Trance Logic in Hypnosis and Imagination

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In 2 experiments we investigated trance logic, or the tolerance of logical incongruity, in age regression and hallucination. Experiment 1 tested 21 hypnotizable and 19 unhypnotizable subjects in an application of the real-simulating model of hypnosis. Experiment 2 tested 26 high and 19 low imagery ability subjects in an adaptation of the model to the imagination context. Subjects' experiences were investigated through the experiential analysis technique. More real than simulating subjects displayed trance logic during age regression, but they did not differ on the major measures of trance logic during hallucination. This pattern of responding occurred in both the hypnosis and the imagination contexts. Subjects' comments suggested that completeness of and belief in age regression or hallucination may play some role in trance logic. The importance of understanding trance logic from the subject's point of view is discussed.

The notion that hypnotized persons tend to mix percept and imagination in a way that is logically incongruous and that they tolerate the incongruity without seeming to resolve it was highlighted by Orne (1959) in his classic article on artifact and essence in hypnosis. Orne (1959) defined *trance logic* as the "apparently simultaneous perception and response to both hallucinations and reality without any apparent attempts to satisfy a need for logical consistency" (p. 295). Questions about the degree to which the "absence of expression of a need for logical consistency. . . [is] one of the major characteristics of hypnosis" (p. 296) have stimulated much theoretical and empirical work in the field. Despite this work, however, there is much about the nature of trance logic that remains to be clarified (Kihlstrom, 1985).

A number of different examples of trance logic have been noted in the literature (e.g., Obstoj & Sheehan, 1977; Orne, 1977), but the most widely used measures involve hypnotized subjects' responses to suggestions for age regression and double hallucination. Orne (1951) developed an age regression procedure to elicit trance logic. This procedure consists of asking the hypnotized subject to regress to a particular age during childhood and then asking the subject to write down a sentence that contains words that could not be spelled by a child of that age (e.g., "I am participating in a psychological experiment"). Trance logic involves the hypnotized subject spelling the words

correctly during age regression. In a conceptually similar way, Orne (1959) developed an hallucination procedure to elicit trance logic. This procedure consists of asking the hypnotized subject to hallucinate a person (who is actually present and who the subject has met) in a chair across the room and then drawing the subject's attention to the actual person who is outside the subject's direct line of vision. One measure of trance logic involves the hypnotized subject's acknowledging the actual person (double hallucination) and another measure of trance logic involves the subject's reporting a transparent quality to the hallucination (transparency).

Although Orne's (1959) observations have been widely influential, formal experimentation with these tests of age regression or hallucination has not provided strong support for the notion of trance logic as a defining characteristic of hypnosis (e.g., Blum & Graef, 1971; Johnson, Maher, & Barber, 1972; Marks, Baird, & McKellar, 1989; McConkey & Sheehan, 1980; McDonald & Smith, 1975; Perry & Walsh, 1978; Peters, 1973; Sheehan, Obstoj, & McConkey, 1976; Spanos, deGroot, & Gwynn, 1987; Spanos, deGroot, Tiller, Weekes, & Bertrand, 1985; Spanos, Lush, & Gwynn, 1989; Stanley, Lynn, & Nash, 1986). Some investigators have reported completely negative findings (e.g., Johnson et al., 1972; see also Hilgard, 1972; Johnson, 1972). Other investigators have reported trends toward predicted differences between real hypnotized subjects and simulating unhypnotized subjects, but these trends typically have not reached statistical significance (e.g., McDonald & Smith, 1975; Obstoj & Sheehan, 1977; Perry & Walsh, 1978; Sheehan et al., 1976). Still other investigators have reported positive support for the predicted differences on specific measures of trance logic under certain test conditions. For instance, differences between hypnotized and unhypnotized subjects have been reported by Marks et al. (1989), Sheehan et al. (1976), Spanos and colleagues (Spanos et al., 1987; Spanos et al., 1985; Spanos et al., 1989), and Stanley et al. (1986) for one or the other measures of trance logic on double hallucination and by McConkey and

Sheehan (1980), Perry and Walsh (1978), and Spanos and colleagues (Spanos et al., 1987; Spanos et al., 1985; Spanos et al., 1989) for the measure of trance logic during age regression.

The precise meaning of these differences is controversial, however, and alternative explanations of the findings are possible. For instance, whether subjects who give the appearance of trance logic are in fact tolerating logical incongruity in a subjective sense is unclear. On the basis of their use of the experiential analysis technique (EAT), for example, Sheehan and McConkey (1982; see also Sheehan, 1977, 1986) argued that an analysis of the experience of hypnotized subjects indicated that the logical incongruity may be more an unwarranted inference on the part of the observer than an aspect of the experience of the hypnotized subject. More recently, Spanos (1986; see also Spanos et al., 1987; Spanos et al., 1985; Spanos et al., 1989) and others (Stanley et al., 1986) have argued that partial or incomplete responding to the suggestions for age regression or hallucination is the basis of what appears to be logically incongruous performance on the part of hypnotized subjects. One aim of our research was to examine the nature of trance logic in terms of the experience of the hypnotized subject and the degree to which any display of trance logic may have been shaped by an incomplete experience of the suggested effect.

