

**THE SKILLS OF HYPNOSIS**

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ABSTRACT

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Previous findings in the literature suggest that hypnotic susceptibility is related to cognitive skills that involve aspects of imagination, selective attention, and absorption. Consequently, a battery of tasks and paper-and-pencil inventories designed to measure these skills was administered to 60 subjects of high, medium, and low hypnotic susceptibility. Since most previous studies have investigated these correlates of hypnotizability on an individual basis, however, the present study sought to confirm and extend these relationships through the use of multiple predictors. The main hypothesis that post-hoc prediction of hypnotic susceptibility would be improved by the use of multiple predictors, as opposed to any single predictor, was supported. A stepwise discriminant analysis revealed that in most cases, high hypnotic susceptibility was related to vivid imagery, preference for an imagic cognitive style, reports of "unusual" subjective experiences in daily life, and relatively few errors on the Stroop Color and Word Test (Stroop, 1935). Additional variables from an auditory selective attention task that was designed for the present study emerged as significant discriminators also. This latter finding, however, is not easily explained at present. Further examination of the degree of effort that subjects deploy when performing difficult selective attention tasks may help to clarify this finding. In order to place the present results in the context of the current literature, univariate analyses are presented also. Results are discussed in terms of their relevance to the domain of hypnosis and to the clinical context.

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## TABLE OF CONTENTS

	Page
Abstract	i
List of Tables	iv
List of Figures	vi
Introduction	1
Method	30
Results	44
Discussion	90
Reference Notes	106
References	107
Footnotes	115
Appendices	118

## LIST OF TABLES

	Page
Table 1 Discriminating Variables in Predicting Group Membership	47
Table 2 Step-by-Step Percentage of Correct Classification for the Discriminant Analysis	48
Table 3 Prediction of Group Membership for Each Step of the Discriminant Analysis (for the Three Susceptibility Groups)	49
Table 4 Probability that a Member of the Predicted Group Would be as Far Away from the Centroid as Each Misclassified Subject	54
Table 5 The Standardized and Unstandardized Discriminant Function Coefficients Associated with the Eight Predictor Variables	56
Table 6 Measures of Central Tendency for the Seven Variables Demonstrating Significant One-Way Analyses of Variance	58
Table 7 Triserial $r$ Coefficients Between Hypnotic Susceptibility and Each of the 20 Variables	65
Table 8 Summary of Significant Results Obtained for the 20 Variables on the Three Different Analyses	71
Table 9 The Nine Variables Demonstrating Significant Relationships with Hypnotic Susceptibility (All Subjects)	74
Table 10 Multiple Correlation Values Between the QMI and the PICS and Each of the Seven Other Variables Demonstrating Significant Relationships with Hypnotic Susceptibility	77
Table 11 Chi-Square Analysis Comparing Reported Severity of Discipline Imposed on Subjects as Children by their Parents and Hypnotic Susceptibility	80
Table 12 Chi-Square Analysis Comparing Reported Subjective Experiences on the Modified Van Nuys Task (Did you feel as if you were there?) and Hypnotic Susceptibility	82
Table 13 Chi-Square Analysis Comparing Reported Subjective Experiences on the Modified Van Nuys Task (Did you feel as if you were observing the scene, like watching a movie?) and Hypnotic Susceptibility	83
Table 14 Chi-Square Analysis Comparing Scores on the QMI, PICS, and Hypnotic Susceptibility	85

**Table 15 Chi-Square Analysis Comparing Scores on the QMI, DPQ:Ab,  
and Hypnotic Susceptibility**

86

**Table 16 Chi-Square Analysis Comparing Scores on the PICS,  
DPQ:Ab, and Hypnotic Susceptibility**

88

LIST OF FIGURES

Page

Figure 1 Distribution of Subjects within the Discriminant  
Function Space Showing the Clustering of Each Group  
Around its Respective Group Centroid

52

## THE SKILLS OF HYPNOSIS

Numerous investigators have attempted to place hypnosis within the context of broader psychological theorizing. Early investigators, starting with the work of Hull (1933), sought to do this by correlating such inventory measures of personality as acquiescence, hysteria and neuroticism with a person's ability to become hypnotized. This initial approach, however, met with little success. In such studies, the correlations were either non-existent, very small, and/or unreliable (Barber, 1964; Bowers, 1976; Hilgard, 1965). A more recent line of approach is beginning to show more fruitful signs. Recent work on differential cognitive skills of individuals by investigators of quite divergent theoretical orientations has led to a certain degree of convergence concerning the subject characteristics that may be involved in hypnotic susceptibility (Spanos & Barber, 1974), leading to greater reconciliation between hypnosis research and mainstream psychology. Hypnotic susceptibility has been shown to be a relatively stable characteristic of the individual (Hilgard, 1965; Perry, 1977); measures of it appear to index the degree to which a person can set aside critical judgment (without relinquishing it completely), and indulge in the make-believe and fantasy conveyed by hypnotic suggestions (Gill & Brenman, 1959; Hilgard, 1977a). It is a differential phenomenon; it has been repeatedly demonstrated that from 10 to 15 % of all individuals are highly responsive (capable of posthypnotic amnesia), a further 10 to 15% are almost completely unresponsive and the remaining majority of individuals are able to experience some but not all of the subjective



alterations that are at the core of a hypnotic procedure, and to varying degrees (Bernheim, 1889; Faria, 1819; Hilgard, 1965).

Since hypnotic susceptibility is a stable characteristic among adults, it is not surprising that investigators in the past were persistent in attempting to find the "typical" hypnotizable personality. (Research with children has shown that hypnotic susceptibility fluctuates during childhood and stabilizes around adolescence (Bowers, 1976; Gardner & Olness, 1981; Gordon, 1972)). The state of the art in the search for gross personality characteristics of hypnotizability can be summed in the following statement: "There may indeed be personality traits which distinguish persons of different degrees of hypnotic susceptibility and these traits may well be worth discovering; but it seems quite clear that they are not going to be discovered by any of our existing gross personality inventories.... It is time to stop doing studies (of this sort) and seek a fresh approach (Schulman & London, 1963, p. 159)."

Fresh approaches have been attempted since the preceding observation was made. Studies of the last two decades have focused on various skills and personal experiences thought to be related to hypnotic susceptibility. Guided by various theories of hypnosis, researchers have investigated possible relationships between hypnotic susceptibility and subject variables such as creativity (P. Bowers, 1979; Perry, Wilder, & Appignesi, 1973), selective attention (Graham & Evans, 1977; Karlin, 1979; Van Nuys, 1973), absorption in sensory and aesthetic experiences (As, 1963; Shor, Orne, & O'Connell, 1962; 1966; J. Hilgard, 1970/1979;

1974; 1979), vividness of reported imagery in various sensory modalities (J. Hilgard, 1970/1979; Perry, 1973; Sutcliffe, Perry & Sheehan, 1970), imaginative involvement in childhood as a prerequisite for hypnotic susceptibility in adulthood (J. Hilgard, 1970/1979; 1974; 1979), and fantasy production in daily life (Wilson & Barber, Note 1; 1982). The picture that is emerging from these and other studies is that the distortions in perception, memory, and/or mood that characterize the hypnotic experiences of highly hypnotizable individuals (Orne, 1980) are partially due to their ability to fantasize the suggested situation to a high degree while disregarding information not consistent with the hypnotic suggestions (J. Hilgard, 1974; Spanos & Barber, 1974). This ability appears to be related to the person's cognitive abilities out of hypnosis. Further, J. Hilgard (1965) has suggested that there may be numerous "pathways" in the course of normal development leading to the acquisition of skills necessary for hypnotizability. How this hypothetical "package" of skills a hypnotizable person may possess translates into hypnotic performance, however, is still the subject of an on-going debate.

Hypnosis has a long, and particularly rich history which spans the last 200 years. Current theorizing needs to be placed within the context of the gradual development over this period from theories such as that of Mesmer, who viewed hypnosis as entirely the product of the hypnotists' powers over the hypnotized person, to current theorizing which sees hypnosis as primarily a manifestation of the skills of the hypnotized person. Initially, the earlier historical conceptions are

4

reviewed briefly, following which more recent theorizing, and the data on which it is based, is surveyed in more detailed fashion.

