

HYPNOTIZABILITY AND DISSOCIATION AS PREDICTORS OF PERFORMANCE IN A PRECOGNITION TASK: A PILOT STUDY¹

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ABSTRACT: We investigated whether hypnotizability, dissociation, and belief in psi are related to performance in a precognition task that measures whether later practice enhances previous memory recall. Participants low ($n = 19$) and high ($n = 19$, 7 also high in dissociation) in hypnotizability completed the task and a measure of belief in psi, with the experimenters masked as to participants' level of hypnotizability and dissociation. A general precognition effect was not replicated and there was no overall effect for hypnotizability, but high hypnotizables who were low in dissociation differed significantly from dissociative high hypnotizables and from low hypnotizables, and scored below chance. Belief in psi was related to dissociation and history of trauma, and trauma and working memory were negatively correlated. With respect to features of the experiment itself, we were contacted after we had run about one third of the participants by the developer of the program, who asked us to use a modified version. We did not change our protocol, but decided to analyze the data in segments before and after we were asked to use a different program. Although not significant, the first third of the data was clearly in the direction of psi-hitting whereas later segments were in the opposite direction. A regression analysis controlling for groups showed a significant decline effect. Our results support the value of using selected groups and suggest that dissociation may mediate the effects of hypnotizability in psi performance.

Keywords: precognition, hypnosis, hypnotizability, dissociation, decline effect

Honorton and Ferrari (1989) conducted a meta-analysis of precognitive experiments published between 1935 and 1987 and concluded that there is experimental support for precognition and that it could not likely be explained by real-time psi phenomena. A later series of six experiments by Steinkamp (2003), however, reported inconsistent support for a precognitive effect. Particularly relevant to this study are the recent findings of Bem (2008a), who created the precognition program and procedure we used in this study (Bem, 2008b). He reported (Experiment 3; Bem, 2008a) significant results in support of precognition, especially among participants scoring high in a measure of novelty seeking. In this study we evaluated whether hypnotizability, dissociation, and belief in psi affect performance on the precognition test. We decided to use Bem's

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program to try to replicate his previous studies and evaluate its usefulness in our sample.

PSI AND HYPNOTIZABILITY

Hypnotizability is a construct that refers to the extent to which individuals follow and experience specific suggestions after a hypnotic induction. It has been related to abilities such as imagery (Kogon et al., 1998), fantasy-proneness (Lynn & Ruhe, 1986), absorption (Tellegen & Atkinson, 1974), and experiential mental boundaries (Cardena & Terhune, 2008). Considering the nature of these correlates, the paucity of even moderate correlations between hypnotizability and the “big five” personality traits, and the finding that hypnotizability is related to the character trait of self-transcendence, Cardena and Terhune (2008) proposed that the propensity to have experiences that suggest personal unboundariedness may be the latent trait underlying all of these correlations.

Kumar and Pekala (2001) reviewed studies that evaluated the relationship between hypnotizability and anomalous experiences and beliefs (including psi). Across 5 studies they found 11 correlations between hypnotizability and paranormal belief, of which 9 were significant (median $r = .20$). They found stronger results for hypnotizability and paranormal experiences; 23 correlations, of which 20 were significant, were reported across 11 studies (median $r = .31$). They also found 3 significant correlations across 2 studies for the relation between imagery and psi experiences, (median $r = .28$) and 9 significant correlations across 3 studies between absorption and anomalous experiences as well as 8 significant correlations between fantasy-proneness and paranormal experiences (median $r = .36$). As for the relationship between these constructs and psi belief, they found that 3 correlations in as many studies were significant (median $r = .16$).

Following an earlier meta-analysis by Schechter (1984), Stanford and Stein (1994) reviewed the literature on the topic of hypnosis and performance on controlled psi tests. The main question was whether psi performance is better following a hypnotic induction than during a control condition. The answer was positive, but no firm conclusions about the cause of the effect could be drawn, as it was not clear whether the induction per se or the difference in hypnotic abilities or even an experimenter effect might have caused the differences in performance. In an abstract, May, Bányai, Vassy, and Faith (2000) reported no evidence between hypnotizability and psi performance in a remote viewing experiment. However, Tressoldi and Del Prete (2007), replicating the results of an earlier experiment, found significant psi scoring in the first of two hypnotic sessions and significant small to moderate correlations between successful psi performance and the personality traits of absorption and transliminality, which have been related to anomalous experiences and perhaps significant psi scoring.

PSI, DISSOCIATION, AND TRAUMA

Also of particular relevance is the trait of dissociation, which refers to the propensity to have alterations of consciousness characterized by detachment from self or others, or failures in the integration of psychological processes that should ordinarily be integrated (Cardeña, 1994). Dissociative processes are sometimes assumed or directly suggested in hypnotic performance and there have been various proposals, harking back at least some decades (cf. White, 1937), that there may be two distinct types of high hypnotizable individuals: those who are mostly dissociative and do not exert imagery, and those who are mostly imaginative (e.g., Barber, 1999; Barrett, 1990; Cardeña, 1996).

Overall, there seems to be a stronger relation between dissociation and psi experiences than between the latter and overall hypnotizability. Re-analyses of data have shown that individuals exhibiting both high dissociativity and high hypnotizability were more likely to report anomalous (including putative psi) experiences than those with high scores in either trait and much more so than those with low scores in both of those traits (Pekala & Cardeña, 2000, p. 71). Thus, participants with high hypnotizability and high dissociation tend to believe more in the paranormal and to report a greater number of paranormal experiences than those who do not score high in both variables. It bears mentioning, however, that dissociation is not necessarily related to all types of unusual belief, such as those in fantastic animals (Sharps, Matthews, & Asten, 2006).