Orne's (1951, 1959; see also Orne, Dinges, & Orne, 1986) focus on trance logic importantly highlighted the need to understand the subjective experience of the hypnotized person. To achieve this in our research, we used the EAT of Sheehan and McConkey (1982) to investigate the way in which subjects went about having the suggested experiences and to investigate the degree to which those suggested experiences were complete and compelling. It has been argued that trance logic reflects a distinctive experience of hypnotized subjects, and the present research used the EAT to gather information about the degree to which the cognitive style of subjects (either constructive or concentrative; see Sheehan & McConkey, 1982) was associated with the degree to which subjects mixed percept and imagination during hypnosis. In particular, we examined whether subjects worked in cognitively active ways to experience the suggested effects (constructive style) or whether those effects were experienced by subjects as occurring without effort (concentrative style).

Our research investigated trance logic in two experiments. Experiment 1 investigated trance logic in hypnosis, and hypnotic procedures were used in a precise fashion. The findings of the first experiment highlighted a need to test subjects in a nonhypnotic context that allowed a more detailed examination of an explanation of the findings in terms of incomplete responding by subjects to the suggested effects. Accordingly, Experiment 2 adapted the procedures to the imagination context, and trance logic in imagination was investigated. Both experiments focused on the behavioral and subjective aspects of apparent logical incongruity in the performance of subjects. Taken together, the two experiments were designed to examine the similarities and differences in the processes that are associated with trance logic in two distinct contexts of testing.

Experiment 1

In Experiment 1, we used the real–simulating paradigm (Orne, 1959, 1979), which is the major methodology associated with trance logic. In this paradigm, high- and low-hypnotizable subjects are instructed by one experimenter either to experience or to simulate hypnosis and are then tested by another experimenter who is unaware of their real or simulating identity. The paradigm is designed to index the potential influence of demand characteristics on the responses of hypnotized subjects. On the one hand, similar responses by real hypnotized subjects and simulators indicates that demand characteristics may be, but are not necessarily, responsible for the performance of hypnotized subjects; real hypnotized subjects and simulators can respond similarly because of different underlying processes. On the other hand, different responses by real hypnotized subjects and simulators indicate that factors other than demand characteristics are responsible for the performance of hypnotized subjects.

We also used the EAT (Sheehan & McConkey, 1982), which is a technique of inquiry into the subjective experience of hypnotized persons. In this technique, subjects watch a videotape playback of their hypnosis session and comment on the phenomenal aspects of their performance during hypnosis. Subsequently, the comments of subjects are categorized in terms of particular subjective dimensions (see Sheehan & McConkey, 1982). In our research we categorized subjects' comments in terms of cognitive style, specifically, in terms of whether they used active, personal strategies to experience the suggested effects (constructive style) or simply focused their thoughts on the literal communications of the hypnotist (concentrative style). We also categorized subjects' comments on the separate dimensions of completeness of and belief in their experience of the suggested effects. Completeness reflected the degree to which subjects described their experience of age regression or hallucination as being total or whole (see Spanos et al., 1987). Belief reflected the degree to which the subjects ascribed reality status to their experience of age regression or hallucination (see Sutcliffe, 1960, 1961).

Method

Subjects

Twenty-one (3 male and 18 female) real hypnotizable subjects of a mean age of 21.71 years (SD = 6.27) and 19 (5 male and 14 female) simulating, unhypnotizable subjects of a mean age of 25.10 years (SD = 8.70) participated in the study. The subjects were undergraduate psychology students and received either research credit or nominal payment of $10.00 (Australian) in return for their participation. They were preselected on the basis of their extreme scores on both the group-administered Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962) and the individually administered Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C; Weitzenhoffer & Hilgard, 1962). On these 12-item scales, the real hypnotizable subjects had scored in the range 9–12 (HGSHS:A, M = 10.57, SD = 0.68; SHSS:C, M = 10.75, SD = 0.97), and the simulating, unhypnotizable subjects had scored in the range 0–3 (HGSHS:A, M = 1.42, SD = 0.77; SHSS:C, M = 1.17, SD = 1.10). The subjects had been tested also on the 35-item, 245-point shortened version of Betts' Questionnaire Upon Mental Imagery (QMI; Sheehan, 1967). The mean QMI scores for the real (M = 85.00, SD = 22.98) and simulating (M = 103.07, SD = 24.84) subjects differed significantly, $t(38)$ = 11.68, $p < .01$.