Theories of hypnosis.

What we now call hypnosis was introduced into European society by Franz Anton Mesmer, who called it animal magnetism. He believed that there were invisible forces or fluids in the atmosphere which could be harnessed by the hypnotist, accumulated in his body, and transmitted to sick persons in a manner that was curative of physical illness. Notwithstanding the fact that Mesmer obtained sufficient cures with magnetism with patients who had not responded to the orthodox medicine of his day, his theory that magnetic phenomena depended upon the special skills and supranormal powers of the magnetist was demonstrated to be false by two French Royal Commissions of 1784, one of which was headed by Benjamin Franklin.

Using a series of blind experiments, the Commission demonstrated that magnetic effects often occurred when patients thought that they were being magnetized when actually they were not, and vice versa. From this, the Commission concluded that magnetic phenomena could be explained with reference to the imagination of the magnetized patients. The Commissioners, however, used the term "imagination" perjoratively and concluded incorrectly that if animal magnetism did not exist, it could not have curative effects. Their conclusions notwithstanding, the notion that magnetizers possessed supranormal powers remained popular with the Marquis de Puységur, a student of Mesmer, and others until well into the late nineteenth century.<sup>1</sup> Even at this time, however, theories

that postulated internal characteristics of the magnetized person as prime determinants of hypnotic behavior (a position that more closely parallels modern views) were beginning to develop.

The Abbé Faria (1756-1819) was the first to argue that the curative effects of animal magnetism were due mainly to inherent, internal characteristics of the patient. He coined the term lucid sleep to replace animal magnetism and ridiculed the views of the animal magnetists and their emphasis on external agents, such as the baquet, as a catalyst for cure. (The baquet was a large oak cast filled with water, glass and iron fillings, around which expectant patients sat, awaiting Mesmer's theatrical entrance.) Faria was thoroughgoing in his rejection of Mesmeric practices and theories. He wrote, for instance:

I am not able to conceive how the human species can be so bizarre that it has to search out the cause of this phenomenon in a baquet, in some external force, in a magnetic fluid, in animal heat and in a thousand other ridiculous extravagances of this nature when this type of sleep is common to all human nature by dreams and to all individuals who get up, walk, and talk in their sleep (Faria, 1819, p.33, quoted in Sheehan and Perry, 1976).

Further, Faria concluded that the most responsive individuals were anemics, hysterics, and other highly impressionable people. This view, contradicted by present knowledge, nevertheless represents the first attempt to emphasize internal characteristics of hypnotically responsive

individuals without discounting the "reality" of the phenomenon. This emphasis, along with Faria's observation that, "lucid sleep ... is in France in the ratio of one in five or six of the population (Faria, 1819, p.142)," anticipated present conceptions of individual differences in hypnotic susceptibility.

Another major figure in the history of hypnosis was James Braid, an English surgeon. Braid, who coined the term "hypnosis" (from the Greek hypnos, to sleep), initially viewed hypnotic phenomena in physiological terms (Braid, 1843). He subsequently emphasized psychological processes (1846), especially that of imagination in response to suggestion. He later added heightened concentration, belief and expectancy as variables relevant to hypnotic responsiveness (1855), thereby anticipating aspects of the social-psychological position held by Barber and his colleagues (Barber, 1969; Barber, Spanos, & Chaves, 1972).

Theories of hypnosis emphasizing the role of the external influence of the hypnotist, as opposed to the internal skills of the subject, nevertheless continued to flourish at this time; they were dealt a final blow as a result of the controversy between the Nancy and Salpêtrière "schools" in France. Hippolyte Bernheim (1837-1919), a medical professor at the University of Nancy, championed a psychological explanation of hypnotic phenomena as a result of becoming interested in the cures obtained with hypnosis by the country physician Augustin Liébault (1823-1904). Jean-Martin Charcot (1835-1893), the highly respected neurosurgeon at the Salpêtrière Hospital in Paris, on the other hand, believed that hypnotic phenomena were brought about through external means, including occasionally through the use of magnets.

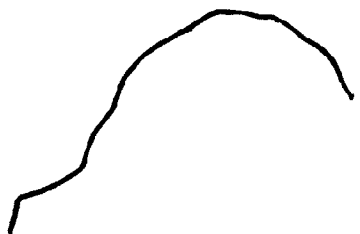
Charcot's theory was essentially a restatement of magnetic doctrines which were scoffed at by most of the scientific community; it was accepted nevertheless, primarily because of Charcot's deserved international reputation (See Ellenberger, 1970; and Sheehan & Perry, 1976, for a discussion). Rejecting psychological conceptions, Charcot looked upon his hypnotic subjects, all females suffering from hysteria, as neuropathological patients. A meticulous observer, Charcot believed that he had found that hypnosis consisted of three "stages", each documented by its own unique neurological signs. Charcot's techniques included eye fixation to enter the first stage of lethargy, the use of sudden stimuli such as sounding a Chinese gong to enter the second stage of catalepsy, and applying pressure to the vertex of the scalp to achieve the final stage of somnambulism. The neurological signs that Charcot "discovered" included exaggeration of the tendon reflex and heightened neuromuscular activity (lethargy), disappearance of the tendon reflex and complete insensibility to pain (catalepsy), and the non-existence of neuromuscular excitability (somnambulism). Believing that his patients were unconscious when hypnotized, however, Charcot openly discussed his expectations and theories in their presence. According to present knowledge then, Charcot's "discoveries" resulted from explicit demand characteristics (Orne, 1962) placed upon his patients so that his patients were, in effect and unbeknown to him, trained subjects.

Bernheim was able to demonstrate that Charcot's discoveries were contaminated by his naturalistic method of observation. He demonstrated.

that since he could obtain essentially the same results as Charcot through other means (e.g., simple eye closure, "Passes" with the hand, and verbal suggestion), the latter's mechanical methods were spurious. Further, Bernheim's patients did not demonstrate Charcot's neurological signs. From this, Bernheim concluded that suggestion was the essential element in eliciting hypnotic phenomena. Moreover, through experience with 600 of his own and 6000 of Liébault's patients, Bernheim established that high responsivity to hypnosis occurred in 15-18% of the cases and that it was not restricted to hysterics.

By the end of the nineteenth century, Charcot's emphasis on external agents gave way to Bernheim's concept of hypnosis as a state of heightened suggestibility. Indeed, this was the position put forward by C.L. Hull in his classic 1933 work, Hypnosis and suggestibility. Hull stated:

The only thing which seems to characterize hypnosis as such and which gives any justification for the practice of calling it a "state" is its generalized hypersuggestibility. The difference between the hypnotic state and the normal is, therefore, a quantitative rather than a qualitative one... no phenomenon whatever can be produced in hypnosis that cannot be produced to lesser degrees by suggestions given in the normal waking condition (p.391).



The circularity of Hull's position (that a hypnotized person is highly responsive to suggestion and therefore hypnosis is a state of hypersuggestibility) notwithstanding, the idea that hypnosis is essentially a psychological phenomenon was finally established through extensive experimentation, confirming the naturalistic observations of nineteenth century figures such as Faria, Braid, and Bernheim. Further, Hull's views on waking suggestibility are important historically since they allude to hypnotic skills as being on a continuum and emphasize also that these skills are available to the person in non-hypnotic contexts. More recent theorists, who reject a formulation of hypnosis in terms of suggestibility because of the inherent circularity of the notion, have hypothesized that various cognitive skills, such as imagination, ability to become intensely absorbed, and the additional ability to dissociate, are available to individuals to varying degrees and that those who possess them in great abundance are most highly hypnotizable. There is disagreement as to how these skills come to be deployed in the hypnotic situation, but research is converging to some extent on common notions as to what skills are involved in hypnotic responsiveness (Spanos & Barber, 1974).