With respect to the relationship between dissociation and actual psi abilities, Cardeña (1998) described various observed links between the two, such as successful performance in psi tasks under dissociated states, a link previously discussed by early psychic researchers such as William James (e.g., Taylor, 1983) and the psychoanalyst Ferenczi. The latter reported that a “traumatic trance” would not only trigger dissociative mechanisms but also psi (“clairvoyant”) abilities because of the “timeless and spaceless omniscience” (Ferenczi, 1955, pp. 162 and 243) occurring at the time of trauma, abilities that might later be used to correctly evaluate and perhaps escape further punishment and abuse (Ferenczi, 1955). Although not a sufficient cause, there is a close association between acute or chronic trauma and dissociation (Cardeña, Butler, & Spiegel, 2003). That chronically traumatized individuals might develop psi abilities could be predicted by the psi-mediated instrumental response (PMIR) theory of Stanford (1977), because psi information could help avoid distressing events.

Irwin (1994a, 1994b) has reported that individuals who have a history of early trauma tend to believe in psi phenomena and that the latter belief is positively correlated with a tendency to dissociate. He has explained these associations by positing that belief in psi and paranormal events may be a psychological defensive mechanism constructed to deal with the uncontrollability experienced early in life. Watt, Watson, and

Wilson (2007) corroborated Irwin's finding in a study that found a negative association between paranormal belief and perceived childhood control, although they cautioned that this relationship explains only a small amount of the variance in belief in reputed psi and paranormal events; they also corroborated that females have stronger paranormal belief than men. A sophisticated analysis by Lawrence, Edwards, Barraclough, Church, and Herrington (1995) tested different models related to Irwin's hypothesis. They found that although reported childhood trauma was associated with childhood fantasy, which was related to reports of paranormal experience, there was also a direct pathway between childhood trauma and paranormal experience. They also confirmed that paranormal experience tends to give rise to paranormal belief, rather than the other way around. Although Lawrence et al. do not seem to have been aware of his work, their study is the clearest general corroboration of Ferenczi's thesis that trauma will directly give rise to paranormal experience, which is also consistent with the proposal by Ring and Rosing (1990) that the association between early abuse and propensity to have a near-death experience can be explained by the alterations of consciousness first experienced around the time of trauma.

To the best of our knowledge, no study has previously looked at the interaction between hypnotizability, dissociation, and trauma in a psi test. Cardeña (2006) hypothesized that individuals high in fantasy or those high in dissociation may perform differently according to the psi tasks (e.g., those requiring good imaginative abilities such as the *ganzfeld* protocol may be more suitable to high fantasy rather than high dissociative individuals).

BELIEF IN PSI

One way to obtain more reliable results in psi experiments is to identify which individuals may perform better in controlled experiments. Schmeidler (1952) divided her participants in two groups, "sheep and goats," on the basis of their belief in psi. Sheep are those who believe in the possibility of psi in general or, more specifically, in the experiment in which they were about to participate; goats have the opposite expectation. The sheep-goat effect refers to the difference in performance on a psi task between the two groups, where sheep have been found to perform significantly better in psi tasks than goats, especially when asked specifically about the psi task in consideration. Under the hypothesis of no psi effects, of course, there should not be any difference in psi tasks between the groups, provided that the tasks prevented ordinary forms of information acquisition. Although the sheep-goat effect is typically small, it has been consistently replicated across studies. Lawrence (1993) reviewed 73 forced-choice ESP studies with 37 principal investigators. He found a small but highly significant sheep-goat effect; 24% of the studies found significant results, in contrast to the expected 5% by chance. The effect size did not covary with the study quality,

so he reported a robust effect for this relationship. As with all meta-analyses there is a risk for a possible file-drawer effect (i.e., nonsignificant studies remaining unpublished), although this seems unlikely given the paucity of research in the area and the amount of “filed” studies that would be needed to invalidate published findings. Thus, there is additional reason to believe that, because they tend to believe more in psi, highly hypnotizable and dissociative individuals may perform better in psi tasks than those low in hypnotizability and/or dissociation (Kumar & Pekala, 2001).

EXPERIMENTER EFFECTS

In all branches of science, some experimenters seem to be consistently more successful than others in obtaining significant results. In general there is a significant relationship between the experimenter’s actions on the task and the participants’ performance. Rosenthal (1966) has also discussed observer errors, interpretation errors and fraud as potential artifacts in research. Silverman, Shulman, and Wiesenthal (1972) found that different experimenters obtained different responses from participants even on a self-rating inventory. Silverman (1974) also conducted a survey to investigate the numbers of experimenters in research. The sample consisted of articles published in three APA journals between October 1968 and September 1969. Only 60 out of 300 studies included more than one experimenter. In 20 cases it was just a matter of convenience with no attention paid toward counterbalancing or measuring a possible experimenter effect. A more recent survey in various disciplines suggested that the use of “masked” methodology is very rare in other disciplines than parapsychology (Sheldrake, 1998). Thus, despite the evidence for experimenter effects, in practice not much attention is given to this source of variance in research.

