed using the *Peters* et al. *Delusions Inventory* (PDI; Peters et al., 2004). This measure includes 21 items requiring dichotomous (yes/no) responses. Participants who respond "yes" to an item then rate their level of distress, preoccupation, and conviction about that item on a five-point Likert scale. All responses are summed to produce a total score (range 0–336). Separate subscales are also computed for: number of delusion-like beliefs (range 0–21), and total subscores for distress (range 0–105), preoccupation (range 0–105), and conviction (range 0–105). For comparison, Peters et al. (2004) found that a sample of clinically deluded participants, on average, endorsed 11.9/21 ($SD = 6.0$) items and scored 130.5/336 ($SD = 79.1$) for the total score.

2.1.2.3. Schizotypy. Schizotypy was assessed using the *Schizotypy Personality Questionnaire-Brief* (SPQ-B; Raine & Benishay, 1995). This measure includes 22 items requiring dichotomous (yes/no) responses. The measure has three subscales for cognitive–perceptual, interpersonal, and disorganised traits. Total scores range from 0–22. Participants scoring 17 and above make up the top 10% of the distribution of scores (Raine & Benishay, 1995).

2.1.2.4. Absorption. Absorption was assessed using the *Tellegen Absorption Scale* (TAS; Tellegen & Atkinson, 1974). This measure includes 34 items requiring dichotomous (yes/no) responses. Scores range from 0 to 34.

2.2. Results

We first examined the correlations with hypnotisability. There was a moderate, positive correlation between hypnotisability and absorption, $r(396) = .351$, $p < .001$, a small, positive correlation between hypnotisability and delusion proneness, $r(396) = .298$, $p < .001$, and a small, positive correlation between hypnotisability and schizotypy, $r(396) = .185$, $p < .001$. In addition, hypnotisability correlated with all the subscales of delusion proneness (all $rs > .281$, all $ps < .001$), the cognitive–perceptual subscale of schizotypy, $r(396) = .254$, $p < .001$, and the disorganised subscale of schizotypy, $r(396) = .152$, $p < .001$, but did not correlate with the interpersonal subscale of schizotypy.

We then compared highs (scoring 7–10 on the HGSHS:A) and lows (scoring 0–3 on the HGSHS:A) because these groups are typically used in hypnosis research. The numbers in each group and their characteristics are shown in Table 1. Highs showed significantly higher scores on all measures and subscales, with the exception of the interpersonal traits subscale of schizotypy (all $ts > 3.723$, all $ps < .001$, all $rs > .269$). Thus, highs showed a greater tendency towards delusional ideation than lows.

Table 1
Mean scores of personality measures for highs and lows in Studies 1 and 2.

	Study 1: HGSHS:A		Study 2: SHSS:C	
	Highs (n = 73)	Lows (n = 117)	Highs (n = 22)	Lows (n = 20)
HGSHS:A	7.58 (.78)*	1.91 (1.02)*	8.05 (.90)*	1.60 (1.19)*
SHSS:C	–	–	8.91 (1.23)*	1.55 (1.19)*
PDI total	77.72 (44.14)*	46.46 (31.98)*	92.73 (50.76)*	62.80 (44.21)*
Number of beliefs	7.88 (4.13)*	5.23 (3.16)*	9.59 (4.65)*	6.70 (4.40)*
Distress	21.84 (13.89)*	12.56 (9.88)*	27.36 (17.29)*	16.80 (13.25)*
Preoccupation	22.82 (13.82)*	13.26 (9.72)*	27.09 (15.58)	18.50 (13.12)
Conviction	25.18 (13.83)*	15.41 (10.57)*	28.68 (14.53)	20.80 (14.98)
SPQ-B total	10.25 (4.97)*	7.21 (4.23)*	11.18 (4.10)*	8.50 (4.45)*
Cognitive–perceptual	4.06 (2.20)*	2.61 (1.70)*	4.27 (1.86)*	2.75 (1.77)*
Interpersonal	3.38 (2.28)	2.84 (2.27)	3.27 (2.16)	3.05 (1.96)
Disorganised	2.81 (2.05)*	1.77 (1.64)*	3.64 (1.73)	2.70 (1.78)
TAS	21.32 (6.62)*	14.72 (7.03)*	23.18 (5.87)*	16.95 (7.95)*

Note: Standard deviations are in parentheses. Highs scored $\geqslant$7 and lows scored $\leqslant$3 on the respective measures of hypnotisability.
* Denotes significant difference between highs and lows within the same study at $p < .05$.