Procedure

Initially, the first experimenter told real hypnotizable subjects that they would be tested by a hypnotist and that a third person would discuss their experiences of hypnosis with them. He did not give any instructions to real hypnotizable subjects as to the type of behavior they ought to display or the type of experiences they ought to report during either the hypnosis or the inquiry sessions. On the other hand, the experimenter instructed simulating, unhypnotizable subjects that they ought to pretend to be excellent hypnotic subjects during both the hypnosis and the inquiry sessions. These instructions precisely followed those of Orne (1959, 1979), and they also followed those of McConkey and Sheehan (1981; see also Nogrady, McConkey, Laurence, & Perry, 1983) that subjects ought to pretend to be excellent hypnotic subjects during the inquiry session. The experimenter mentioned to all subjects that "a student from overseas [was] learning about the work" and asked their permission for that student to sit in on the hypnosis session; the experimenter additionally informed simulators that this student, like the hypnotist and the inquirer, would not know that they were faking. After this the first experimenter escorted subjects to the hypnosis setting and introduced them to the second experimenter (the hypnotist).

Initially, the hypnotist introduced subjects to the associate, "the student from overseas", and then seated them in a comfortable reclining chair. The hypnotist sat to the left of the subject and the associate sat in front of the subject. The hypnotist then administered a standardized induction and six test items in the following order: hands moving apart, arm rigidity, age regression, double hallucination, circle-touch test, and negative visual hallucination.[1] Our focus in this article is on the classic trance logic tests of age regression and double hallucination (see Orne, 1951, 1959).

Age regression. The hypnotist first asked subjects to write down some information on a pad. He then administered the suggestion that subjects were "going back in time" to the first or second grade of school. After establishing that subjects were experiencing age regression (by stating an appropriate age and place), the hypnotist again asked subjects to write down some information (name, age, date, and day of the week) and to write down the sentence "I am participating in a psychological experiment." After this the hypnotist canceled the age regression suggestion. The relevant behavioral data were whether subjects passed the suggestion (change in stated age and handwriting) and whether they displayed trance logic (correct spelling of *participating, psychological,* or *experiment*).

Double hallucination. Toward the end of the age regression item, while the hypnotist was retrieving the pad and pencil from the subject, the associate quietly moved from the chair in which she had been sitting to a chair that was behind the subject. This latter chair was out of the subject's field of vision unless he or she turned around.

The hypnotist first told subjects that when they opened their eyes, they would see the associate sitting in the chair in front of them. He reminded subjects that they had met the associate and told them they would "see [her] sitting in the chair in the corner across from you, just as she was before." After asking subjects to open their eyes and establishing they were hallucinating the associate (by describing her clothing and facial expression), the hypnotist drew subjects' attention to the actual associate by pointing to her and saying "Now can you tell me what you see behind you?" If subjects did not acknowledge the actual associate, then the hypnotist said "Why don't you take another look, and tell me who that is." If subjects still did not acknowledge the actual associate, then the hypnotist asked them to look back to the front. The hypnotist then drew subjects' attention to the hallucinated associate by pointing to the chair in front and saying "Who is this?" and "Tell me about the chair." The chair was a plain black plastic one that had a salient blue dot on the middle of the back; this dot could not be seen if a person was sitting in the chair. After this the hypnotist canceled the

hallucination suggestion, and the associate left the setting. The relevant behavioral data were whether subjects passed the suggestion (reported the hallucinated associate) and whether they displayed trance logic on the double hallucination measure (acknowledged the actual associate and maintained report of the hallucinated associate) or on the transparency measure (reported transparent quality of the hallucination or reported the dot on the chair).

After testing subjects on the remaining items, the hypnotist administered an awakening procedure. Finally, he escorted subjects to the inquiry setting and introduced them to the third experimenter (the inquirer).

Initially, the inquirer told subjects that he would show them the videotape of their hypnosis session and that this would help them to remember their experiences of hypnosis. Furthermore, he told them that he would stop the videotape at a number of points and ask them to describe their experiences. At these points the inquirer asked subjects about their expectations, images, and thoughts about the suggested effects (see Sheehan & McConkey, 1982). For instance, he asked them to comment on their responses to the suggestions (e.g., "Did you really feel like a young child?" or "Did you really believe [the associate] was sitting there?") and on their responses to trance logic aspects (e.g., "What happened when you were asked to write that sentence?" or "What happened when you looked behind you?").

After the inquiry session the inquirer escorted subjects to the original setting where the first experimenter was waiting. This experimenter conducted a brief inquiry into subjects' perceptions of the hypnosis and inquiry sessions. He then answered any questions and ended the session.

Experiential analysis technique information. Videotapes of the inquiry sessions were examined by the inquirer and an independent rater, who also was unaware of the real or simulating identity of subjects. For the age regression and hallucination items, they categorized the comments of subjects in terms of cognitive style, completeness of experience, and belief in experience.[2] Cognitive style was rated as constructive (involving active strategies) or concentrative (focusing on the words of the hypnotist). Completeness and belief were rated separately

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[1] There are a number of phenomena that are said to index trance logic (see Obstoj & Sheehan, 1977; Orne, 1977), but age regression and double hallucination are closely associated with classic studies of the phenomenon (see Orne, 1951, 1959). Accordingly, we focus on those items in this article. The data for the circle-touch test and the negative visual hallucination items are related to other research issues and are reported elsewhere (see Bryant & McConkey, 1989; McConkey, Bryant, Bibb, Kihlstrom, & Tataryn, 1990).