With respect to psi, Smith (2003a) found significant correlations between psi-conduciveness, self-rated by researchers who had conducted experiments, and reported beliefs in various aspects of psi. Both psychological (e.g., how the experimenter interacts with the participant) and parapsychological (e.g., the experimenter using his or her own putative psi ability) factors may underlie the differences in the data (Smith, 2003b). Wiseman and Schlitz (1997) examined the experimenter effect by conducting a joint study in which a skeptic and a proponent acted as experimenters for two sets of trials. In this experiment electrodermal activity was used to measure whether participants could detect remote staring. Participants who were run by the proponent were significantly more physiologically reactive in stare than nonstare trials compared to participants that were run by the skeptic. The findings were replicated in a second study, but a third experiment yielded nonsignificant results (Wiseman & Schlitz, 1999; Schlitz, Wiseman, Radin, & Watt, 2006).

OUR STUDY

The purpose of this study was to examine whether hypnotizability, dissociation, and belief in psi predict performance in a precognition task. We evaluated the level of hypnotizability and dissociation, but no hypnotic induction was conducted. Therefore, any differences between low and high hypnotizable individuals would be caused by this trait and not by a hypnotic procedure and its possible effect on the state of consciousness. We also included as a variable belief in psi. Two experimenters ran separate sets of trials and their belief in psi was measured; thus another variable was the possible effect of the experimenter that ran the sessions.

We had four hypotheses. The first one was that individuals would remember more words to which they would be exposed again in the future. The second was that high hypnotizables would perform better than lows in the precognitive memory test. The third was that high hypnotizable, high dissociators would perform better than the low dissociator highs. The fourth was that belief in psi would correlate positively with performance on the task.

METHOD

Participants

Participants in this experiment were recruited from a list of people who had previously taken part in a hypnosis study and consisted of those high or low in hypnotizability. The participants from each group were spread out on different days for balancing purposes. The experimenters were masked to group identity until the completion of data collection. The number of participants was prespecified as $N = 30$ (Marcusson-Clavertz & Wasmuth, 2008) for completion of a thesis. After those initial analyses were done, however, 8 additional participants were recruited to increase the power of the study. For all 38 participants, age ranged from 19 to 65 years ($M = 24.11$, $SD = 7.28$). There were 19 high hypnotizables (6 males, 13 females; $M_{\text{Age}} = 23.21$, $SD = 2.25$), 7 (6 females, 1 male; $M_{\text{Age}} = 24.00$, $SD = 2.00$) of whom also scored high in dissociation, whereas 10 scored low in dissociation (5 males, 5 females; $M_{\text{Age}} = 23.00$, $SD = 2.49$) and there were no data on dissociation for the remaining 2 high hypnotizables. We did not measure dissociation among the low hypnotizables because we have found almost no low hypnotizables that also score high in dissociation, as have other studies (e.g., Putnam, Helmers, Horowitz, & Trickett, 1995). There were also 19 low hypnotizables (11 males, 8 females; $M_{\text{Age}} = 25.00$, $SD = 10.11$). The participants were mainly Lund university undergraduates. All participants gave informed consent to participate and were compensated with a cinema ticket.

Experimenters

D. C. acted as the experimenter for 24 trials (12 high, 12 low) whereas J. W. was the experimenter for 14 (7 high, 7 low) trials. The experimenters were students and hold slightly different views on parapsychology, with D. C. being more positive to the research in general. J.W. had a more skeptical view but did not rule out the possibility of psi phenomena. D. C. scored 14 out of 32 on the Australian Sheep-Goat Scale (ASGS) and J. W. scored 8. The first author of this paper is generally supportive of the psi hypothesis and scored 23 in the ASGS but did not interact with the participants.

Materials

Precognitive memory task. Precognitive memory was measured with a computer program created by Bem (2008b). The program includes a Filemaker database engine. The task was run on a PC computer in a sound-attenuated room. In the task, participants first experienced a 3-min relaxation period in which they were shown Hubble images of the galaxy accompanied by relaxing music. After the relaxation period we asked the participants to visualize the referent to 48 English nouns, shown in succession. The nouns came from four categories (foods, animals, occupations, and clothes). Each word was presented for 3 s with interstimulus intervals of 1 s. Next, participants were administered an automated surprise recall test for which they were asked to recall as many of the words as possible within a 5-min period. The recall test was then followed by a practice session. Both the selection of practice words and the practice session occurred following the completion of the recall test; thus the participants could not know which words were practice words at the time of the first recall test.

Half of the words from the original list were then randomly selected and grouped into a list (the practice words). The remaining half were not shown again and thus served as control words. The practice words were divided into four lists with six words each. Each list consisted of words from one of the four categories. The participants were first exposed to one of these lists and asked to memorize the words. When they clicked on the “ready” button, the list was replaced by six empty slots for which the participants were asked to fill in the correct words. If the participants forgot any of the words, they had the opportunity to click on a button that revealed the list again for a brief amount of time. This repetition could be done until all slots were filled. The program did not monitor their answers at this stage except that they had to at least write something in all six slots before they were asked to recall six words from a category. When this criterion was met and the participants clicked on an “OK” button, the practice continued with the remaining three lists.

Australian Sheep-Goat Scale. The ASGS (Thalbourne & Delin, 1993) is a Rasch-scaled questionnaire with 16 items relating to belief in

psi phenomena. In this version two items relating to belief in afterlife are excluded. Items consist of two bipolar statements. The ASGS uses a visual analog scale; participants make a mark on a line above the two statements. Items are scored from zero to two points, depending on where the mark is placed. Total scores range from 0 to 32, with greater scores reflecting increased belief in psi phenomena. The 18-item version of the ASGS was found to have strong test-retest reliability (Thalbourne & Delin, 1993). The ASGS had good internal consistency ($\alpha = .94$) in this study.