3. Study 2

Although, as a group, highs appear to reliably experience hypnotic effects, there is still substantial variation within this group with regard to their responses to specific suggestions (McConkey & Barnier, 2004). For example, in an experiment using hypnotic suggestion to model the mirrored-self misidentification delusion (the belief that one's reflection in the mirror is a stranger), Connors, Barnier, Coltheart, Cox, and Langdon (2012) found that approximately 70% of highs passed the suggestion and reported seeing a stranger in the mirror, whereas 30% failed the suggestion and reported seeing themselves. An important question, therefore, is whether there are any particular characteristics that distinguish those highs who reliably pass versus fail delusional suggestions. It is possible, for example, that participants with a disposition to form unusual beliefs may be more likely to accept delusional suggestions and develop the temporary delusion-like beliefs.

In Study 2, we sought to test whether delusion proneness, cognitive–perceptual traits of schizotypy, or absorption predicted which highs respond to suggestions for hypnotic delusions. For this second study, we invited both high and low hypnotisable participants from Study 1 to return for a session involving a modified *Stanford Hypnotic Susceptibility Scale, Form C* (SHSS:C; Weitzenhoffer & Hilgard, 1962). The session involved two suggestions for modelling target delusions: Frégoli (the belief that strangers are actually known people in disguise) and mirrored-self misidentification. In this way, it was possible to test whether personality characteristics measured in Study 1 predicted participants' response to the delusion suggestions. We expected that greater hypnotisability, delusion proneness, and cognitive–perceptual schizotypy traits within highs would be associated with a greater likelihood of experiencing the delusion suggestions.

3.1. Method

3.1.1. Participants

Highs and lows from Study 1 were invited to participate in a session that included an 11-item modified version of the SHSS:C (Weitzenhoffer & Hilgard, 1962) and two additional hypnotic suggestions. Participants received payment ($20 for 1.5 h) for their involvement. A total of 51 participants (16 male, 35 female) of mean age 21.92 years (SD = 6.10) completed this session. Consistent with protocol in hypnosis research, only participants whose hypnotisability was confirmed on both the HGSHS:A and SHSS:C were included in the analyses. The final sample consisted of 22 highs (8 males, 14 females) of mean age 21.32 years (SD = 3.85), and 20 lows (7 males, 13 females) of mean age 21.15 years (SD = 5.28). The mean hypnotisability and personality scores of confirmed highs and lows are shown in Table 1, with significant differences indicated. In brief, highs showed higher levels of delusion proneness, schizotypy, and absorption than lows. The study used the same exclusion criteria and ethical procedures as Study 1.

3.1.2. Materials and procedure

A hypnotist tested each participant individually in a 90 min session. The session was recorded using a video camera. Before the experiment, the hypnotist briefly explained the procedures and obtained participants' informed consent. The hypnotist then administered a standard induction procedure (approximately 10 min, from the SHSS:C; Weitzenhoffer & Hilgard, 1962) and the first 10 items from the SHSS:C. Next, the hypnotist administered the suggestions for Frégoli or mirrored-self misidentification in counterbalanced order.

3.1.2.1. Frégoli. While participants sat with their eyes closed, the hypnotist summoned a confederate of the same sex as the participant to enter the room and sit in a chair approximately 2 metres from the participant. The hypnotist then gave participants a suggestion for the Frégoli delusion: "You will believe that the person sitting on your right is someone you know who is in disguise". The hypnotist asked participants to look at the confederate. The confederate then left the room and the hypnotist asked participants to identify who they saw. The hypnotist cancelled the suggestion.

3.1.2.2. Mirrored-self misidentification. The hypnotist uncovered a mirror (40 × 50 cm) that was mounted on the wall to the participant's left. The hypnotist then gave participants a suggestion for the mirrored-self misidentification delusion: "You will see a face in the mirror that you will not be able to identify, as if you have never seen this face before". This suggestion was used by Connors et al. (2012) to successfully model mirrored-self misidentification. Half the participants received an additional suggestion that they would not recognise any face. However, as later analysis showed that this additional suggestion did not affect whether or not participants passed the delusion, we do not consider it further in this paper. The hypnotist asked participants to identify who they saw in the mirror. The hypnotist then cancelled the suggestion.