One of the recent theorists to emphasize cognitive skills, T. R. Sarbin, initially put forward a "role-enactment" theory of hypnosis in 1950, a position later expanded upon (Sarbin & Coe, 1972). In essence the theory postulates that hypnotic behavior and experience can be explained most parsimoniously along a continuum of degree of involvement in the hypnotic "role". Sarbin (1950) postulated that a hypnotized



person, similar to a "heated" actor who becomes so involved in a dramatic role that he or she is temporarily unaware of a "self", reacts to imagined stimuli as if they were actually present. In addition, this alteration of cognitive processes in hypnosis was seen by Sarbin as involving non-specified skills not unique to hypnosis. Reminiscent of Charcot, Sarbin (1950) proposed that in its extremes, as if behavior is present in pathological hysteria. Indeed, Sarbin and Mancuso (1980) have advanced the view that schizophrenia and depression can also be explained in terms of role-enactment theory. Thus, Sarbin has attempted to encompass a wide variety of human behavior within his concept of role enactment. Hypnotic behavior, however, is not seen as pathological; Sarbin sees it as ranging along a cognitive continuum from technical acting when role and self are differentiated, through "heated" acting, hypnosis, and hysteria where these two characteristics become progressively more fused. Further, as if behavior is thought by Sarbin to be involved in fantasy, play, and in all forms of imaginative behavior (1950).

In the Sarbin and Coe (1972) extension of the theory, greater emphasis is placed on the social antecedents of hypnosis such as situational and expectational variables as opposed to the internal processes implied by the dramaturgical metaphor. Although unspecified role skills are still retained in this later view, social variables such as conforming to the social expectations of the hypnotic situation, the reinforcing properties of the audience (e.g., the hypnotist), and the extent to which the person perceives the role as favorable, are postulated as

more crucial to the subjective alterations that occur in hypnosis than are the internal process variables implied by the notion of believed-in-imaginings. That is, a highly hypnotically skilled person may not demonstrate high responsivity if he/she perceives the social variables negatively and a relatively poorly skilled person may show high responsivity if they are perceived positively. As such, this later formulation emphasizes the interaction between situation and skill, with the greater emphasis being placed on external rather than internal process aspects.

Another theorist in hypnosis, T. X. Barber, initially attempted to explain hypnotic phenomena in terms of compliant behavior dependent upon social antecedent variables such as motivation, expectancies, beliefs, and desire to please the hypnotist (Barber, 1969). Indeed, Barber's (1969) logical positivist approach rejected internal subjective experiences of the hypnotized person as not being amenable to scientific investigation. This criticism of the entire field of hypnotic research led to some scathing attacks on his position (See for example, Hilgard, 1971, where Barber is labelled "an enemy from within").

More recently, Barber and his colleagues (Barber & Ham, 1974; Barber, Spanos, & Chaves, 1974; Spanos & Barber, 1974) have emphasized the special relevance of imagination to hypnosis. While maintaining belief in the importance of social-psychological variables, this new approach represents a gradual progression away from the strict logical positivist approach. Hypnotic behavior and the accompanying cognitive processes are conceptualized in terms of "involvement in suggestion-

related imaginings" (Barber & Ham, 1974; Barber et al., 1974). It is argued that the imaginative skills necessary for hypnotic performance are internal responses to external stimuli, such as verbal suggestion, and are therefore differentiated from night dreaming. Further, these skills are thought to be available to the person in non-hypnotic contexts also.

This view has been developed further (Spanos, 1971), in the form of the construct of goal-directed fantasy, which follows from White's (1941) construct of goal-directed striving. This latter formulation saw the hypnotic subject as attempting to behave like a hypnotized person as this is being communicated to him or her by the hypnotist. In the Spanos (1971) model, the "good" hypnotic subject is said to vividly imagine the suggested situation in such a way that, if it actually occurred, would bring about the suggested effect. For an arm heaviness suggestion for instance, imagining that a heavy object has been placed in an outstretched hand would be an example of a goal-directed fantasy. The extent to which a subject is capable of becoming involved in the imagined situation determines, in part, his or her degree of responsiveness. While this position is an extension of the basic social-psychological position since the subjects' imaginings are thought to be mainly directed through social variables, hypnotic responsiveness is thought to index more than mere compliance.

More recently, Barber's position has undergone an even more radical extension (Wilson & Barber, Note 1; 1982). In these papers, extensive interviews with female hypnotic "virtuosos" (top 4% of hypnotic

susceptibility) are reported. These subjects were found to be so involved in fantasy in their everyday lives that the authors labelled them "fantasy addicts". The women reported almost constant fantasy while simultaneously going about their daily activities. These interviews, which will be discussed more extensively in the following section, represent a shifting of emphasis for Barber from the social antecedents of hypnotic responsiveness to internal subject characteristics.

In another context, Gill and Brenman (1959) have attempted to relate hypnosis to psychoanalytic theory, stressing regression and transference as explanatory concepts. According to their formulation, the hypnotized person is in a partially regressed state, according to the concept of "regression in the service of the ego". Further, the authors have proposed that the hypnotized person's usual sense of reality is held in abeyance, resulting in fantasy becoming virtually indistinguishable from objective reality.

In a different line of enquiry, Sutcliffe (1958) has argued that the hypnotizable subject is "deluded" into thinking that "reality" is as the hypnotist is suggesting. Delusion here is used in a non-perjorative sense and its extent, according to Sutcliffe, is primarily dependent upon the subject's aptitude for fantasy experiences that are not constrained by the reality principle in both hypnotic and non-hypnotic contexts. Central to this aptitude for fantasy is the subject's capacity for vivid imagery (Sutcliffe, Perry, & Sheehan, 1970).

The ability to become absorbed in externally directed fantasy without the usual reality constraints has also been emphasized by the late R. E. Shor. In a number of influential papers, Shor (1962; 1970; 1979), drew upon the construct of the generalized reality orientation (GRO) to account for the apparent merging of fantasy and objective reality for some people in hypnosis and in non-hypnotic activities such as reading. For Shor, the GRO is a "network of cognitive understandings about reality in general which serves as a context or frame of reference within which all ongoing experiences are interpreted (Shor, 1979; p. 122)". The GRO, according to Shor, serves to give ongoing experiences their usual wide abstract interpretative significance. This framework is absent in the hypnotic situation as the GRO is temporarily eliminated from the background of consciousness, resulting in the highly responsive individual not being consciously aware of the distinction between reality and imagination.

The idea that aptitude for fantasy is an important determinant of hypnotic susceptibility has been taken up more extensively by J. Hilgard (1970/1979; 1974; 1979) and is subsumed under the rubric of "imaginative involvement", a concept that Gill (1972) has stated is consistent with the earlier (Gill & Brenman, 1959) psychoanalytic formulation. In extensive interviews with hundreds of subjects prior to hypnosis, Hilgard has documented the high degree of involvement highly susceptible individuals experience in everyday activities such as reading, the dramatic arts, appreciation of sensory stimulation, and enjoyment of absorbing physical and mental adventures. Further, she has speculated

that this capacity for imaginative involvement is developed in childhood and that there may be a critical period for its development (a speculation consistent with empirical data that demonstrate the "peaking" of hypnotizability at the time of adolescence; see Bowers, 1976, for a review).

The extent of involvement in non-hypnotic activities is exemplified by a statement of one of Hilgard's high susceptible subjects on reading a novel:

I don't especially identify with any person. If there's a hero, I hope he'll win. If a bad guy, I hate him. I'm emotionally involved as a bystander. I'm somebody who's there. (invisible?) Yes, they don't know I'm there, but I'm in the middle of the action. Sometimes I identify with the character, and then will dream that I'm the character for two or three nights. I continue with the story rather than having it end... In some ways I know I'm myself, I have my own identity, but on many levels, I'm that other person--thinking like that person and acting the way that person would act (Hilgard, 1974, p. 141).