Waterloo-Stanford Group Scale of Hypnotic Susceptibility (WSGC). The WSGC (Bowers, 1993, 1998) is a group-version of the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C; Weitzenhoffer & Hilgard, 1962) and has strong psychometric properties (Bowers, 1993, 1998). The scale includes 12 dichotomously-scored suggestions including ideomotor, challenge, and cognitive-perceptual suggestions. Scores range from 0 to 12 and we defined those scoring 0-4 as low hypnotizables and those scoring 8-12 as high hypnotizables.

Dissociative Experiences Scale (DES). The Swedish version (Körlin, Edman, & Nybäck, 2007) of the DES (Bernstein & Putnam, 1986; Carlson & Putnam, 1993) is a 28-item scale with good psychometric properties in which participants rate the percentage of time they experience different dissociative phenomena. The final score reflects the average percentage of the items. Individuals were categorized as high dissociators if they scored above a cutoff value of 20.

Life Stressor Checklist-Revised. The LSC-R (Wolfe & Kimerling, 1997) is a valid and reliable 30-item questionnaire that assesses the number and impact of various traumatic and adverse events throughout a person's life. We used the number of checked items as the overall score for this measure.

Procedure

The WSGC had been previously administered by either the first author or another experimenter, Devin Terhune. The LSC-R had also been previously filled out by 21 participants. For the next stage of the study, volunteers were recruited for a study involving reading English words and looking at faces (the latter for a different study). There was no mention of psi or hypnotizability until the end of the experiment. The consent form, however, mentioned that the purpose of data gathering could not be revealed until the end of the experiment. Participants were tested individually in laboratory sessions that lasted approximately 20 min. The instructions were to listen to the relaxation music and then answer the English words test presented by the computer at the participants' ease. The chair and the computer were arranged so that they would be comfortable for each participant and lights in the room were turned down, making the laboratory semidarkened. After the completion of the task, the ASGS was administered to participants. At the

completion of data collection, participants were debriefed by e-mail about the real purpose of the experiment and were provided with feedback on how they had done on the precognitive test.

After about one third of our participants had been run, we were contacted by the developer of the program, who suggested that we change to a new version that included a slightly different practice test. Because it was not practical to change programs at that point, we decided instead to analyze the data in segments to ascertain whether this new knowledge might affect the results; thus, before looking at the results, we divided the data for the first 30 participants in thirds, to which we added a fourth segment when we gathered additional data.

Statistical Analyses

Data were weighted; that is, the scores used were the difference between the number of practice words recalled from the number of control words recalled multiplied by the participant's overall score, to control for total words recalled (Bem, 2008a). We used parametric tests for analyses where all required assumptions were met and Kendall tau-b coefficients to evaluate correlations between the DES and other variables, given the nonnormal distribution of the DES reported in previous research (Cardena, 2008b) and also observed in our data. We assessed the effect of dissociation/hypnotizability on other variables through ANOVAs, planned comparisons and Tukey's HSD test. We also conducted a regression analysis on the weighted scores to evaluate performance across sessions. All analyses were done in SPSS (16.0). An alpha level of .05, two-tailed was used for all statistical tests, and Chauvenet's criterion (Taylor, 1997) was used to determine the presence of any possible outlier, for exclusion from the relevant analyses.

RESULTS

Demographic and Related Variables

We evaluated the correlations between age, sex, history of trauma, belief in psi, dissociation, and number of words recalled. Belief in psi had significant correlations with the tendency to dissociate, $\tau(22) = .53, p < .001$, report more traumatic events, $r(19) = .46, p = .04$, and with being female, $r(36) = -.39, p = .02$. History of trauma was further associated with being older, $r(19) = .62, p = .002$ and with fewer words recalled, $r(19) = -.51, p = .02$. The only other significant correlation were between dissociation and history of trauma, $\tau(19) = .33, p = .04$, and dissociation and being female, $\tau(22) = -.35, p = .04$.

Age, sex, trauma history and belief in psi were not significantly related to performance on the psi task ($p > .3$ for all analyses), so these variables were not used further in analyses of the main dependent variable.

However, after we blocked the sample by dissociation we found that the groups differed on their belief in psi, $F(2, 32) = 5.48, p = .009, \eta_p^2 = .26$. High hypnotizables who also scored high in dissociation (henceforth “HdHys”) exhibited stronger belief in psi than low hypnotizables (henceforth “Lows”; $M = 20.00, SD = 4.86$ vs. $M = 8.89, SD = 8.15$; planned contrast $p = .002$), and marginally than high hypnotizables low in dissociation (henceforth “LdHys”; $M = 12.56, SD = 8.02$; planned contrast $p = .06$). There was no difference between Lows and LdHys (Tukey’s HSD, $p = .47$).

Performance on the Precognition Task

On average, participants recalled 0.08 more control than practice words, and the t test showed no significant precognitive effect, $t(37) = -0.27, p = .79$. High hypnotizables were found to exhibit lower scores ($M = -1.76, SD = 11.63$) than low hypnotizables ($M = 0.77, SD = 10.95$), but the difference was not significant, $F(1, 35) = 0.35, p = .56, \eta_p^2 = 0.01$. The weighted scores for sessions run by D. C. were in the predicted direction ($M = 0.27, SD = 11.86$), whereas those for J. W. were in the opposite direction ($M = -1.81, SD = 10.30$), but the difference was nonsignificant, $F(1, 36) = 0.30, p = .59, \eta_p^2 = 0.01$.