3.1.2.3. Postexperimental inquiry. The hypnotist gave participants the final SHSS:C suggestion (posthypnotic amnesia), administered the SHSS:C deinduction, and cancelled the posthypnotic suggestion.

The hypnotist asked participants to rate the extent to which they believed that the person who entered the room was a friend in disguise (1 = *not at all*, 7 = *completely*). The hypnotist also asked participants to rate the extent to which they believed that their reflection in the mirror was a stranger (1 = *not at all*, 7 = *completely*). Finally, the hypnotist debriefed participants, ensured their wellbeing, and thanked them for their time. No participants reported being distressed or experiencing any lasting effects in the postexperimental inquiry or in a later follow-up.

3.1.3. Coding of responses

Two independent raters (one of whom was blind to the aims of the experiment and the conditions in which participants were tested) watched the videotape of the experimental session and scored whether or not the participants experienced the Frégoli and mirrored-self misidentification delusions. Interrater reliability was 100%.

3.2. Results

We scored participants as passing the Frégoli suggestion if they *identified the confederate as someone they knew in disguise* and as passing the mirrored-self misidentification suggestion if they *reported seeing someone other than themselves* in the mirror. Overall, 12 highs (55%) passed the Frégoli suggestion and 15 highs (68%) passed the mirrored-self misidentification suggestion. Chi-square analysis indicated that there was no relationship between highs' responses to the two suggestions, $\chi^2(1, N = 22) = .105$, $p = .746$. No lows passed either suggestion.

In the postexperimental inquiry, highs who passed the Frégoli suggestion rated their belief in the delusion as 4.92 ($SD = 1.73$), whereas highs who failed the suggestion rated their belief as 2.30 ($SD = 1.42$). Highs who passed the mirror suggestion rated their belief in the delusion as 5.07 ($SD = 1.21$), whereas highs who failed the suggestion rated their belief as 2.38 ($SD = 1.51$). Lows rated their belief in Frégoli as 1.20 ($SD = .41$) and in mirrored-self misidentification as 1.10 ($SD = .31$). Thus, whereas highs rated their beliefs as relatively strong, lows did not.

For highs, we used backward stepwise logistic regression analyses, with the outcome measure being pass or fail for each delusional suggestion and the predictor variables being the hypnotisability scores (HGSHS:A and SHSS:C), delusion proneness (PDI Total score), the cognitive–perceptual schizotypy subscale (SPQ-B CP) and absorption (TAS). We selected these predictor variables because of their theoretical relevance and their comparatively high correlations with hypnotisability in Study 1. Predictor variables were eliminated from the model on the basis of likelihood ratio. Including the disorganised subscale of schizotypy or the total score of schizotypy in the analyses did not significantly alter the results.

For the Frégoli delusion, the initial full model is summarised in Table 2. A significant amount of variance was accounted for, with R^2 (Cox and Snell) = .406 and R^2 (Nagelkerke) = .543. After backward reduction, the only significant unique predictor to remain in the model was delusion proneness. This model was statistically reliable, $\chi^2(1, N = 22) = 9.320$, $p = .002$, indicating that delusion proneness reliably distinguished highs passing and failing the Frégoli suggestion. A significant amount of the variance was accounted for, with R^2 (Cox and Snell) = .341 and R^2 (Nagelkerke) = .455. Prediction success of the model was good, with 81.8% of highs correctly predicted as either passing or failing the suggestion. Consistent with this finding, there was a significant correlation between total PDI score and postexperimental ratings of belief in the Frégoli delusion for highs, $r(22) = .623$, $p = .002$. There was also a significant correlation between the SHSS:C hypnotisability scores and postexperimental ratings of belief, $r(22) = .461$, $p = .031$. No other correlations were statistically significant.