[2] The inquirer and the independent rater were told that *constructive* style involved subjects "processing information in such a way to structure events to be in accord with the suggestion given by the hypnotist; the hallmark of this style is that the subject actively employs a strategy to achieve the suggested effect" and that *concentrative* style involved subjects "concentrating on the suggestion given by the hypnotist in a literal way; the subject focuses attention on the suggestion, and there is a lack of strategy to achieve the suggested effect." *Completeness* was defined as "the extent to which the subject describes the suggested effect as being complete, total, or whole," and *belief* was defined as "the extent to which the subject believes in the reality of the suggested effect; describes the suggested effect as true or real in status." The inquirer and rater scored the experiential analysis technique data independently and then compared their categorizations of cognitive style in the presence of a third person. Disagreements about categorization of cognitive style were resolved through discussion when possible; when not possible, cognitive style was left uncategorized. Ratings of completeness and belief were averaged across the inquirer and the rater. This procedure was followed in both experiments.

on a scale from *not at all* (0) to *very* (7). If the inquirer and the rater could not agree on the cognitive style, then it was left uncategorized in that instance. The data for completeness and belief are the average ratings of the inquirer and the rater.

Results and Discussion

Table 1 presents the number of real and simulating subjects who responded positively on various measures of the age regression and double hallucination items.

Age Regression

As can be seen in Table 1, the majority of real hypnotized subjects (95.24%) and simulators (100%) passed the age regression suggestion; that is, they stated a younger age and showed a change in their handwriting. Of these subjects, however, very few real hypnotized subjects (15.00%) and simulators (5.26%) correctly spelled all the words (i.e., *participating, psychological,* and *experiment*). However, about half the real hypnotized subjects (55.00%) and a fifth of the simulators (21.05%) correctly spelled at least one word. Chi-square analysis indicated a significant difference in the number of real hypnotized subjects and simulators who correctly spelled at least one word, $\chi^2(1, N = 39) = 4.74, p < .05$.

Experiential analysis technique data. For subjects who correctly spelled at least one word, 3 (27.27%) real hypnotized subjects and 4 (100%) simulators showed a concentrative style, and 7 (63.64%) real hypnotized subjects and no simulators showed a constructive style. (Style could not be determined for 1 real hypnotized subject.) Chi-square analysis indicated a significant difference in the number of real hypnotized subjects and simulators who displayed trance logic and showed a concentrative or constructive style, $\chi^2(1, N = 14) = 5.60, p < .05$. For the subjects who did not display trance logic, 3 (33.33%) real hypnotized subjects and 12 (80.00%) simulators showed a concentrative style, and no real hypnotized subjects or simulators showed a constructive style. (Style could not be determined for 6 real hypnotized subjects and 3 simulators.) Chi-square analysis indi-

Table 1
*Subjects Who Responded Positively on the
Measures in Experiment 1*

Item and measure	Reals (n = 21)	Simulators (n = 19)
Age regression		
Passed suggestion	20	19
Correctly spelled all words	3	1
Correctly spelled at least		
one word	11	4
Double hallucination		
Passed suggestion	7	19
Acknowledged actual associate	3	5
Reported hallucination after		
exposure to actual associate	4	12
Mentioned transparency		
spontaneously	1	1
Reported dot on chair	2	1

Note. *Reals* indicates real hypnotized subjects.

cated a significant difference in the number of real hypnotized subjects who did or did not display trance logic and showed a concentrative or constructive style, $\chi^2(1, N = 13) = 4.55, p < .05$. More real hypnotized subjects than simulators who displayed trance logic displayed a constructive style, and more real hypnotized subjects who displayed a constructive rather than a concentrative style displayed trance logic. In terms of completeness (overall $M = 5.39$) and belief (overall $M = 4.86$), separate 2×2 (Subject Grouping $\times$ Trance Logic) analyses of variance yielded no significant effects; that is, all subjects showed similar degrees of completeness and belief in their age regression experience.

Summary. Experiment 1 yielded a meaningful difference between real hypnotized subjects and simulators on the age-regression item. More real hypnotized subjects than simulators correctly spelled at least one word; that is, more real hypnotized subjects than simulators displayed trance logic during age regression. In terms of the data obtained from the EAT, more real hypnotized subjects showed a constructive style, and more simulators showed a concentrative style. Relatedly, more subjects who displayed trance logic showed a constructive style, and more of those who did not showed a concentrative style. However, the subjects, regardless of whether they displayed trance logic, showed similar degrees of completeness and belief in their age-regression experience.