When high hypnotizables were grouped according to dissociative tendencies, an ANOVA revealed a significant main effect of Group, $F(2, 32) = 3.81, p < .05, \eta_p^2 = .19$. Low-dissociative high hypnotizables (LdHy, $M = -9.59, SD = 6.77$) had lower scores than low hypnotizables (Lows, $M = 0.77, SD = 10.95$; Tukey HSD $p = .030$) and marginally lower scores than dissociative high hypnotizables (HdHy) ($M = 0.15, SD = 8.11$; planned contrast, $p = .05$); Lows did not differ from HdHys (planned contrast, $p = .89$). See Figure 1. Analyses of deviation from chance showed that LdHys recalled a higher ratio of control words than chance would predict, $t(8) = -4.25, p = .003$, but neither HdHys, $t(2) = 0.78, p > .05$, nor Lows deviated from chance, $t(14) = 0.87, p > .05$.

Decline Effect

The practice-control difference was positive in the first sequence, but negative in the last three (see Table 1).

This pattern differed across groups. Whereas the scores of the HdHys, $r(5) = -.84, p < .05$, and Lows, $r(17) = -.53, p < .05$, declined across sessions, $r(17) = -.53, p < .05$, the scores for the LdHys increased nonsignificantly, $r(7) = .05, p = .90$ (see Figure 2). Thus we decided to run a regression analysis partialing out grouping by hypnotizability/dissociation, and obtained a significant decline effect, $r(34) = -.36, p = .03$ (see Figure 3). Exploratory analyses showed that only the experimenter that was most invested in the project (D. C.) produced a significant decline effect, after controlling for grouping, $r(22) = -.42, p = .04$.

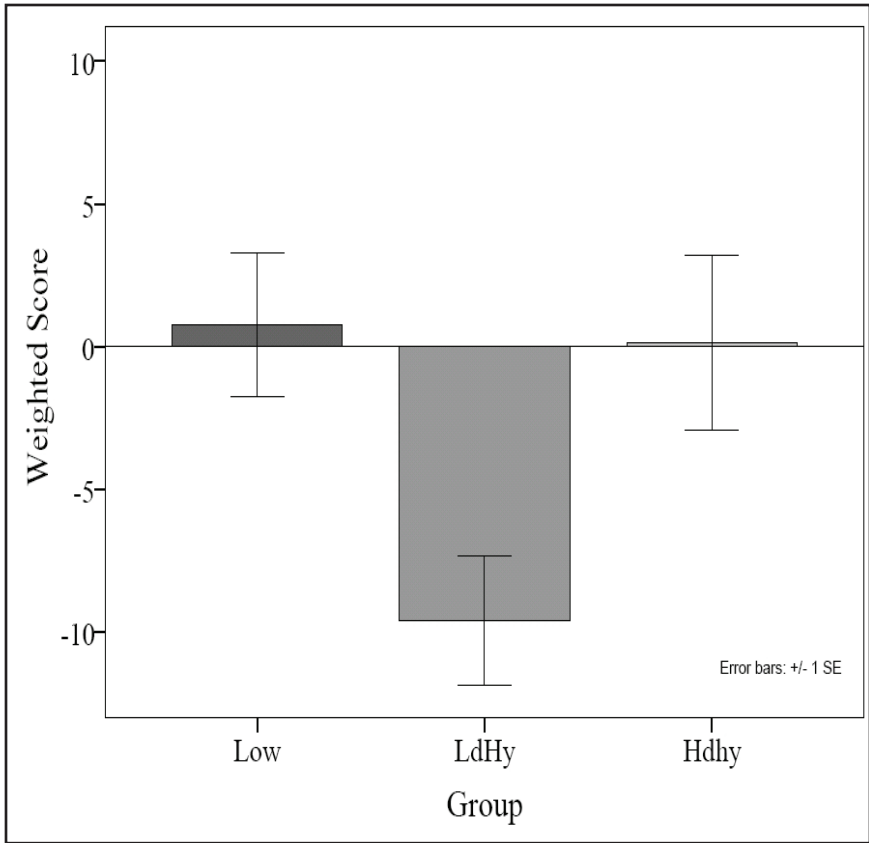


Figure 1. Scores grouped by hypnotizability/dissociation.

TABLE 1
SCORES AS A FUNCTION OF SEQUENCE

Sequence	<i>N</i>	<i>M</i>	<i>SD</i>
1	10	5.10	11.24
2	10	-2.52	9.98
3	10	-1.55	11.98
4	8	-3.67	11.22