For mirrored-self misidentification delusion, the initial full model is summarised in Table 3. A significant amount of variance was accounted for, with R^2 (Cox and Snell) = .366 and R^2 (Nagelkerke) = .501 After backward reduction, the only significant unique predictor was the *SHSS:C* hypnotisability score. This model was statistically reliable, $\chi^2(1, N = 22) = 6.229$, $p = .013$, indicating that hypnotisability reliably distinguished highs passing and failing the mirrored-self misidentification suggestion. A significant amount of the variance was accounted for, with R^2 (Cox and Snell) = .247 and R^2 (Nagelkerke) = .338. Prediction success of the model was good, with 72.7% of highs correctly predicted as either passing or failing the suggestion. Consistent with this finding, there was a significant correlation between the SHSS:C scores and postexperimental ratings of belief in the mirrored-self misidentification delusion, $r(22) = .485$, $p = .022$. No other correlations were statistically significant.

4. Discussion

In Study 1, we found modest correlations between hypnotisability and both delusion proneness and the cognitive–perceptual subscale of schizotypy. In Study 2, we found that delusion proneness was the best predictor of which highs responded to a suggestion for the Frégoli delusion. In contrast, hypnotisability scores, as measured by the SHSS:C, were the best predictor of which highs responded to a suggestion for the mirrored-self misidentification delusion. Overall, these findings provide evidence that personality characteristics associated with openness to delusional ideation (delusion proneness) and slight differences in hypnotisability (even within highs) play a role in participants' responses to hypnotic delusion analogues.

Table 2
Predictors of the hypnotic Frégoli delusion in confirmed highs.

	B (SE)	Wald	*p*	95% CI for odds ratio		
				Lower	Odds ratio	Upper
Initial full model						
PDI Total	.045 (.028)	2.623	.105	.991	1.046	1.105
SPQ-B CP	−.335 (.510)	.431	.512	.263	.716	1.944
TAS	.093 (.114)	.662	.416	.877	1.097	1.373
HGSHS:A	.501 (.861)	.339	.561	.305	1.651	8.922
SHSS:C	.304 (.629)	.233	.630	.395	1.355	4.650
Constant	−10.999 (7.938)	1.920	.166		.000	
Final reduced model						
PDI total	.038 (.016)	5.214	.022	1.005	1.038	1.072
Constant	−3.029 (1.423)	4.533	.033		.048	

Table 3
Predictors of the hypnotic mirrored-self misidentification in confirmed highs.

	B (SE)	Wald	*p*	95% CI for odds ratio		
				Lower	Odds ratio	Upper
Initial full model						
PDI total	.022 (.022)	.990	.320	.979	1.022	1.068
SPQ-B CP	−.016 (.423)	.001	.970	.430	.984	2.253
TAS	−.071 (.125)	.323	.570	.729	.931	1.190
HGSHS:A	−1.377 (.988)	1.945	.163	.036	.252	1.748
SHSS:C	1.720 (.889)	3.747	.053	.979	5.585	31.872
Constant	−3.370 (6.754)	.249	.618		.034	
Final reduced model						
SHSS:C	1.166 (.578)	4.066	.044	1.033	3.209	9.965
Constant	−9.553 (4.924)	3.764	.052		.000	

Both sets of findings are consistent with previous research that has found a similar relationship between hypnotisability and paranormal belief (Diamond & Taft, 1975; Nadon et al., 1987; see also Jamieson & Gruzelier, 2001). It is thus possible that features of hypnotisability could contribute to the preparedness to entertain delusion-like ideas. Alternatively, a greater openness to unusual beliefs, as evident in delusion proneness scores, might facilitate greater responsiveness to hypnosis, particularly a hypnotic suggestion for a delusion, or a common mechanism could underlie aspects of both traits. Consistent with previous research (Nadon & Kihlstrom, 1987; Spanos & Moretti, 1988), absorption correlated with both hypnotisability and delusion proneness, so it is also possible that a tendency to become fully engaged in sensory experience could underpin these relationships.

The results from Study 2 that delusion proneness could predict which highs responded to the Frégoli delusion suggests that a proclivity to unusual beliefs may be influential for generating this type of hypnotically induced analogue. One possible explanation is that participants high in delusion proneness are more likely to accept this "unusual" hypnotic suggestion as it engages their hypnotic talents more easily than participants low in this proclivity. Participants low in delusion proneness may find it more difficult to entertain the suggestion and engage the necessary cognitive strategies to bring about the experience. Future research can test this account by interviewing participants after hypnosis and specifically examining their interpretation of the suggestion and the cognitive strategies they used (Sheehan & McConkey, 1982).