An unexpected finding of the Hilgard interviews was that 21 of the 42 highly susceptible subjects reported having received moderate to severe punishment in childhood while 13 of the 15 low susceptible subjects reported mild or no punishment, with the remaining two lows reporting

moderate punishment (Hilgard, 1974). The hypothesis that obedience to higher authority may be at play in hypnotic responsiveness was refuted by the observation that few of the highs reported prompt obedience to parents. Indeed, it appears that lack of obedience was one of the causes for these subjects receiving relatively severe and frequent punishment. Thus, "of the 21 highs who reported moderate or high punishment, 12 (57%) reported fantasy either as an accompaniment of the punishment experience or as an after-effect (Hilgard, 1974, p. 145)." These subjects, then, used fantasy to block the pain of punishment as it was occurring and as a coping mechanism while in subsequent isolation. Further, most of the reported fantasies had no hostile content; as children, the subjects apparently concentrated on fantasies incongruent with the unpleasantness associated with the punishment. Hilgard (1974; 1979) has emphasized, however, that punishment in childhood is not necessary for the development of hypnotic susceptibility. Rather, it appears to be one method by which the fantasy skills of the hypnotizable individual are developed or, in Hilgard's terminology, it may represent one of the "pathways" to hypnotizability.

Using hypnotic phenomena as a point of departure, E. Hilgard (1973a, 1973b, 1977a, 1977b, 1979) has put forth a neo-dissociation theory of cognitive processing that has its historical roots in the dissociation theory of Janet (1889). The major tenet of neo-dissociation theory is that mental functioning may be regulated by a hierarchy of cognitive controls rather than by a single mental apparatus, such as consciousness. The classes of phenomena that the theory seeks to account for can be subsumed under the general title of cognitive processing out of awareness.

According to the theory, in hypnosis and in dual activities such as driving a car and simultaneously carrying on a conversation, behavior can be seen as involving a fair degree of automaticity (Hilgard, 1977a). An "executive ego" is postulated to be the controlling factor that regulates the prominence of particular cognitive subsystems in particular situations. In sleep, for example, the subsystem controlling dreams is dominant, but during waking, it is present in a subsidiary role, as evidenced by daydreams and waking fantasy production. Further, the executive ego is thought to be constantly critically scanning the environment. In hypnosis and in other activities when critical scanning is reduced, the person's ability to consciously differentiate reality from fantasy is likewise reduced. On some level, however, the individual maintains a reality awareness, as evidenced by the hypnotized person's ability to refuse a suggestion and also in the case of self-hypnosis, where the person is simultaneously the hypnotist and the hypnotized person.

While neodissociation theory was derived from the study of hypnotic phenomena, Hilgard (1973b) has asserted that it can account for non-hypnotic cognitive phenomena involving aspects of automatic behavior. Indeed, Hebb (1982) has stated that Hilgard's work is important because it "brings hypnosis closer to everyday experience (p. 52)". Using hypnosis as a starting point is also useful since, as J. Hilgard (1974) has cautioned, relying too heavily on explanations of hypnotic phenomena in terms of broader theories may cause "some of the puzzling problems of hypnosis (to be) overlooked, with familiar metaphors substituting for precise explanations (p. 151)".



In another line of inquiry, it has been suggested that susceptibility to hypnosis should be routinely assessed in clinical contexts, regardless of whether or not hypnosis is to be used in treatment. Bowers and Kelly (1979), for example, have emphasized that in the therapeutic situation, "it is not so much the external trappings of hypnotic suggestions and procedures, but characteristics of the person receiving them, that are crucial to reported successes of suggested healing (p. 501)". Further, they argue that any communication (with or without hypnosis) can serve as a suggestion which is beneficial to the patient if he or she possesses the cognitive skills required to translate "mere words" into curative effect. Similarly, Frankel et al. (1979) have found, contrary to traditional clinical belief, that assessment of patients' susceptibility to hypnosis almost always results in a positive experience for the patient, even when he or she demonstrates low responsiveness and fails most or all of the hypnotic test items. The authors emphasize the importance of appropriate rapport with the patients and report highly favorable results when hypnosis is presented as one of a number of tests designed to aid in the development of treatment strategy.

As we have seen, theories differing widely in perspective and emphasis have tended to hone in on three aspects of the hypnotic experience: imagination (and the related skill, imagery), degree of involvement in the suggestions (what may be termed absorption), and inattention to details not consistent or not relevant to the hypnotic suggestions. Further, many theories have postulated that these three aspects are

representative of cognitive skills which are available to the person in non-hypnotic contexts and which are potentially useful in clinical situations. While it is certainly true that one's theoretical orientation guides one's methodology (Sheehan & Perry, 1976) and determines which questions are asked (Spanos & Barber, 1974), much recent research has focused on the above three hypothesized skills of hypnosis. It appears that, to an increasing extent, the vision of researchers is not limited by their theoretical paradigms (Kuhn, 1973) and we now turn our attention to this recent research that bears upon the issue of hypnotic susceptibility as a "package" of cognitive skills.

#### Research

Traditional emphasis on cognitive phenomena of hypnosis such as hallucinations has led some researchers to emphasize the ability of highly hypnotizable individuals to form images and to indulge in fantasy (Sheehan, 1979). Research on vividness of imagery in relation to hypnotic susceptibility has predominantly concentrated on self-report inventories such as the shortened version of Betts' Questionnaire Upon Mental Imagery (QMI) (Betts, 1909), developed by Sheehan (1967), Marks' Vividness of Visual Imagery Questionnaire (VVIQ) (Marks, 1973), and Gordon's Test of Imagery Control (see Richardson, 1969).

In the initial study utilizing the shortened version of the QMI (Sheehan, 1967), Sutcliffe, Perry and Sheehan (1970) found an overall significant correlation between imagery and hypnotizability, as measured by the Stanford Scale of Hypnotic Susceptibility, Form C (SHSS:C) of Hilgard and Weitzenhoffer (1962). On closer analysis, however, the data

revealed a significant correlation for male but not for female subjects. Further, the relationship was shown to be non-linear. That is, poor imagery was almost always indicative of low hypnotic susceptibility but good imagery was not necessarily indicative of high susceptibility. The authors concluded that good imagery was a necessary, but not a sufficient, condition for hypnotizability.

J. Hilgard (1970/1979) also found an overall positive relationship between vividness of imagery and hypnotizability but the burden of the relationship in her study was carried by the female subjects. To complicate matters further, Perry (1973) and Morgan and Lam (Note 2) were unable to find a significant relationship between imagery and hypnotizability, although Perry (1973) was able to replicate the Sutcliffe et al. (1970) finding that poor imagers are almost invariably insusceptible to hypnosis.

Sheehan (1979) cites a study by Rhoades and Edmonston (1969) to argue that perhaps the sex differences found in these studies may actually be due to other factors, such as socioeconomic background. In the study, a positive relationship was found between imaginative activity (as measured by Cattell's Factor M of the 16 PF Scale) for the males in one sample and for neither sex in another sample. Unlike the other subjects, the males who accounted for the relationship were highly homogeneous with respect to socioeconomic level. Thus, the inconsistency of results in the Sutcliffe et al. (1970), Hilgard (1970), and Perry (1973) studies may at least be partially due to this potential confound, especially since the samples were drawn from Australian, American, and Canadian populations, respectively.

Additional problems with the self-report imagery scales is the potential confound of social desirability. Although there is conflicting evidence on the importance of social desirability in the self-report scales (see Isaacs, Note 3), one study (Divesta, Ingersoll, & Sunshine, 1971) found that subjective imagery measures all loaded on the factor on which the social desirability measure had its highest loading.

Sutcliffe et al. (1970) and Perry (1973) also employed a fantasy index in terms of distortion of reported night dreams. Near zero correlations between hypnotic susceptibility and the fantasy measure were found in both studies. In part, this finding may be reflective of the difficulties inherent in asking for dream reports sometime after the dreams have occurred. A potentially more telling explanation, however, is offered by Bowers (1976). Since hypnosis appears to be related to externally incited fantasy (e.g., J. Hilgard, 1970/1979; 1974; 1979), it should not be surprising to find that night dreams, which are essentially unbidden and which center around personal concerns, are not related to hypnotizability.

Isaacs (Note 3) has recently developed a self-report scale that attempts to measure four aspects of subjects' thinking styles: Verbal, Imagery, Absorption, and Effort. Results of the Preference for an Imagic Cognitive Style Test (PICS) revealed that high susceptible individuals (as measured by the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A) of Shor and Orne (1962)) tended to prefer an imagic and effortless style of thinking; low susceptibles, in contrast,

tended to prefer a verbal and effortful style. Isaacs notes that this bipolarity was not a necessary outcome of the test since subjects are not forced to choose between the two styles; the test allows for each of the four aspects of thinking style to be assessed independently.

