

ANOMALOUS COGNITION IN HYPNAGOGIC STATE WITH OBE INDUCTION: AN EXPERIMENTAL STUDY

GUIDO DEL PRETE* AND PATRIZIO E. TRESSOLDI**

ABSTRACT: The main question addressed with this experiment is whether the hypnagogic state is a special mental state conducive of anomalous cognitive processes. Twelve volunteers with high scores on the transliminality or the absorption scale participated in a guessing-like task alternating trials in hypnotic and relaxed states of consciousness. Each participant contributed to 10 trials in a hypnagogic state and 10 trials in a self-induced relaxed state. Participants were shown 20 different series of 4 emotionally neutral figures presented in sequence one at a time for about 1 min on a PC monitor and successively presented all 4 to guess which one could be the target. Before the participant's choice, the target, chosen by a pseudorandom algorithm, was simultaneously presented on a monitor in a different isolated room connected with the apparatus installed in the subject's room. With hypnotic induction emphasising OBE in the hypnagogic state, the mean hits score was 37.5% whereas in the self-relaxation state it was at chance level, 25%. Further support for the hypothesis that the hypnagogic state is psi-conductive was obtained by the significant correlation between ESP performance in the hypnagogic state and the score on transliminality (.71) and absorption scales (.76). Induced hypnagogic imagery associated with a high level of transliminality and/or absorption is proving to be a special mental state conducive to ESP phenomena.

Among the so-called altered states of consciousness, hypnosis is considered one of the psi-favorable states. In his review of the physical, physiological, and psychological psi-favorable conditions, William Braud (2002) considered the relaxed condition that accompanies it as well as the increased tendencies toward creative imagination, suggestibility, absorption, dissociation, and a cognitive style that combines psychological components favouring the capacity to experience a whole range of ESP phenomena (Braud, Wood, & Braud, 1975; Gertz, 1983; Rose, Hogan, & Blackmore, 1997; Schacter & Kelly, 1975). More specifically, hypnagogic/hypnopompic imagery has been associated with reports of ESP, apparitions, communication with the dead, and out-of-body experiences (OBEs) (Glicksohn, 1989; Mavromatis & Richardson, 1984; Palmer & Lieberman, 1975). For a review of the anomalous cognitive processes associated with hypnagogic/hypnopompic imagery, see Sherwood (2002).

Alvarado's (1998) complete historical review of the relationship between ESP and altered states of consciousness presents the rise and fall of interest by parapsychological researchers in the role of hypnosis as a favourable condition for ESP. In 1969, Honorton and Krippner reviewed

the existent literature and found that in 9 out of 12 studies in which the hypnotic condition was compared to a nonhypnotic condition, hypnosis yielded better results.

Stanford and Stein (1994) reviewed by means of a meta-analysis the literature investigating ESP using hypnosis from 1945 up to 1993. The main result drawn from 25 studies, 23 of which used forced-choice tasks, revealed an effect size $\pi = .524$ ($SD = .035$), corresponding to a z score of 8.77 for hypnosis, compared to an effect size $\pi = .505$ ($SD = .031$) in the control conditions, corresponding to a z score of .34 ($MCE = .50$).

This revision not only gives evidence that the hypnotic state is a promising mental state for ESP investigation comparable to the ganzfeld condition but also precisely analyzes flaws presented in the studies, such as agent and receiver in the same room, target knowledge by the experimenters, inappropriate scoring registration, shuffling instead of proper randomization, and lack of balance between the control and the experimental conditions.

Our experiment was an attempt to enhance the hit score in the hypnagogic state by eliminating all potential flaws and considering some new moderators not examined before.

As first potential moderators, we considered absorption (Tellegen, 1981; Tellegen & Atkinson, 1974) and transliminality (Lange, Thalbourne, Houran, & Storm, 2000; Thalbourne, 2000) two personality characteristics previously associated with ESP performance. Although Thalbourne (1998) obtained a $Rho = .72$ correlation between the two scales, they are not measuring identical personality and experiential characteristics, so we decided to use them both.

Both scales have been used to explore paranormal experiences and paranormal capacity (i.e., Thalbourne, 1996, 2004). The transliminality scale, for example, comprises 14% of the items related to paranormal experiences. A significant positive correlation between transliminality scores and performance in telepathic transmission of emotional states was obtained by Sanders, Thalbourne, and Delin (2000) whereas highly transliminal participants were significantly more likely to score a hit in a psi experiment using the *I Ching* (Storm & Thalbourne, 1999).