The finding that hypnotisability, as measured by SHSS:C, predicted which highs best responded to the mirrored-self misidentification suggestion confirms that subtle differences in hypnotic ability, even within the high hypnotisable range, can impact on the analogue (McConkey & Barnier, 2004). Future research involving hypnotically induced clinical analogues could screen participants on both hypnotisability and delusion proneness to increase the likelihood of participants responding to the suggestion.

An important question, however, remains as to why different traits predicted participants' responses to the two different belief suggestions. One possibility is that the suggestions tapped different cognitive mechanisms. This is understandable since the Frégoli suggestion required participants to accept a prescribed belief (that the confederate was a friend in disguise), whereas the mirrored-self misidentification suggestion required participants to (i) inhibit aspects of their experience (self-recognition) and then (ii) derive a belief based on this (that the person in the mirror was a stranger; Connors et al., 2012). The mirrored-self misidentification suggestion thus did not directly specify the delusion in the same way as the Frégoli suggestion. It is possible that these delusional demand characteristics require different cognitive abilities that vary within the high hypnotisable population. Another possibility is the delusions themselves vary in their degree of plausibility and hence engagement. Although most people would find the idea of someone physically disguising themselves as a stranger to be highly implausible, many would have had the experience of momentarily not recognising themselves when encountering a mirror unexpectedly (Brédart & Young, 2004). As a result, delusion proneness may be necessary to engage with the Frégoli suggestion but not the mirrored-self misidentification suggestion. These are important issues for future research.

We acknowledge two limitations to our studies. First, we assessed the personality measures in the same "context" as hypnotisability. Some authors have suggested that context effects can artificially inflate the correlations (Kirsch & Council, 1992). Despite counterbalancing the measures, such an inflationary effect could also account for the differences in the personality measures between the confirmed highs and lows in Study 2. Second, we measured hypnotisability for the correlational analysis in Study 1 using the HGSHS:A (Shor & Orne, 1962). Although widely used as a measure of hypnotisability, it focuses on suggestions for arm movements (so-called ideomotor and challenge items) and contains few suggestions for perceptual-cognitive experiences. It is thus difficult to assess whether delusion proneness (entertaining false beliefs) relates to hypnotisability generally or to a particular facet of hypnotisability (see Woody, Barnier, & McConkey, 2005). For these reasons, the results require replication. Future research also needs to assess the traits in different contexts to control for context effects. In addition, future research could incorporate subjective rating scales to examine the relationship between delusion proneness and the perceived involuntariness of the hypnotic effects.

Overall, these findings suggest a further commonality between hypnotic analogues and the clinical phenomena they seek to model in terms of underlying traits. The findings support the ecological validity of the hypnotic clinical analogue approach. Importantly, the findings also indicate that pre-existing individual differences other than hypnotisability can affect participants' response to suggestion. This confirms the heterogeneity previously reported amongst highs (McConkey & Barnier, 2004; Sheehan & McConkey, 1982). The targeted suggestion facilitated by hypnosis is shaped by a range of social and cognitive processes, and it is likely that pre-existing individual differences influence the resulting response. Future research into these variations has the potential to enrich our understanding of both hypnosis and its application to studying clinical disorders.

References

Brédart, S., & Young, A. W. (2004). Self-recognition in everyday life. *Cognitive Neuropsychiatry, 9*, 183–197.
Claridge, G. (1985). *Origins of mental illness*. Oxford: Blackwell.
Connors, M. H., Barnier, A. J., Coltheart, M., Cox, R. E., & Langdon, R. (2012). Mirrored-self misidentification in the hypnosis laboratory: Recreating the delusion from its component factors. *Cognitive Neuropsychiatry, 17*, 151–176.