Another line of enquiry that has shed some light on the "pathway(s)" to hypnosis hypothesis (J. Hilgard, 1965) is represented by various experience inventories. Shor (1960) initially investigated the frequency of naturally occurring "hypnotic-like experiences" in the normal population. The questions tapped various types of experiences such as absorption (Have you ever become so absorbed in listening to music that you were hardly aware of your surroundings?), imagination (Have you ever been able to quiet down your mind, construct a new imaginary world, and feel for the time that it was real?), and unusual experiences (Have you ever felt a second self floating above your body and looking down on the other as an empty shell?). Shor (1960) found that the frequency of such experiences to be quite high among college students. In a subsequent study, Shor, Orne, and O'Connell (1962) found that reported intensity, but not frequency, of such experiences was related to hypnotizability.

Working independently, As and his colleagues (As, 1962; 1963; As, O'Hara, & Munger, 1962) developed similar inventories. Two main "experience clusters" to emerge from these factor-analytic studies were ability to become absorbed in nature, art, or a particular role, and tolerance for unusual experiences. Attempts to relate reports obtained on

the Shor and As inventories to hypnotic susceptibility have yielded low to moderate correlations, usually between .25 and .50 (As, 1962; 1963; Shor et al., 1962; 1966; Lee Teng, 1965).

The developmentally oriented work of J. Hilgard (1970/1979; 1974; 1979) already discussed, has led to further interest in everyday experiences of hypnotically responsive individuals. In a series of extensive and surprisingly candid interviews, Wilson and Barber (Note 1; 1982) have outlined the characteristics of highly hypnotizable (top 4%) females. These excellent hypnotic subjects differ markedly in personality make-up (e.g., some are introverted and some are extraverted) but all share unusual characteristics, a syndrome the authors have labelled "addiction to fantasy".

These interviews have confirmed Hilgard's (1970/1979; 1974; 1979) observations on the development of fantasy skills among high susceptibles. Further, the Wilson and Barber subjects reported being engaged as adults in almost constant fantasy while simultaneously going about their daily activities without any apparent interference. Indeed, fantasizing appears to have the opposite effect; all of the subjects reported that they could not imagine how they would be able to get along without the internal imaginary fantasies that they have enjoyed since childhood.

Wilson and Barber (1982) report that of their 26 hypnotic "virtuosos", 85% report fantasies as being so realistic that they tend to confuse their memories of fantasies with memories of real events; 60% report having had at least four symptoms of "phantom pregnancy" at least once in their lives; 75% report being able to experience sexual orgasms

solely through sexual fantasies; 85% report realistic out-of-body experiences; 67% felt that they have the ability to heal through the use of touch; and 75% report encounters with spiritual apparitions. Not surprisingly, all of these subjects report also that they have learned to avoid ridicule by keeping their fantasy world primarily to themselves. Further, these high percentages of unusual experiences reported by these subjects is in sharp contrast to the very low frequency of these and other unusual experiences reported by otherwise equivalent but low susceptible controls.

In an often cited study, Tellegen and Atkinson (1974) found a relationship between a 34-item scale they labelled "Openness to Absorbing and Self-Altering Experiences" or simply, "Absorption", and hypnotic susceptibility as measured by the HGSHS:A. Some of the items from the "Absorption" scale were taken from the inventories developed by Shor and As, along with other items chosen by the authors. Through factor-analytic methods, the authors isolated six primary factors that loaded above .30 on the "Absorption" scale. These were labelled Reality Absorption (e.g. The sound of a voice can be so fascinating to me that I can just go on listening to it), Fantasy Absorption (e.g. I am sometimes able to forget about my present self and get absorbed in a fantasy that I am someone else), Dissociation (e.g. If I wish, I can imagine that my body is so heavy that I could not move it if I wanted to), Sleep Automatism (e.g. I know at sometime I have walked in my sleep), Openness to Experience (e.g. I enjoy-- or would enjoy--getting beyond the world of logic and reason to experience something new and different) and Devotion and

Trust (e.g. It gives me--or would give me--deep satisfaction to devote myself to someone I care about). Results with two samples indicated that the "Absorption" scale correlated significantly with hypnotic susceptibility. Further, this finding has been replicated (Finke & Macdonald, 1978).

The absorption dimension has also been investigated in another context. Van Nuys (1973) found that the ability to become absorbed in fifteen minute meditation tasks was related to hypnotizability on the HGSHS:A. Subjects were instructed to meditate for fifteen minutes on a candle and then for another fifteen minutes on their breathing. They were further instructed to attempt to block out all thoughts, including thoughts on the candle and on their breathing. They were left alone in the testing room and were asked to record any random thoughts on a counter. The number of random thoughts reported by the subjects for both tasks was found to correlate with hypnotizability to a significantly negative degree.

Based on the work of Norman (1968), Karlin (1979) has advanced an attentional explanation of cognitive hypnotic phenomena (e.g., hallucinations and posthypnotic amnesia). According to Norman's (1968) model, relevant and irrelevant information in a selective attention task are initially processed in parallel (i.e., simultaneously) and only the information that is judged to be "pertinent" receives additional processing. Karlin's (1979) formulation "postulates that highly hypnotizable individuals differ from others in the ability to shift the pertinence of information in primary memory and in long-term storage (pp. 92-93)".



Subjects, who had already been assessed on the HGSHS:A, were asked to listen to two tapes containing different information as they were played simultaneously over a single speaker. For half the subjects, Tape 1 was the target and Tape 2 was the distractor; the reverse was true for the remaining subjects. On the basis of the number of items recalled and the perceived difficulty of the task, subjects were classified into either the good pertinence shift (GP) group or the poor pertinence shift (PP) group. Karlin (1979) found, as hypothesized, that subjects in the GP group passed significantly more of the three cognitive items on the HGSHS:A (mosquito hallucination, posthypnotic suggestion, and posthypnotic amnesia), than did the subjects in the PP group.

In another study investigating the potential relationship between attentional factors and hypnotizability, Ingram, Saccuzzo, McNeill, and McDonald (1979) found that high susceptible subjects were more resistant to the effects of a backward-masking stimulus in a visual information-processing task than were low susceptible subjects. (Subjects' hypnotizability had been previously assessed on the HGSHS:A.) For the experiment, letters of the alphabet were initially presented in a tachistoscope in order to determine each subject's critical duration time, which was defined as the stimulus duration at which he or she could correctly identify four consecutive presentations of the target stimuli. The two groups of subjects did not differ significantly on this dimension. Significant differences between the groups were found, however, for the duration of the interstimulus interval. This was defined as the minimum amount of time required between the offset of the target stimulus and

the onset of the masking stimulus to correctly identify four consecutive presentations of the target stimuli. It was found that low susceptibles required a longer mean interstimulus time, indicating slower speed of information processing. Results were interpreted by the authors as supporting the hypothesis that high susceptible subjects possess superior attentional abilities by virtue of their demonstrated more rapid processing of the visually presented information.

Finally, Graham and Evans (1977) have developed a measure of waking attention deployment--the random-number generation task (RNG). For this task, subjects are asked to either call out or write the numbers from 1 to 10 inclusive in random order to a metronome beating once a second. The task is not easy for subjects to perform since they must monitor their previous output in order to select appropriate numbers as the task progresses and to simultaneously disregard all they know since childhood about the correct order of numbers. The authors found that performance on the RNG task correlated significantly with hypnotizability on both the HGSHS:A and the SHSS:C; high susceptible subjects were better able to produce random sequences than low susceptible subjects.