Absorption scores correlate with OBEs (Dalton, Zingrone, & Alvarado, 1999) and anomalous experiences (Kennedy, Kanthamani, & Palmer, 1994) as well as with hypnotizability (Glisky, Tataryn, Tobias, Kihlstrom, & McConkey, 1991). For these reasons we decided to select participants according to their scores on these scales.

As described in the Methods section, all participants filled out the two scales and were selected as participants if their score in at least one scale was equal to or above a cutoff point.

As a second potential moderator, we considered a modification of the hypnotic induction procedure emphasising out-of-body experiences (OBEs). We took inspiration from Palmer and Leiberman (1975), who

induced OBEs by means of a progressive relaxation technique followed by monotonous auditory stimulation and ganzfeld. Using a clairvoyance task similar to the one used in that study, we added post-hypnotic OBE suggestions in order to help participants collect more details of the target, either by means of a real OBE or by enhancing their confidence to be able to see the target mentally.

Unlike the Palmer and Leiberan (1975) study, but similar to what was used in most of the studies examined by Stanford & Stein (1994), we chose a forced-choice instead of a free response task.

METHOD

Participants

Twelve participants (9 male, 3 female; mean age = 35.08) were recruited from participants attending courses given by the first author. The Tellegen Absorption Scale (Tellegen & Atkinson, 1974) and the Revised Transliminality Scale (Lange, Thalbourne, Houran, & Storm, 2000) were distributed to the participants. They were selected if their scores were above 9 (corresponding to 25.7 of a maximum of 37.3 of the corrected scores) on the Revised Transliminality Scale¹ and/or above 23 (over 2/3 of the range, 0-34) on the Tellegen Absorption Scale, which were chosen as arbitrary cutoffs to select "ESP conducive" participants.

Task

The task was devised as a simple gambling-like task. Twenty different series of four emotionally neutral figures² (representing landscapes, animals, buildings, flowers, etc.) were presented in sequence one at time on a PC monitor for about 1 min and successively presented simultaneously to let the participant guess which one could be the target. At the same time, the target, chosen by a pseudorandom algorithm,³ was projected to a second monitor in an isolated room connected with the apparatus installed in the

¹ At the time of this study we were not aware of the methodological note of Houran, Thalbourne, and Lange (2003) in which it was suggested to use the 29-item scale even if the score has to be computed on the 17 items of the revised scale. However, for the purpose of selecting participants with high scores, the risk of imperfect differential item functioning is irrelevant.

² The level of emotionality of each figure was measured by asking 10 independent judges to rate each picture on a 10-point scale from 0 (no emotion) to 10 (high level of emotion). The mean score was 1.5, $SD = .5$.

³ The randomisation procedure is a subroutine of the Delphi™ programming language used to create the software for this experiment. Briefly, this program returns a random number within the range 1-4 (corresponding to the four pictures) after an initialisation with a random value obtained from the system clock. The equality of the numbers 1 to 4 was tested using the χ^2 statistic and the result was nonsignificant.

room where the subject was located. During the experiment the two rooms were completely isolated. The experimental assistant and the participant could not see what was shown in the adjacent room.

Procedure

Each participant was shown the room where the target was going to appear and was then invited to lie down on a couch in the main room, isolated from environmental noise. The task was explained as follows:

When you will be in the desired mental state after self-induced relaxation or induced hypnagogic state, you will see four pictures presented one after another for about 1 minute each, on the monitor. Then you will see all the four pictures and you will have to choose the target. Remember not to try to discover any rule because the target is chosen by a randomised algorithm. Before the target choice, we will suggest that you imagine going into the adjacent room where the target will appear on the monitor you saw before. Once you choose the target, you will point at it and tell me which one is it.

The experimenter then input the answer on the computer and the program recorded the choice in a file without any feedback.

Self-induced relaxation included mainly bodily and mental relaxation freely chosen by each participant. None of them was expert in this or other similar self-relaxation techniques. In this respect they are to be considered naïve.