Cox, R. E., & Barnier, A. J. (2010). Hypnotic illusions and clinical delusions: Hypnosis as a research method. *Cognitive Neuropsychiatry, 15*, 202–232.
Diamond, M. J., & Taft, R. (1975). The role played by ego permissiveness and imagery in hypnotic responsivity. *International Journal of Clinical and Experimental Hypnosis, 23*, 130–138.
Gruzelier, J., De Pascalis, V., Jamieson, G., Laidlaw, T., Naito, A., Bennett, B., et al. (2004). Relations between hypnotizability and psychopathology revisited. *Contemporary Hypnosis, 21*, 169–176.
Heaps, C., & Nash, M. (1999). Individual differences in imagination inflation. *Psychonomic Bulletin & Review, 6*, 313–318.
Jamieson, G. A., & Gruzelier, J. H. (2001). Hypnotic susceptibility is positively related to a subset of schizotypy items. *Contemporary Hypnosis, 18*, 32–37.
Johnson, M. K. (1988). Discriminating the origin of information. In T. F. Oltmanns & B. A. Maher (Eds.), *Delusional beliefs* (pp. 34–65). New York: John Wiley & Sons.
Kihlstrom, J. F. (1979). Hypnosis and psychopathology: Retrospect and prospect. *Journal of Abnormal Psychology, 88*, 459–473.
Kirsch, I., & Council, J. R. (1992). Situational and personality correlates of hypnotic responsiveness. In E. Fromm & M. R. Nash (Eds.), *Contemporary hypnosis research* (pp. 267–291). New York: Guilford Press.
Laidlaw, T. M., Dwivedi, P., Naito, A., & Gruzelier, J. H. (2005). Low self-directedness (TCI), mood, schizotypy and hypnotic susceptibility. *Personality and Individual Differences, 39*, 469–480.
Laurence, J.-R., Beaulieu-Prévost, D., & du Chéné, T. (2008). Measuring and understanding individual differences in hypnotizability. In M. R. Nash & A. J. Barnier (Eds.), *Oxford handbook of hypnosis: Theory, research and practice* (pp. 255–282). Oxford: Oxford University Press.
McConkey, K. M., & Barnier, A. J. (2004). High hypnotizability: Unity and diversity in behaviour and experience. In M. Heap, R. J. Brown, & D. A. Oakley (Eds.), *The highly hypnotizable person: Theoretical, experimental and clinical issues* (pp. 61–84). East Sussex, UK: Brunner-Routledge.
Nadon, R., & Kihlstrom, J. F. (1987). Hypnosis, psi, and the psychology of anomalous experience. *Behavioral and Brain Sciences, 10*, 597–599.
Nadon, R., Laurence, J.-R., & Perry, C. W. (1987). Multiple predictors of hypnotic susceptibility. *Journal of Personality and Social Psychology, 53*, 948–960.
Oakley, D. A., & Halligan, P. W. (2009). Hypnotic suggestion and cognitive neuroscience. *Trends in Cognitive Sciences, 13*, 264–270.
Peters, E., Joseph, S., Day, S., & Garety, P. (2004). Measuring delusional ideation: The 21-item Peters et al. Delusions Inventory (PDI). *Schizophrenia Bulletin, 30*, 1005–1022.
Raine, A., & Benishay, D. (1995). The SPQ-B: A brief screening instrument for schizotypal personality disorder. *Journal of Personality Disorders, 9*, 346–355.
Sheehan, P. W., & McConkey, K. M. (1982). *Hypnosis and experience: The exploration of phenomena and process*. Hillsdale, NJ: Lawrence Erlbaum.
Shor, R. E., & Orne, E. C. (1962). *The harvard group scale of hypnotic susceptibility: Form A*. Palo Alto, CA: Consulting Psychologists Press.
Spanos, N. P., & Moretti, P. (1988). Correlates of mystical and diabolical experiences in a sample of female university students. *Journal for the Scientific Study of Religion, 27*, 105–116.
Tellegen, A., & Atkinson, G. (1974). Openness to absorbing and self-altering experiences (''absorption''), a trait related to hypnotic susceptibility. *Journal of Abnormal Psychology, 83*, 268–277.
Weitzenhoffer, A. M., & Hilgard, E. R. (1962). *Stanford Hypnotic Susceptibility Scale, Form C*. Palo Alto, CA: Consulting Psychologists Press.
Wilson, S. C., & Barber, T. X. (1983). The fantasy-prone personality: Implications for understanding imagery, hypnosis, and parapsychological phenomena. In A. A. Sheikh (Ed.), *Imagery: Current theory, research, and application* (pp. 340–387). New York: John Wiley & Sons.
Woody, E. Z., Barnier, A. J., & McConkey, K. M. (2005). Multiple hypnotizabilities: Differentiating the building blocks of hypnotic response. *Psychological Assessment, 17*, 200–211.
Woody, E., & Szechtman, H. (2011). Using hypnosis to develop and test models of psychopathology. *Journal of Mind-Body Regulation, 1*, 4–16.