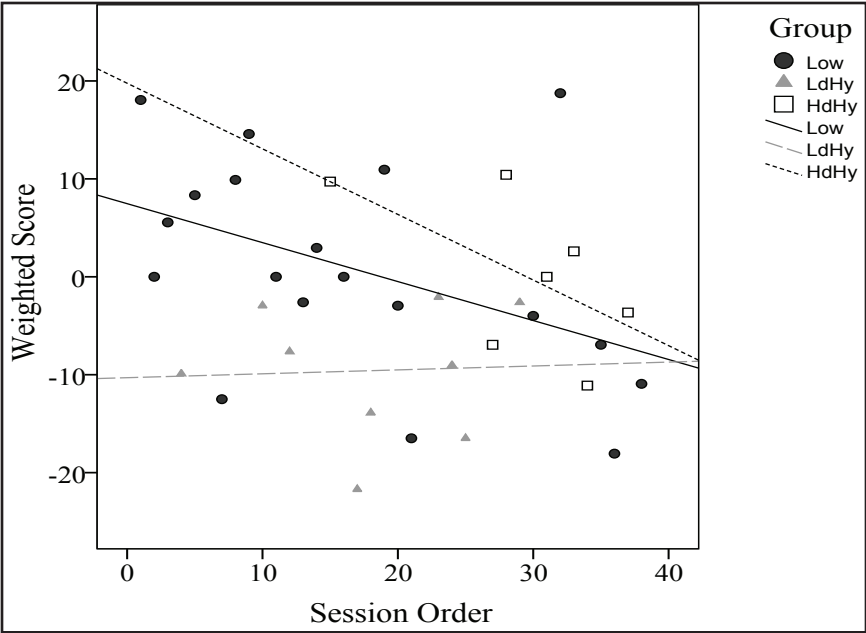


Figure 2. Scatterplot of individual scores stratified by hypnotizability and dissociation, by session order.

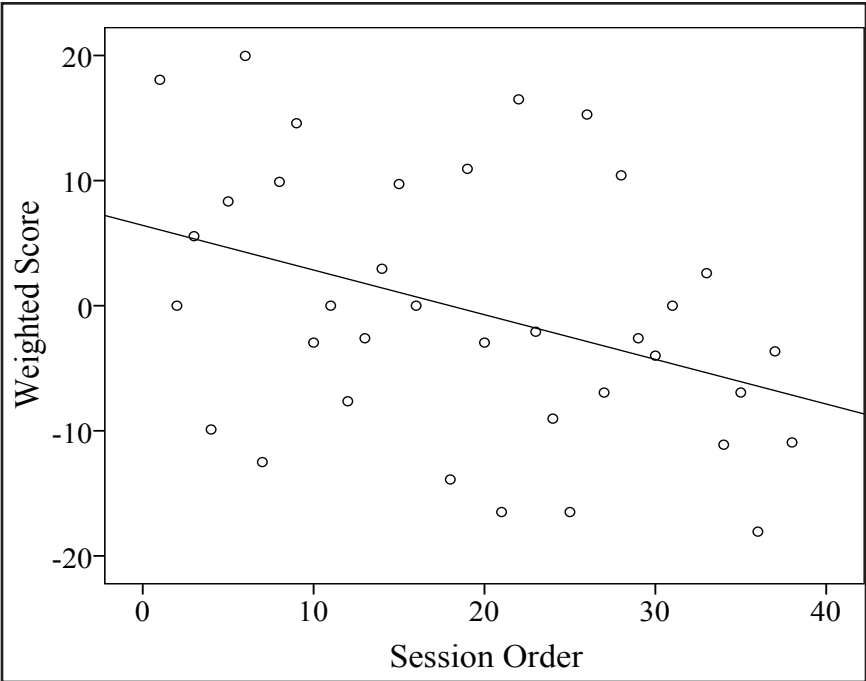


Figure 3. General scatterplot of individual scores by session order.

DISCUSSION

In replication of previous research, we found that having a history of trauma, being more dissociative and hypnotizable, and being a female were positively associated with believing in psi. We also replicated a recent finding with adults that a history of trauma is related to poorer working memory (El-Hage, Gaillard, Isingrini, & Belzung, 2006). Taking the group as a whole, we did not replicate Bem's previous research (Bem, 2008a), and contrary to what we hypothesized, neither hypnotizability nor belief in psi as main effects predicted performance on the precognitive memory test. However, the interaction of hypnotizability and dissociation did produce significant results, with the LdHys scoring worse than chance and lower than the other two groups, which suggests that dissociativity may be a mediator of the possible relationship between hypnotizability and performance in psi tasks. Other areas in psychology (e.g., McFatter, 1994) have revealed that interactions between traits have different or increased explanatory power than the effect of those traits alone.

It is puzzling why LdHys psi-missed, as other research has found hypnosis (rather than hypnotizability, though) to be associated with psi scoring. A possible explanation is that we encountered a psi *differential effect*, a phenomenon in which comparing contrasting conditions produces one condition to score significantly better or worse than chance, and the other one to have the opposite effect or none at all (Irwin & Watt, 2007). We did not tell participants before debriefing that they were participating in a psi test, so it might have been that nonconsciously they misconstrued their task and recalled more of the control than the practice words. A possible factor in the psi-missing effect was the fact that we continued to use the same test even after becoming aware that there might be a problem with it. This might have created a negative psychological set in one or both experimenters, somehow affecting more the LdHys, perhaps making them less comfortable in the situation, a factor that Palmer (1997) has discussed as a mediator of whether participants tend to psi-hit or psi-miss. That the first third of the data was suggestive of psi-hitting whereas the other segments reversed direction supports this hypothesis.

Low hypnotizables scored almost exactly at chance; HdHys also scored at chance, contrary to our expectations, but the positive correlation between trauma and dissociation, and the negative correlation between trauma and recall suggests that psi memory tests may not be ideal with this group. In any event, we think that further research, especially with high hypnotizables, is warranted, although they should be grouped by dissociativity as well. Bem (2008a) recommended using individuals high in novelty seeking, and our literature search did not reveal any studies evaluating a relationship between novelty seeking and hypnotizability or psi beliefs or abilities. A linear regression analysis on data of a group of alcohol dependents showed that depression was not predicted by either novelty

seeking or self-transcendence (Evren, Sar, & Dalbudak, 2008). Because self-transcendence is related to hypnotizability (Cardena & Terhune, 2008), the only data we know of suggests that novelty seeking is most likely a different process than the ones we investigated in this study.