Double Hallucination

As can be seen in Table 1, a third of the real hypnotized subjects (33.33%) and all simulators (100%) passed the hallucination suggestion; that is, they reported seeing the associate in front of them. Chi-square analysis indicated a significant difference in the number of real hypnotized subjects and simulators who passed the suggestion, $\chi^2(1, N = 40) = 19.49, p < .001$. Of these subjects less than half of the real hypnotized subjects (42.86%) and a quarter of the simulators (26.32%) acknowledged the actual associate when the hypnotist asked them to look behind to where she was sitting. Over half the real hypnotized subjects (57.14%) and almost two thirds of the simulators (63.16%) maintained their report of the hallucination after being exposed to the actual associate; that is, they displayed double hallucination. In terms of the transparency measure, only 1 real hypnotized subject (14.29%) and 1 simulator (5.26%) spontaneously mentioned a transparent quality of the hallucination. When the hypnotist asked subjects about the chair in which the hallucinated associate was sitting, only 2 real hypnotized subjects (28.57%) and 1 simulator (5.26%) reported the dot on the chair. Chi-square analysis indicated a marginally significant difference in the number of real hypnotized subjects and simulators who reported the dot on the chair, $\chi^2(1, N = 26) = 2.72, p = .09$, but the numbers involved in this analysis are very small.

Experiential analysis technique data. For subjects who acknowledged the actual associate, 1 (33.33%) real hypnotized subject and 4 (80.00%) simulators showed a concentrative style, and 1 (33.33%) real hypnotized subject and 1 (20.00%) simulator showed a constructive style. (Style could not be determined for 1 real hypnotized subject.) For subjects who did not display trance logic, 2 (50.00%) real hypnotized subjects and 13 (92.86%) simulators showed a concentrative style, and no real hypnotized subjects or simulators showed a constructive style. (Style could not

be determined for 2 real hypnotized subjects and 1 simulator.) Real hypnotized subjects and simulators, regardless of whether they displayed trance logic, did not differ in terms of cognitive style on the hallucination. In terms of completeness (overall $M = 5.70$) and belief (overall $M = 6.25$), separate 2×2 (Subject Grouping $\times$ Trance Logic) analyses of variance yielded no significant effects; that is, all subjects showed similar degrees of completeness and belief in their hallucination experience.

Summary. Experiment 1 yielded no meaningful differences between real hypnotized subjects and simulators on trance logic on the double hallucination item, although a marginal difference occurred between real hypnotized subjects and simulators on the trance logic measure that involved the dot on the chair. In terms of the data obtained from the EAT, the experiment indicated no appreciable differences between real hypnotized subjects and simulators or between subjects who did and did not display trance logic on the double hallucination item. Notably, however, the subjects, regardless of whether they displayed trance logic, showed similar degrees of completeness of and belief in their hallucination experience.

Overall, and as with much previous research, the findings of the first experiment are consistent in some respects and inconsistent in others in terms of Orne's (1959) statements about tolerance of logical incongruity. Thus, depending on the particular item and the specific measure of trance logic associated with that item, hypnotized subjects can or cannot be said to display a tolerance of logical incongruity more so than unhypnotized subjects. The findings from application of the EAT, however, suggest that when trance logic occurs in subjects, it is not necessarily associated with subjects experiencing the suggested effects to an incomplete degree. These experiential data aside, however, an explanation of trance logic in terms of incomplete responding rather than tolerance of logical incongruity needs to be examined in more detail, and this is taken up in the second experiment.

Experiment 2

Spanos et al. (1987) suggested that the apparently illogical performance of some hypnotized subjects is based on the incompleteness of their experience of the suggested effect. In terms of the items we used in this study, for instance, the argument is as follows. Correctly spelling difficult words during age regression is illogical only if the experience of age regression is complete; if the age regression experience is incomplete, then it is not illogical to correctly spell the words. Similarly, acknowledging the actual associate while also hallucinating her is incongruous only if the experience of hallucination is complete; if the hallucination experience is incomplete, then it is not illogical to acknowledge the actual associate. From this perspective, when the experience of hypnotized subjects is incomplete, a difference between real hypnotized and simulating subjects on trance logic (as during age regression in Experiment 1) may reflect the difference between the actual (incomplete) experience of the hypnotized subjects and the pretense (of complete experience) by subjects who are faking excellent hypnotic performance. From this perspective, real hypnotized subjects who are experiencing an incomplete regression will tend to spell at least some words correctly; simulating, unhypnotized subjects, however,

will pretend to be experiencing complete regression and tend to spell the words incorrectly.

This analysis of the difference that was obtained between real and simulating subjects on the age regression item in Experiment 1 raises the question of whether a similar pattern of findings may be obtained in a context of testing that does not involve hypnosis. Such a nonhypnotic context in which subjects can reasonably be asked either to genuinely experience suggested effects or to simulate those effects may involve imagination. Moreover, in such a context the subjects can be preselected for their real or simulating roles on the basis of their imagery ability, in a manner analogous to the selection of subjects for the hypnosis context of Experiment 1 on the basis of their hypnotizability.