The hypnagogic state was induced by the first author, an expert hypnotist. The procedure started with a modified Jacobson technique (20-30 min) followed by 15-20 min of real hypnotic induction with indirect flight suggestions, according to the Erickson procedure, to induce spontaneous OBE experiences, plus an element of expectancy or "mental set" whereby the participant was encouraged to want an OBE and to believe it could happen.⁴ The attainment of the hypnagogic state was based on behavioral indices observed by the expert hypnotist. The main indices are: deep muscular relaxation, slow and regular breath, reports of spontaneous images, slow ocular movements, and a sensation of hand paralysis.

The participant was instructed to report every impression arising during the hypnagogic state. Following the reception period, participants were shown the four possible targets and asked to choose the real one using their impressions.

⁴ The detailed description of the hypnotic suggestions may be requested from the first author.

Each participant did 10 trials in the hypnagogic state and another 10 trials in a self-induced relaxed state on four or five different days in order to reduce fatigue or boredom. In every session there was the same number of self-relaxed and hypnagogic trials. To reduce possible carry-over effects, the order between the 2 experimental conditions was balanced in the following way: for each participant there were 5 self-relaxed followed by hypnagogic and 5 hypnagogic followed by self-relaxed sessions in alternating sequence (10 sessions of 2 trials each).

RESULTS

Absorption and Transliminality Scores

Means and standard deviations on the absorption and transliminality scales were, respectively, 25.5 (6.3) and 9.8 (2.7).

Hits Scores

Ten out of 12 participants obtained a higher score in the hypnagogic than in the self-relaxed state, 1 participant obtained an equal score, and the last 1 obtained a higher score in the self-relaxed than in the hypnagogic state (see Table 1).

There were no statistical differences in the hits obtained in the self-relaxed condition before and after the hypnagogic one ($z = .26$; $p = .79$; two-tailed) and in the hypnagogic condition before and after the Self-relaxed one ($z = .42$; $p = .67$; two-tailed).

TABLE 1
RAW HITS SCORES (MAX = 10; MCE: 2.5) OF EACH PARTICIPANT IN THE
SELF-RELAXED AND HYPNAGOGIC CONDITIONS

Participant	Self-Relaxed	Hypnagogic	First condition
A	2	5	Self-Rel
B	1	4	Self-Rel
C	3	5	Self-Rel
D	3	2	Self-Rel
E	3	4	Self-Rel
F	2	3	Self-Rel
G	3	3	Hypnag
H	2	4	Hypnag
I	2	3	Hypnag
L	3	5	Hypnag
M	2	3	Hypnag
N	3	4	Hypnag

The mean percentages of hits obtained by the 12 participants in the 2 experimental conditions are illustrated in Figure 1 (MCE = 25%).

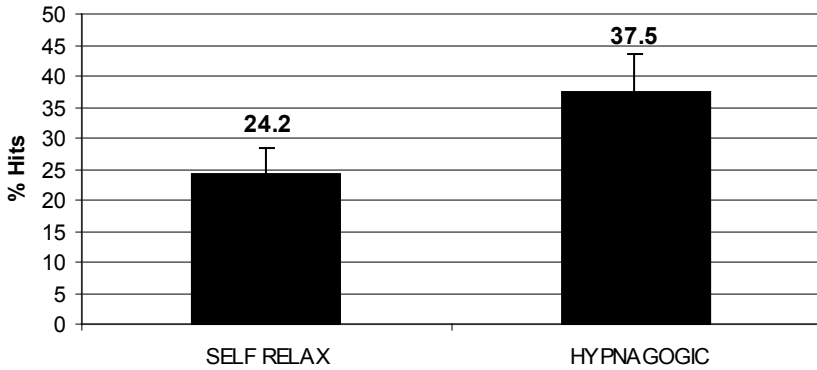


Figure 1. Mean percentages of hits and corresponding 95% confidence intervals in the self-relaxed and hypnagogic mental states

The statistical comparison between the two conditions with a paired t test yielded a statistically significant result $t(11) = 4.00$; $p = .002$, two-tailed; Effect Size $d = -2.41$; CI 95% [-4.80 to -.71]. To test the reliability of this result, the data were reanalyzed using the bootstrap procedure of Simstat™ software (Péladeau & Lacoutre, 1993). The descriptive statistics of the t test after 100 resamples are, Mean = -4.45; $p = .001$ (two-tailed); CI 95% [-8.74 to -2.04].