The data showed a decline effect, in accord with much of the research in psi (cf. Irwin & Watt, 2007). Figure 2 suggests that the effect was differential in that the group that was in the direction of psi-missing at the beginning tended to improve, whereas the groups that were in the direction of psi-hitting, followed the opposite pattern. This seemed to be even clearer in the fourth stage of data collection, after we had looked at the initial data. At that stage we obtained outlier or near-outlier scores that went against the previous pattern. Although by no means a test of von Lucadou's observation systems theory, our results are consistent with it (cf. Lucadou, Römer, & Walach, 2007).

Finally, although not significantly, we found some support for the notion of an experimenter effect in that the experimenter with a stronger belief in psi obtained scores in the direction of psi-hitting, whereas the other experimenter got scores in the opposite direction. However, the first experimenter was also the only one that showed a significant decline effect. In any case, this study does suggest the need to at least evaluate the effect of experimenters in a psi study.

This study had a number of limitations that should be acknowledged. First, the N, especially after grouping, was modest, so the experiment had limited power. Also, with small *ns* the significance of the data can easily shift with inclusion of new data; thus our results should be considered tentative and in need of replication. Another issue to consider is that the task was completely in English and included words that the participants were asked to visualize. In general, the words were not very complicated but a few of them might have been difficult for Swedish volunteers to understand (e.g., "mortician" and "parka"). If the participants did not understand the words, they would not have been able to visualize them. Hence, the way the participants processed the words may have differed. Some may have activated working memory rather than long-term memory. According to Irwin's (1979) interpretation of Roll's memory trace theory, that might have influenced how well the participants performed on the test. It would therefore be optimal that additional studies using this task be conducted in the participant's native tongue. The language problem might have also depressed the scores of our other measures, although probably not to a large degree (cf. Cardena, Kallio, Terhune, Buratti, & Löf, 2007).

Second, it is possible that far from everyone gets relaxed by the type of stimuli that the relaxation video included. For some individuals, such relaxation could be associated with traumatic/dissociative experiences and might have the opposite effect. This question should be evaluated in future research. Also, there was a constant humming sound coming from another computer in the room; although the sound was fairly low, it might have served as another distraction.

Another limitation might be the nature of the task. Presentiment and other psi studies suggest that emotionality is an important factor (Cardeña, 2008a; Hinterberger, Studer, Jäger, Haverly-Stacke, & Walach, 2007). There was no emotional component in our task. It may therefore be a good idea to expose the participants to stimuli of greater salience in further experiments of this kind. Another issue worth pursuing is to design a study with consequences that may be desirable (or not) to the participants, as per Ferenczi's hypothesis (1955) and the PMIR model (Stanford, 1977). And, as mentioned earlier, memory tasks may not be ideal with individuals who are likely to have more traumatic events in the past and to dissociate. The creator of the task also mentioned to us (Bem, personal communication, August 2009) that the program as he had originally sent it to us did not produce psi effects, as compared with other versions of the program, which is why he had wanted us to modify it. This factor may have affected the overall performance in the study, but it is worth pointing out that we nonetheless obtained some significant effects when grouping and when analyzing a decline effect.

In parapsychology the role of the experimenter has been emphasized (Smith, 2003b); particularly the experimenter-participant interaction has been brought into focus. Therefore the inexperience of the experimenters and the way they interacted with the participants may have affected the outcome of the study. Furthermore, both researchers had a moderate score on the ASGS, which could have influenced the outcome as well. It is hard to pinpoint exactly what experimental factors could have made an impact on the outcome, as little is known about the importance of personal characteristics in experimenters (Watt & Wiseman, 2002). Although the program was developed to minimize the experimenter role with the test being run mainly on computer, the initial contact with the experimenter may still have an important role to play in participants' performance.

Finally, hypnotizability may have had a greater effect in the context of an actual hypnotic induction, as is suggested by reports of an advantage of hypnosis over control conditions and of specific hypnotic suggestions (Tressoldi & Del Prete, 2007; see also Cardeña, in press). Studies with and without a hypnotic procedure but also measuring hypnotizability and dissociation should be conducted in the future. In sum, we found a more complicated set of results than we had originally predicted, but one pregnant with suggestions for future research on the possible relationship between hypnosis, dissociation, and psi.

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ABSTRACTS IN OTHER LANGUAGES

Spanish

HIPNOTIZABILIDAD Y DISOCIACIÓN COMO PREDICTORES DE DESEMPEÑO EN UNA PRUEBA DE PRECOGNICIÓN: UN ESTUDIO PILOTO

RESUMEN: Investigamos si la hipnotizabilidad, la disociación, y la creencia en psi estaban relacionadas con el desempeño en una prueba de precognición que medía si la práctica posterior aumentaba recuerdos anteriores. Los participantes fueron bajos (n = 19) y altos (n = 19, 7 también altos en disociación) en hipnotizabilidad, y completaron pruebas sobre creencias sobre psi mientras los experimentadores estaban ciegos en cuanto a los niveles de hipnotizabilidad y de disociación. No replicamos el efecto general de precognición y no hubo un efecto global para hipnotizabilidad, pero los hipnotizables altos que eran bajos en disociación obtuvieron una diferencia significativa de los que eran altos en disociación e hipnotizabilidad y de los que eran bajos en hipnotizabilidad, y obtuvieron puntuaciones significativas bajo lo esperado al azar. La creencia en