Whether real hypnotized subjects experience complete or incomplete age regression or hallucination in an imagination context is an empirical question. According to the argument of Spanos et al. (1987), however, if they experience complete effects, then the incidence of trance logic will be very low. If they experience incomplete effects, then the incidence of trance logic will be higher; these responses, however, would not be illogical ones. Exactly how simulating subjects perform on age regression and hallucination in an imagination context is also an empirical question. It is plausible, however, that these subjects will assume that the suggested effects ought to be complete and thus not display trance logic. From this perspective of discovery, Experiment 2 was conducted to evaluate trance logic responding in real and simulating subjects in a context of imagination, rather than hypnosis.

Experiment 2 paralleled Experiment 1 with the following differences. Subjects were preselected on the basis of their high and low imagery ability (rather than their high and low hypnotic ability), and the test procedures referred to imagination (rather than hypnosis). Thus, Experiment 2 involved real high-ability and simulating, low-ability subjects in an adapted application of the real–simulating paradigm and the EAT procedure in the imagination context.

Method

Subjects

Twenty-six (5 male and 21 female) real high imagery ability subjects of a mean age of 26.19 years ($SD = 12.97$) and 19 (4 male and 15 female) simulating, low imagery ability subjects of a mean age of 21.68 years ($SD = 6.10$) participated in the study. The subjects were undergraduate psychology students and received either research credit or nominal payment of $10.00 (Australian) in return for their participation. They were preselected on the basis of their extreme scores on the QMI. On this 245-point scale, the real high-ability subjects had scored in the range 42–72 ($M = 57.31$, $SD = 10.10$), and the simulating, low-ability subjects had scored in the range 104–175 ($M = 121.58$, $SD = 16.88$). The subjects had been tested also on the 12-item HGSHS:A. The HGSHS:A scores for the real ($M = 5.33$, $SD = 2.69$) and simulating ($M = 5.85$, $SD = 2.58$) subjects did not differ significantly.

Procedure

The procedure paralleled that of Experiment 1. The differences involved instructing subjects in terms of *imagery* and *imagination* rather than *hypnosis* and *hypnotic suggestion*. Thus, the first experimenter

instructed the high- and low-ability subjects according to our adaptation of the real–simulating model. High-ability subjects were told they would be tested by an experimenter who would ask them to imagine various things and that a third person would discuss their experiences of imagination with them. Simulators on the other hand were told that they ought to pretend to have excellent imagery and imagination. The second experimenter administered a relaxation procedure, the test items, and an alerting procedure; throughout this session, the experimenter referred to imagination (rather than hypnosis, as in Experiment 1). The third experimenter conducted the EAT session; again, this experimenter referred to imagination rather than hypnosis. Finally, subjects returned to the first experimenter, who ended the session. As in Experiment 1, the inquirer and an independent rater categorized subjects' comments in terms of cognitive style, completeness of experience, and belief in experience for both the age regression and hallucination items.

Results and Discussion

Table 2 presents the number of high-ability and simulating subjects who responded positively on various measures of the age regression and double hallucination items.

Age Regression

As can be seen in Table 2, all high-ability subjects and simulators passed the age regression suggestion; that is, they stated a younger age and showed a change in their handwriting. Of these subjects about three quarters of the high-ability subjects (76.92%) and half the simulators (52.63%) correctly spelled all the words. Most high-ability subjects (96.15%) and about two thirds of the simulators (68.42%) correctly spelled at least one word. Chi-square analyses indicated a marginal difference in the number of high-ability subjects and simulators who correctly spelled all the words, $\chi^2(1, N = 45) = 2.92$, $p = .08$, and a significant difference in the number of high-ability subjects and simulators who correctly spelled at least one word, $\chi^2(1, N = 45) = 14.08$, $p < .001$.

Experiential analysis technique data. For subjects who correctly spelled at least one word, 13 (52.00%) high-ability sub-

jects and 8 (61.54%) simulators showed a concentrative style, and 12 (48.00%) high-ability subjects and 5 (38.46%) simulators showed a constructive style. For subjects who did not display trance logic, 1 (100%) high-ability subject and 3 (50.00%) simulators reported a concentrative style, and no high-ability subject but 1 (16.67%) simulator reported a constructive style. (Style could not be not determined for 2 simulators.) Chi-square analyses indicated no significant differences. In terms of completeness (overall $M = 5.52$), a 2 × 2 (Subject Grouping × Trance Logic) analysis of variance yielded no significant effects. A similar analysis of belief yielded a marginally significant effect for trance logic, $F(1, 39) = 3.24$, $p = .08$. Subjects who displayed trance logic ($M = 3.63$) showed somewhat less belief in their age regression experience than those who did not ($M = 5.60$).

Summary. Like Experiment 1, Experiment 2 yielded a meaningful difference between high-ability subjects and simulators on the age regression item. More high-ability subjects than simulators correctly spelled at least one word; that is, more high-ability subjects than simulators displayed trance logic during age regression. In terms of the data obtained from the EAT, the experiment indicated no appreciable differences between high-ability subjects and simulators or between subjects who did and did not display trance logic on the age regression item in terms of cognitive style. Importantly, however, and unlike Experiment 1, subjects who displayed trance logic showed less belief but not less completeness in their age regression experience than those who did not display trance logic.