If we would express the effect size using π (Rosenthal & Rubin, 1989), the result in the hypnagogic condition would be: $\pi = .64$; CI: .55-.72; Contrast: $\Delta\pi .14$.

Correlations With the Absorption and Transliminality Scales

Correlations among the hits obtained in the self-relaxed and hypnagogic states and the scores obtained from the absorption and transliminality scales are presented in Table 2.

TABLE 2
CORRELATION VALUES r AND CORRESPONDING CI, 95%, BETWEEN HITS AND
ABSORPTION AND TRANSLIMINALITY SCORES

	Absorption	Transliminality
Self-Relaxed	-.14 [-.64 to .44]	.19 [-.41 to .66]
Hypnagogic	.76* [.32 to .92]	.71* [.23 to .90]

* $p < .01$

Both the absorption and the transliminality scores share almost 50% of the variance with the hits but only when participants are in the hypnotic state. This almost identical result of the two scales is partly a consequence of their moderate correlation, $r = .70$. These results are discussed further in the following section.

DISCUSSION

The percentage of hits obtained in the hypnagogic condition is not only statistically significant but corresponds to a relevant effect size in the range of the best results obtained with the ganzfeld and hypnosis techniques. For example, the more recent revision of the studies using ganzfeld by Bem, Palmer, and Broughton (2001) yielded an overall hit rate of 30.1%, Stouffer $Z = 2.59$, $p = .0048$, one-tailed, whereas the Stanford and Stein (1994) meta-analysis yielded an effect size $\pi = .524$ ($SD = .035$), corresponding to a z score of 8.77.

The increment of hits in the hypnagogic condition in 10 out of 12 participants is well above the mean expected by chance, and the high correlation between hits and scores on the absorption and transliminality scales seem to support the view that the hits difference between the hypnagogic and the control condition is due to the particular mental state induced in the hypnagogic condition. The nonstatistically significant correlations between the scores on the absorption and transliminality scales and the hits in the control condition are not a statistical artifact (the range is similar to the hits in the hypnagogic condition) and suggest that participants with relatively high scores on at least one of these scales may exploit their ESP capacity only if in a mental state similar to the one induced with hypnosis. To our knowledge this is the first evidence of this association, and it is evident that further replications are necessary before arriving at more precise interpretations.

We note that in the control condition we suggested simply that participants relax mentally and physically and choose the preferred means and level of relaxation. More structured procedures such as listening to special tapes or music are clearly more apt to induce a mental set potentially psi-conducive, as Honorton (1977) and Storm, and Thalbourne (2001) have documented. However, we think that psi-favouring post-hypnotic suggestions that the expert hypnotist can add after the hypnagogic state is obtained may enhance the results with respect to the ganzfeld or other more structured procedures.

As for the role of the OBE suggestions inserted in the induction procedure, even though only 2 participants reported specific OBE sensations, i.e., hearing a click while "leaving" the body and vibrations in the physical body, we think that the emphasis on suggesting that the participants have an OBE may have contributed to the overall result by enhancing their expectation and confidence to be able to see the target.

To summarize, even if the hypnagogic induction requires more time than the ganzfeld condition and requires a specific experience to obtain it, we think that with some selected participants, i.e., those with high levels of absorption or transliminality, this special state of consciousness seems to facilitate psi because it may exploit the potentiality of these personality characteristics to

cross the threshold to receive experiences whose sources are in preconscious or unconscious processes. Persons who manifest a medium to high degree of transliminality might then be expected to have erupt into consciousness, from the preconscious, experiences that we variously know at relatively low intensities as psychic, mystical and creative. (Thalbourne, 2000, p. 5)

An interesting discussion of hypnosis as a liminal phenomenon was recently presented by Krippner (2005), in which the author underlines the fact that hypnotized people often report hallucinations that confound their ordinary distinctions between reality and illusion, external and internal processes, and many other binary oppositions, including time and space as well as mind and body.

Furthermore, in the hypnagogic state the hypnotist may add special suggestions to enhance ESP performance. Our OBE induction seems promising and we are planning to exploit it in a future series of experiments.

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*Advanced Mind Development Center "Shambhala"
 Frattamaggiore, Naples, Italy
 guidodelprete@interfree.it

***Department of Psychology
The University of Padova
Padova, Italy
patrizio.tressoldi@unipd.it*

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