#### The Present Study

The aim of the present study is to expand on a current conceptualization of hypnotizability as a "package" of cognitive skills and experiences that the subject possesses and which he or she may exercise outside of the hypnotic context as well as when the subject undergoes a hypnotic induction. Most experimental studies investigating variables presumed to be related to hypnotizability have concentrated on single

measures. Since several factors have emerged from early factor-analytical studies of the Stanford Hypnotic Susceptibility Scales (Hilgard, 1965), it is not surprising that single measures have at best correlated moderately with hypnotizability. For example, Hilgard (1965) reported three factors emerging from the SHSS:C. The first factor, ideomotor inhibition, was represented by test items involving inhibition of recall (amnesia), inhibition of sensory impressions (negative visual hallucination and anosmia to ammonia), and inhibition of motor movement, represented by two challenge items (arm rigidity and arm immobilization). Most representative of the second factor, item difficulty, were two motor items (hand lowering and moving hands apart) and two quite different items (hypnotic dream and age regression). The third factor, positive hallucinations, included three hallucination items (hallucinated voice, mosquito hallucination, and taste hallucination). These data suggest that hypnotizability is a complex criterion; accordingly, a multiplicity of variables may be required to predict it.

Some combination of the number of cognitive skills and/or calibre of the skills would appear to at least partially account for individual differences in hypnotic susceptibility. Of course, social-psychological variables such as motivation, expectancies, and beliefs (Barber, 1969: 1970) and demand characteristics of the experimental situation (Orne, 1962) have been shown to influence overt hypnotic behavior also. Whether these variables also affect subjective experiences is the subject of an ongoing controversy in hypnosis research. It is a matter of whether these variables are artifacts of hypnotic testing that must be

controlled for in order to arrive at the essence of hypnotic susceptibility (Orne, 1959) or if they represent an integral part of what hypnotic responsivity is (Barber, 1969; Sarbin & Coe, 1972). The present study will not address this complex issue. Rather, a multidimensional approach will be employed, aimed at delineating some of the cognitive skills and experiences outside of the hypnotic context that are potentially relevant to hypnotic susceptibility.

A battery of paper-and-pencil inventories and cognitive tasks was constructed for the present study. Some of the tests have already been discussed; others have been specifically designed for the present study. In addition, a rigorous screening procedure involving two hypnotic susceptibility scales (HGSHS:A and SHSS:C) was employed, allowing for a high degree of confidence in the classifications of subjects into the generally accepted hypnotizability classifications of high, medium, and low susceptibles. It is hypothesized that post-hoc classification of subjects into susceptibility groups will be improved by the use of the multiple predictors to be employed rather than the use of any single predictor.

## Method

### Subjects

Sixty subjects participated in the present study. Based on a rigorous assessment of their hypnotic susceptibility to be described presently, subjects were divided into three groups of 10 males and 10 females each. The mean ages for each of the groups were as follows: low susceptibles ( $\bar{x} = 23.1$ ;  $S.D. = 5.702$ ), medium susceptibles ( $\bar{x} = 25.7$ ;  $S.D. = 7.355$ ), and high susceptibles ( $\bar{x} = 24.7$ ;  $S.D. = 5.304$ ). The mean ages for the 30 male and 30 female subjects, respectively, were 25.2 ( $S.D. = 5.488$ ) and 23.7 ( $S.D. = 6.788$ ). Across all subjects the mean age was 24.5 ( $S.D. = 6.151$ ) with ages ranging from 19 to 46.

### Hypnosis Testing

All subjects underwent two hypnosis sessions prior to their participation in the present study. The initial session on the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSMS:A) of Shor and E. Orne (1962) is a measure of hypnotic susceptibility that is standardly used as a screening device in many experimental contexts since it can be administered to groups of up to 15 subjects in an hour. There are reasons, however, for preferring at least one additional, more stringent, assessment of hypnotizability. Firstly, the HGSMS:A usually represents subjects' first exposure to hypnosis. Consequently, potential apprehensions and misconceptions may affect their scores, regardless of how diligently the experimenter attempts to allay any initial misgivings.

Secondly, occasionally a subject's score will be affected by his/her neighbor's behavior. Thirdly, subjects determine their own scores on the basis of retrospective assessments of their behavior. While the majority of subjects have been shown to be quite accurate at this task (Hilgard, 1965), some of them will occasionally under or overestimate their hypnotic performance. Finally, there are few of the relatively difficult cognitive items on the HGSHS:A. Cognitive items tend to index distortions of memory and perception which are considered to be the hallmarks of hypnotic responsiveness (Orne, 1959; 1980). Further, the HGSHS:A correlates only moderately with the more stringent individually administered Stanford Scale of Hypnotic Susceptibility, Form C (SHSS:C) of Weitzenhoffer and Hilgard (1962) ( $r = .60$ , Evans, 1979).

Consequently, subjects were selected for further assessment on a slightly modified SHSS:C on the basis of their HGSHS:A scores (the modification consisted of replacing the anosmia to ammonia item with the posthypnotic suggestion item of the Stanford Hypnotic Susceptibility Scale, Form B (SHSS:B) of Weitzenhoffer and Hilgard, 1959). The 12 item SHSS:C has the advantage of being individually administered and experimenter-scored as well as being more adequately represented by cognitive items. In addition, by the time subjects are assessed on this scale, they have been familiarized with the procedures of experimental hypnotic testing, thus minimizing potential antecedent confounds possibly present to a greater extent in initial testing. On the basis of their SHSS:C scores, subjects were selected for participation in the present study.

Subjects were classified into three groups. Those whose SHSS:C scores ranged from 0-2 were classified as low susceptibles; subjects who scored from 5-10 (without posthypnotic amnesia) were classified as medium susceptibles; subjects who scored from 10-12 (including posthypnotic amnesia) were classified as high susceptibles. By virtue of having been assessed on two hypnotic susceptibility scales, all subjects in the present study possessed a relatively high degree of experience with hypnosis. Further, with the exception of seven subjects (4 lows and 3 mediums) all subjects had undergone at least one additional hypnosis session as part of another experiment. The mean SHSS:C scores for the 20 subjects in each group were as follows: low ( $\bar{x} = 1.0$ ;  $S.D. = 0.795$ ; for the males,  $\bar{x} = 1.3$ ;  $S.D. = 0.675$ ; for the females,  $\bar{x} = 0.7$ ;  $S.D. = 0.823$ ), medium ( $\bar{x} = 7.9$ ;  $S.D. = 1.725$ ; for the males,  $\bar{x} = 8.0$ ;  $S.D. = 1.633$ ; for the females,  $\bar{x} = 7.7$ ;  $S.D. = 1.889$ ), and high ( $\bar{x} = 10.8$ ;  $S.D. = 0.786$ ; for the males,  $\bar{x} = 10.7$ ;  $S.D. = 0.675$ ; for the females,  $\bar{x} = 10.8$ ;  $S.D. = 0.919$ ).

Subjects were paid nominal fees of \$4.00 and \$5.00 for their participation in the HGSHS:A and SHSS:C sessions, respectively. They were paid an additional \$10.00 for the present study since the experiment lasted approximately two hours.

#### Procedure

The present study was divided into two parts. Part A consisted of subjects completing five paper-and-pencil inventories. Part B consisted of five experimenter-administered tasks. There was no hypnotic induction in any part of the experimental session.

To avoid any potential order effects, one half of male and female subjects in each susceptibility group underwent Part A first, followed by Part B; the reverse order applied to the remaining subjects. To further control for potential order effects, the five inventories and the five tasks were presented in different predetermined random orders for each subject within each part of the experiment.

Subjects were informed before testing began that the general purpose of the study was to assess various aspects of their thinking styles. It was emphasized to all subjects that no particular performance or response on any of the tests was more desirable than another. Subjects were also informed that a better understanding of any similarities and/or differences in the cognitive styles of individuals of varying hypnotizability levels could potentially aid in the development of both hypnotic and non-hypnotic therapeutic strategies in the clinical setting. Accordingly, subjects were asked to be as honest as possible in all self-reports and to try to do their best on the various tasks.

#### Part A -- Inventory Measures

The inventories administered in this part of the experiment were as follows:

(1) Sheehan's shortened version of the Betts' Questionnaire Upon Mental Imagery (QMI) (Sheehan, 1967) (see Appendix A). The QMI has a total of 35 items, one for each of the following categories: vision, audition, touch, kinesthesia, gustation, olfaction, and organic sensations (e.g., hunger). Subjects are asked to "classify the image that comes to your mind's (eye, ear, etc.)" for each of the 35 items on a



discrete scale from 1 to 7; '1' represents "Perfectly clear and vivid as the actual experience", '3' represents "Moderately clear and vivid", and '7' represents "No image present at all, you only 'knowing' that you are thinking of the object", with the remaining numbers corresponding to likewise graduated descriptions.