Double Hallucination

As can be seen in Table 2, more than three quarters of the high-ability subjects (80.76%) and all simulators (100%) passed the hallucination suggestion; that is, they reported seeing the associate in front of them. Of these subjects most of the high-ability subjects (95.24%) and simulators (89.47%) acknowledged the actual associate when the experimenter asked them to look behind to where she was sitting. About half the high-ability subjects (47.62%) and simulators (57.89%) maintained their report of the hallucination after being exposed to the actual associate; that is, they displayed double hallucination. In terms of the transparency measure, only 2 high-ability subjects (9.52%) and 2 simulators (10.53%) spontaneously mentioned a transparent quality of the hallucination. When the experimenter asked subjects about the chair in which the hallucinated associate was sitting, almost three quarters of the high-ability subjects (71.43%) and a third of the simulators (31.58%) reported the dot on the chair. Chi-square analyses indicated a significant difference only in the number of high-ability subjects and simulators who reported the dot on the chair, $\chi^2(1, N = 45) = 6.35$, $p < .05$.

Experiential analysis technique data. For subjects who acknowledged the actual associate, 5 (25.00%) high-ability subjects and 7 (41.18%) simulators showed a concentrative style, and 15 (75.00%) high-ability subjects and 10 (58.82%) simulators showed a constructive style. For subjects who did not display trance logic, no high-ability subjects but 2 (100%) simulators showed a concentrative style, and 1 high-ability subject (5.00%) but no simulators showed a constructive style. Chi-square analyses indicated no significant differences. In terms of completeness, a 2 × 2 (Subject Grouping × Trance Logic) analysis of

Table 2
Subjects Who Responded Positively on the
Measures in Experiment 2

Item and measure	Reals (n = 26)	Simulators (n = 19)
Age regression		
Passed suggestion	26	19
Correctly spelled all words	20	10
Correctly spelled at least one word	25	13
Double hallucination		
Passed suggestion	21	19
Acknowledged actual associate	20	17
Reported hallucination after exposure to actual associate	10	11
Mentioned transparency spontaneously	2	2
Reported dot on chair	15	6

Note. Reals indicates high imagery ability subjects.

variance yielded a significant effect for trance logic, $F(1, 36) = 9.49$, $p < .01$. Subjects who displayed trance logic ($M = 4.38$) reported less completeness of their hallucination experience than those who did not ($M = 7.00$). A similar analysis of belief yielded a significant effect for trance logic, $F(1, 36) = 6.77$, $p < .05$. Subjects who displayed trance logic ($M = 2.67$) reported less belief in their hallucination experience than those who did not ($M = 6.33$).

Summary. Like Experiment 1, Experiment 2 yielded no meaningful differences between high-ability subjects and simulators on the trance logic measure that involved acknowledging the actual associate. Unlike Experiment 1, however, virtually all subjects in this experiment passed the suggestion and acknowledged the actual associate; that is, virtually all subjects showed a classic trance logic response of double hallucination. Experiment 2 yielded a meaningful difference between high-ability subjects and simulators on the trance logic measure that involved the dot on the chair. More high-ability subjects than simulators mentioned the dot on the chair in which the hallucinated associate was sitting. In terms of the data obtained from the EAT, the experiment indicated no appreciable differences between reals and simulators or between subjects who did and did not display trance logic on the double hallucination item in terms of cognitive style. Importantly, however, and again unlike Experiment 1, subjects who displayed trance logic showed less completeness and less belief in their hallucination experience than those who did not display trance logic, and this is consistent with the argument based on the notions of Spanos et al. (1987).

General Discussion

Our findings are consistent with a number of previous investigations of trance logic. That is, real and simulating subjects differed on trance logic during age regression but not during hallucination. Notably, however, this pattern of responding occurred in both the hypnosis (Experiment 1) and the imagination (Experiment 2) contexts of testing. Collectively, the findings challenge the notion that trance logic is a distinguishing characteristic of hypnosis.

On the age regression item, more real than simulating subjects showed trance logic in both experiments. That is, more real than simulating subjects in both the hypnosis and the imagination contexts spelled at least one word correctly. Notably, however, the incidence of this type of trance logic was higher in the imagination than the hypnosis context. On the double hallucination item, there were no differences between real and simulating subjects in acknowledging the actual associate, and there were no differences in their spontaneous reporting of a transparent quality of the hallucination. There was a marginal difference between real and simulating subjects in the hypnosis context and a significant difference between them in the imagination context in their reporting of the dot when the hypnotist asked them to comment on the chair in which the hallucinated associate was sitting; that is, more real hypnotized or high imagery ability subjects than simulators displayed trance logic on this measure. Again, however, it is notable that the incidence of this type of trance logic was higher in the imagination than the hypnosis context.