psi estuvo relacionada a la disociación y a la historia de trauma, y el trauma y la memoria de trabajo (working memory) obtuvieron una correlación negativa. Después de procesar alrededor de una tercera parte de los participantes el desarrollador del programa se puso en contacto con nosotros y nos solicitó que usáramos una versión modificada del programa. No cambiamos el protocolo pero decidimos analizar los datos en segmentos antes y después de que nos solicitaran usar otro programa. Aunque no fue significativa, la primera tercera parte de los datos mostró una dirección hacia tener aciertos mientras que otros segmentos mostraron una dirección opuesta. Un análisis de regresión controlando por grupos mostró un efecto de declinación significativo. Nuestros resultados apoyan el valor de usar grupos especiales y sugieren que la disociación puede mediar los efectos de la hipnotizabilidad en la manifestación de psi.

French

HYPNOTISABILITE ET DISSOCIATION COMME PREDICTEURS DE PERFORMANCES DANS UNE TACHE DE PRECOGNITION: UNE ETUDE PILOTE

RESUME: Nous avons étudié si l'hypnotisabilité, la dissociation et la croyance au psi étaient liées à la performance dans une tâche de précognition qui mesure si une pratique ultérieure améliore le rappel de souvenirs antérieur. Les participants bas ($n = 19$) et hauts ($n = 19$, 7 également hauts en dissociation) en hypnotisabilité ont complété la tâche et une mesure de la croyance au psi sans que les expérimentateurs ne sachent leur niveau d'hypnotisabilité et de dissociation. Un effet de précognition générale ne fut pas répliqué et il n'y a pas d'effet global pour l'hypnotisabilité, mais les personnes ayant à la fois un score élevé en hypnotisabilité et bas en dissociation différaient significativement des personnes ayant un score élevé en dissociation et de celles ayant un score bas en hypnotisabilité, et obtenaient des résultats inférieurs au hasard. La croyance au psi fut liée à la dissociation et à une histoire de trauma, et le trauma et la mémoire de travail furent corrélés négativement. En ce qui concerne les caractéristiques de l'expérience elle-même, nous avons été contacté après avoir commencé les essais d'un tiers des participants par le développeur du programme qui nous a demandé d'utiliser une version modifiée. Nous n'avons pas changé notre protocole, mais nous avons décidé d'analyser les données par segments avant et après que nous ayons dû utiliser un programme différent. Bien que non significatif, le premier tiers des données était clairement en direction d'un succès psi tandis que les segments suivants allaient dans la direction opposée. Une analyse de régression contrôlant les groupes montra un effet de déclin significatif. Nos résultats encouragent l'utilisation de groupes sélectionnés et suggèrent que la dissociation pourrait médier les effets de l'hypnotisabilité dans la performance psi.

*German***HYPNOTISIERBARKEIT UND DISSOZIATION ALS PRÄDIKTOREN FÜR DAS ABSCHNEIDEN BEI EINER PRÄKOGNITIONSAUFGABE: EINE PILOT-STUDIE**

ZUSAMMENFASSUNG: Wir untersuchten, ob sich Hypnotisierbarkeit, Dissoziation und der Glaube an Psi auf das Abschneiden bei einer Prækognitionsaufgabe auswirken, die messen sollte, ob eine spätere Übung eine vorherige Gedächtnisleistung verstärkt. Teilnehmer mit geringer ($n = 19$) und hoher ($n = 19$, 7 davon auch mit hoher Dissoziation) Hypnotisierbarkeit absolvierten die Aufgabe und füllten einen Fragebogen zur Messung des Glaubens an Psi aus, wobei die Experimentatoren in Bezug auf den jeweiligen Grad der Hypnotisierbarkeit und Dissoziation der Teilnehmer verblindet waren. Ein allgemeiner Prækognitionseffekt ließ sich nicht replizieren, und es zeigte sich kein Gesamteffekt in Bezug auf Hypnotisierbarkeit; leicht Hypnotisierbare mit geringen Dissoziationswerten unterschieden sich jedoch signifikant von dissoziierten leicht Hypnotisierbaren und von schlecht Hypnotisierbaren und schnitten zudem unterzufällig ab. Der Glaube an Psi hing mit Dissoziation und der Geschichte des Traumas zusammen, und Trauma und Arbeitsgedächtnis waren negativ korreliert. Was besondere Merkmale des Experiments selbst betraf, so wurden wir – nachdem wir über ein Drittel der Teilnehmer getestet hatten – vom Programmentwickler kontaktiert mit der Bitte, eine modifizierte Version zu verwenden. Wir änderten nicht unser Protokoll, entschlossen uns aber, die Daten in Segmenten auszuwerten – entweder vor dem Zeitpunkt oder nachdem wir gebeten wurden, ein unterschiedliches Programm zu verwenden. Obwohl nicht signifikant, deutete das erste Drittel der Daten eindeutig in Richtung eines Psi-Hitting, während die späteren Segmente in die gegenteilige Richtung gingen. Eine Regressionsanalyse, in der der Gruppeneinfluß kontrolliert wurde, zeigte einen signifikanten Absinkungseffekt. Unsere Ergebnisse unterstützen die Annahme, dass es wichtig ist, mit ausgewählten Gruppen zu arbeiten und legen die Vermutung nahe, daß Dissoziation die Wirkungen von Hypnotisierbarkeit in Bezug auf Psi-Trefferleistungen vermittelt.