The range of possible scores on the QMI is from 35 to 245, with a low score corresponding to high vividness of imagery. Its internal consistency, as measured by Cronbach's coefficient alpha, is reported to be in the 0.90's (Westcott & Rosenstock, 1976) and test-retest reliability, with a seven month interval, has been measured at 0.78 (Sheehan, 1967). Further, factor analyses have shown the existence of a general imagery factor which is common to all the subscales (Sheehan, 1967; White, Ashton, & Law, 1974).

(ii) Paivio's 86 item Individual Difference Questionnaire (IDQ) (Paivio, 1971; Paivio & Harshman, in press) (See Appendix B).

The IDQ yields a 47 item verbal and a 39 item imagery scale. Based on factor analyses, however, a recent study (Paivio & Harshman, in press) has revealed that the two main scales may be broken down into six factors, three of which were considered in the present study. These are Factor 1 (Good Verbal Expression and Fluency, 16 items), Factor 2 (Habitual Use of Imagery, 13 items), and Factor 6 (Vividness of Dreams, Daydreams, and "Imagination", 6 items).

Statement numbers 1, 4, 8, 9, 13, 14, 28, 30, 34, 40, 52, 64, 69, 80, 81, and 85 on the IDQ represent Factor 1. Numbers 2, 20, 25, 29, 42, 46, 54, 61, 67, 68, 72, 73, and 74 represent Factor 2. Numbers 10,

19, 32, 50, 63, and 70 represent Factor 6. Subjects' answers are scored as contributing positively or negatively to each respective subscale, depending on the wording of the question, thus yielding a range of possible scores equal to the number of items on each subscale.

The internal consistency reliability of the two main scales, as measured by Cronbach's coefficient alpha, is reported to be 0.861 (verbal scale) and 0.821 (imagery scale) (Paivio & Harshman, in press). For factors 1, 2, and 6, respectively, the reliability coefficients are reported to be 0.837, 0.777, and 0.720. Further, the authors report that cross-sample congruence coefficients between two samples of 350 subjects range from .83 to .89 for Factors 1 through 3 and from .62 to .74 for Factors 4 through 6, thus demonstrating adequate cross replication.

(iii) The Tellegen Differential Personality Questionnaire, Scale Ab ("Absorption") (DPQ: Ab) (Tellegen & Atkinson, 1974) (See Appendix C).

The DPQ: Ab contains 34 items that tap everyday experiences which pertain to appreciation and involvement in fantasy, new experiences, and other "absorbing" events. All "true" answers to the statements in the inventory are summed, yielding a range of possible scores from 0 to 34.

The inventory, one of 11 content scales in the 300 item DPQ which Tellegen is developing, has been refined through a number of cycles of data collection, factor analysis, and modification. Further, it has been reported to show an internal consistency reliability coefficient alpha of 0.89 (See Isaacs, Note 3).

(iv) A shortened 18 item version of Shor's Personal Experiences Questionnaire (PEQ) (Shor, Orne, & O'Connell, 1962) (Evans, Note 4) (See Appendix D).

This inventory includes questions on "unusual" subjective experiences in everyday life. The 18 items that comprise the scale are part of a 60 item absorption questionnaire that is currently being developed (Evans, Note 4). The scale in the present study includes two types of questions which Evans has labelled controlled absorption (e.g., Have you ever become so absorbed in listening to music that you became lost in imagination?) and involuntary absorption (e.g., Have you almost fallen asleep while you were driving on a quiet, level stretch of road?). The items on the shortened version of the PEQ were chosen purely on an a priori basis, based on previous findings in the literature (Evans, Note 4). All "yes" answers are summed, yielding a range of possible scores from 0 to 18. No reliability data have been reported thus far.

(v) A shortened version of an unpublished questionnaire on "Fantasy" experiences (Nadon & Nogrady, Note 5) (See Appendix E).

This recently constructed inventory is based on the initial study of hypnotic "virtuosos" reported by Wilson and Barber (Note 1). The questions are aimed primarily at eliciting reports concerning the role that "fantasy" has played in the subjects' childhoods and adult lives.

Questions 1a, 1b, 1d and 5a through 5c were not considered in the scoring. Question 2i was scored positively if the subject indicated that severity of punishment in childhood was between "Just Right" and "Extremely Severe". Questions 3d and 3e were scored positively if the subject indicated high involvement in reading or watching a film, respectively. The remaining questions were scored positively for each "yes" answer, yielding a range of possible scores from 0 to 30.

### Part B - Experimental Tasks

The tasks administered in this part of the experiment were as follows:

(1) Random Number Generation Task (RNG) (Evans, 1978; Graham & Evans, 1977).

The RNG task requires subjects to call out numbers from 1 to 10 inclusive in random order for two minutes in time with a metronome that is beating once a second, producing 120 numbers (See Appendix F for verbatim instructions).

The RNG is assessed by means of a statistical measure derived from Tulving's (1962) index of subjective organization used to investigate sequencing and ordering in the free recall of learned material. It is described by Graham and Evans (1977) in the following terms:

Randomness is defined as that condition in which any number compared to any other number has an equal probability of occurrence, and its production follows no particular order of sequence. The present RNG index is a chi-square-like measure that evaluates the frequency with which any number follows any other number compared to chance expectations and is appropriately modified by an adjustment based on the marginal frequency of use of each of the 10 digits in the series of 100 numbers. The higher the index (which varies from 0.0 to 1.00), the less random the series (p. 633).

In keeping with Graham and Evans (1977), only the first 100 numbers generated by each subject were considered for calculation (See Appendix G for method of calculation).

Horne, Evans, and Orne (1982) report a mean RNG<sup>d</sup> value of 0.317 (S.D. = 0.050) for a sample of 154 college students. Further, they report little evidence of repetition or practice effects; the mean values for 21 subjects were 0.288, 0.292, 0.288, and 0.284 for four trials. Moreover, it is very difficult for either the experimenter or the subject to evaluate the subject's ongoing performance, thereby minimizing any potentially confounding effects of experimenter bias (Rosenthal, 1969) or and/or demand characteristics (Orne, 1962).

(ii) Stroop Color and Word Test (Golden, 1978; Stroop, 1935).

The Stroop was administered as an additional measure of attention skills. For the present study, subjects were asked to read aloud "as quickly as possible" each of three cards (A to C) composing the task. Card A requires the reading of color-name-words (red, blue, green) printed in black ink. Card B requires the naming of ink colors (red, blue, green) printed in rows of four x's. Card C, the interference card, requires subjects to name the ink-colors (red, blue, green) printed in different color-name-words (red, blue, green). That is, subjects are asked to attend to the color of the ink of each stimulus word and to ignore the different printed word. Each card consists of 100 stimuli. Subjects were instructed to correct any errors before going on to the next stimulus. If a subject failed to notice an error, the experimenter informed him/her of the error. Subjects' performances were timed and number of errors were noted.

Stroop (1935) reported mean first-administration response times of 41.0 sec., 63.3 sec., and 110.3 sec., for Cards A, B, and C, respectively, for samples of 70 to 100 college students; these times have been replicated by Jensen (1965). Further, second administration times show practice effects that are proportionally greatest on Card C.

Saunders (1980) has reviewed data demonstrating Card A to be an extraneous control. Further, he has argued that the logarithm of the ratio of time it takes to read Card C divided by the time it takes to read Card B ( $\log(C/B)$ ) is the best Stroop interference measure available; this was the interference measure calculated for the present study.

(iii) An adaptation of Karlin's (1979) selective attention task.

The method of administration of the task for the present study was essentially the same as the one reported by Karlin (1979), with the exception that Karlin administered the task to groups of subjects. For the present study, subjects were asked to listen to a cassette tape (duration of 4½ minutes) on which two stories were recorded.