Although the hypnosis and imagination contexts of testing probably place quite different social demands on subjects and subjects probably use different cognitive processes to experience the suggested effects, it is clear from the present research that trance logic responding can occur in hypnotic and imagination contexts and in both genuine and faking subjects in those two contexts. Moreover, given that trance logic occurred on some but not other measures, the question must be raised as to whether the processes that are involved in different types of trance logic are the same. Our research, together with other reported research (e.g., McConkey & Sheehan, 1980; Perry & Walsh, 1978; Spanos et al., 1987; Spanos et al., 1985; Spanos et al., 1989; Stanley et al., 1986), indicates that correct spelling during age regression does not necessarily involve the same processes as reporting a double hallucination or reporting a transparent quality to a hallucination. Thus, as Obstoj and Sheehan (1977) pointed out, there appears to be relatively little commonality across different measures of trance logic.

On the basis of this and other research, it appears that the only relatively consistent difference between real and simulating subjects occurs for trance logic during age regression; that is, more real than simulating subjects typically spell difficult words correctly during age regression (e.g., McConkey & Sheehan, 1980; Perry & Walsh, 1978; Spanos et al., 1987; Spanos et al., 1985; Spanos et al., 1989). The relevance of this difference for understanding hypnosis, however, is challenged by the finding in Experiment 2 that this difference occurs for real and simulating subjects who are tested in an imagination context as well. That is, even this difference between real and simulating subjects cannot be said to be associated particularly with hypnosis.

Interpretation of the performance of real and simulating subjects in the hypnosis and imagination contexts is assisted by the information that was obtained from the EAT. In terms of cognitive style, it was only on age regression in the hypnosis context that a particular style (constructive) was associated with trance logic; however, no strong inferences should be drawn from this finding because of the rather few subjects involved. Nevertheless, together with other work (e.g., Sheehan & McConkey, 1982), this finding suggests that cognitive style may be relevant to particular patterns of performance by hypnotized persons.

Interpretation of trance logic responses needs to account for the relevance of hypnotizability and imagery ability, and the inferences to be drawn from the present research are limited by the types of subjects who were tested. Despite strict screening on group and individual hypnotizability tests, a large proportion of high hypnotizable subjects did not display trance logic on at least one measure. This finding is consistent with other reports of trance logic that have used a range of screening criteria in testing hypnotizability (e.g., Marks et al., 1989; Stanley et al., 1986). This seems to indicate that factors that are not measured by standard hypnotizability tests contribute to trance logic responses. This possibility is consistent with divergent findings in the hypnosis and imagination conditions and with the complex relationship between hypnotizability and imagery ability (Sheehan, 1979). Arguably, a different pattern of findings may have emerged had our subjects in Experiment 1 been tested individually in hypnosis sessions more than once before the experimental session or had been selected through a different

combination of screening instruments. Similarly, a different pattern of findings may have emerged had our subjects in Experiment 2 been selected on a different measure of imagery ability. Nevertheless, our subjects were selected carefully and on standardized measures. Moreover, the findings from Stanley et al. (1986) indicate that a more rigorous selection of high hypnotizable subjects does not necessarily lead to a greater incidence of trance logic responding.

In terms of subjects' comments about the completeness of and belief in their experience of suggested effects, no differences were observed on these dimensions for either age regression or double hallucination in the hypnosis context. That is, no differences were seen between real or simulating subjects or between subjects who did or did not display trance logic. These findings challenge to some extent the interpretation offered by Spanos et al. (1987) that subjects who display trance logic are experiencing the suggested effect in a less complete way than those who do not display trance logic in the hypnosis context. By contrast, however, the differences observed on these dimensions in the imagination context are consistent with the interpretation offered by Spanos et al. (1987). In the imagination context, subjects who displayed trance logic on age regression showed less belief in their age regression experience than those who did not. Similarly, subjects who displayed trance logic on double hallucination showed less completeness and less belief in their hallucination experience than those who did not. Thus, although the notion that trance logic simply reflects incomplete experience may be viable in the imagination context, further work is needed to determine its specific relevance to the hypnosis context. Nevertheless, Spanos et al.'s (1987) interpretation of trance logic is a useful step in understanding this phenomenon.

At this stage in the investigation of trance logic, it is clear that Orne (1951, 1959) pointed importantly to a feature of hypnosis that Binet (1905) captured long ago:

> Let us put a key, a piece of coin, a needle, a watch into the anesthetic hand, and let us ask the subject to think of any object whatsoever; it will happen . . . that the subject is thinking of the precise object that has been put into his insensible hand (p. 28).

The exact nature of this apparent paradox remains elusive, however, and further research is needed to fully clarify its nature. Our research suggests that the context of testing will influence the incidence of trance logic and that particular test items and the specific measures applied to those items will yield varying patterns of response. Moreover, our research indicates that the completeness of subjects' experience and the belief that they hold in the reality of the suggested effect may play roles in trance logic under at least some circumstances. These and other variables need to be investigated systematically in future research. That research should be attuned especially, however, to the importance of understanding trance logic from the subject's point of view.

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