Karlin's (1979) stories were decidedly of American content (one story was about an American GI). Consequently, two different stories (Story A on the death of King Charles II of England and Story B on the French monarchy in the 17th century) were employed in the present study. The stories were played simultaneously, in monophonic sound, over two speakers of a Sony ATS stereo-cassette-corder (Model CFS-66) and were recorded by the same speaker (the experimenter).

Subjects were initially asked to attend to one of the stories (target) while disattending to the other one (distractor); they were told in advance that questions would follow. Further, since Karlin (1979) reported that the task was found to be very difficult by most subjects, task motivation instructions were given to the effect that although the task was difficult, most college students performed quite well if they applied themselves to the task. Subjects were seated before the Sony cassette player and were informed that they could move closer or further away if they so desired; this was done to allow each subject optimal opportunity to attend to the target story in his/her own particular style. Once the subjects had listened to the story, their free recall of the story was assessed. Once the subjects indicated that they could no longer recall any additional information, they were given a 15-item forced-choice questionnaire. For the scoring of the recall protocols, bits of information and intrusions were considered. A bit was defined as a single aspect of information contained in the story (e.g., a date, name of a character, or part of the story plot); an intrusion was defined as an incorrect piece of information that could take one of three forms - an inference not mentioned in the target story, a bit from the distractor story, or simply an incorrect piece of information (e.g., a wrong date). If a subject indicated that he or she was guessing (e.g., by placing a question mark after the entry), the entry was not scored. For the questionnaire, each item was followed by a 10 centimetre line that the subjects were required to checkmark. The line represented the confidence subjects had in the correctness of their answers from "zero" to "100%" certain.

After subjects had answered the questions for the first story, they were asked to listen to the cassette again but for this time to attend to the other story; again subjects were informed that questions would follow. For one half of the male and female subjects in each susceptibility group, Story A was the initial target followed by Story B; the reverse was true for the remaining subjects (See Appendices H and I for questions on Stories A and B, respectively).

(iv) A modified version of Van Nuys' (1974) meditation-absorption task (See Appendix J).

The major modification of the task consisted of requesting subjects to concentrate on an image of their choice (rather than on a candle or on their breathing) for the duration of the task. (Also, the task's duration was reduced from 15 to 10 minutes). In this manner, the task's essence was maintained by having subjects concentrate to a relatively high degree over a prolonged period of time. Further, additional data on subjects' abilities to form images were able to be gathered.

Subjects were asked to "close your eyes and imagine a real place where you enjoy being". They were asked to report any intrusions into their thoughts by raising the index finger of their right hand. An intrusion was defined as "whenever you find that you have gotten caught up on some thought or other and by force of will, have to bring yourself back to the task of focusing on the image". Subjects were also informed that there would be questions on what they had imagined following the task. The questions concerned the types of intrusions the subjects experienced (if any) and various descriptions of the experience of imagining the scene during the task (See Appendix K).



(v) The Preference for an Imagic Cognitive Style Test (PICS) (Isaacs, Note 3) (See Appendix L).

The PICS has a number of advantages over other self-report imagery scales. Firstly, the imagery component is not emphasized; both the verbal and the imagery aspects of thinking style are presented as being equally desirable. Secondly, subjects are asked to "think about" (as opposed to "imagine") certain topics for relatively long periods of time (1 or 2 minutes), allowing for their preferred thinking style to emerge. Thirdly, the test seeks to measure "preference" for imagery as opposed to imagery "ability", a distinction made significant by J. Hilgard (1970/1979; 1974; 1979) and Wilson and Barber (Note 1; 1982). Finally, the test takes two other potentially important factors into account, degree of effort and of absorption.

Subjects were initially asked to read the general instructions for the test and were given the accompanying questionnaire but were asked not to open it until instructed to do so. During the course of testing, the experimenter described three scenarios in turn; subjects were asked to close their eyes and to think about each of these. Following each scenario, subjects were asked to answer the appropriate questions in the questionnaire.

The scoring procedure for the PICS is as follows: after each scenario, subjects answer four questions, one on each of the four subscales of the test. The first three subscales (Verbal, Imagery, and Absorption) provide five forced-choice descriptions, yielding a range of possible scores from 3 to 15 on each subscale, with a high score

corresponding to a high degree of self-reported verbal content, imagery content, and absorptive involvement, respectively. The fourth aspect provides five choices for the first scenario, and four for each of the other two, yielding a range of possible scores from 3 to 13, with a high score corresponding to high effort.

The final PICS score is derived by subtracting the Verbal and Effort scores from the Imagery and Absorption scores, yielding a range of possible scores from -22 to +24 (See the last page of Appendix L for further details).

At the end of their participation subjects were thanked, debriefed, and encouraged to contact the experimenter if they wished to see their personal scores on the various tests and/or to be informed of the overall results of the study.

### Results

As indicated earlier, 60 subjects were divided into three groups of high, medium, and low hypnotic susceptibility on the basis of their SHSS:C scores. Since the present study was exploratory in nature, subjects at both extremes of hypnotizability were selected in order to more easily detect potential differences in the cognitive styles and out-of-hypnosis experiences between these two sub-populations. Accordingly, only subjects who scored very low on the SHSS:C (scores from 0-2) or very high (scores from 10-12, including posthypnotic amnesia) were classified as low and high susceptibles respectively. Medium susceptibles were also included in the present study in order to explore more closely potential individual differences in cognitive skills along the entire range of hypnotic susceptibility.<sup>2</sup>

The main data of the present study concern the post-hoc classifications ("predictions") of subjects into susceptibility groups on the basis of their self-reports and performances on the various inventories and tasks. A stepwise discriminant analysis was employed to this end. Additional univariate analyses are presented also in order to compare the present findings to earlier findings that have been reported in the literature. The raw data for all the variables employed in the present study are presented in Appendix M.

### Discriminatory Variables for the Three Susceptibility Groups

A discriminant analysis was performed in order to statistically discriminate between the three hypnotic susceptibility groups. A stepwise method, maximizing Rao's  $V$ , was used to identify the best linear combinations (discriminant functions) of the discriminating variables. The Rao's  $V$  criterion is a generalized distance measure and the variable that is selected at each step of the analysis is the one that contributes to the largest increase in  $V$ , i.e., to the greatest overall separation of the groups. Overall, only one (of a possible two) discriminant function was found to be significant ( $\chi^2(18) = 58.205$ ;  $p < .0001$ ); this first derived function accounted for 95.05% of the total discriminatory power. The second function ( $\chi^2(8) = 4.617$ ;  $p > .79$ ), consequently, accounted for only 4.95% of the discriminatory power. Further, a canonical correlation value of .7976 ( $p < .0001$ ) was found for the first function. The canonical correlation indicates how closely the function and the group variable (hypnotic susceptibility) are related; the proportion of variance in the first discriminant function explained by the groups is the canonical correlation squared, or 63.62%.

While the canonical correlation is a measure of association, prediction of group membership provides a measure of the adequacy of the derived function; this is determined by examination of the percentage of correctly classified cases (subjects). In the present study, nine of the 20 variables that were entered into the analysis<sup>2</sup> were selected that best predicted group membership. Ten variables were selected originally; variable 33 (number of intrusions in the free recall of the

first story heard on the Selective Attention Task), which was entered at the ninth step, however, was removed at the final step since it contained information already included in the previously selected variables and caused a decrease in the value of  $V$ . Further, of the remaining nine variables, only the first eight are relevant from a predictive viewpoint since on closer examination, variable 16 (number of reported intrusions during the Modified Van Nuys Meditation-Absorption Task), which was entered at the tenth step, slightly decreased the percentage of accurately predicted group membership. By step 8 of the analysis, a relatively high correct classification rate of 80% was found as opposed to 56.67% at step 1. Table 1 presents the discriminating variables and Table 2 presents the  $F$  values for entering or removing a variable, the corresponding change in  $V$ , and the overall percentage of correct classification for each step of the analysis. (See Appendix N for variables not included in the analysis after the final step).

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Insert Tables 1 and 2 about here

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Further examination of the stepwise analysis reveals that most of the high and low susceptible subjects (75 and 60% respectively) had been classified correctly by the first step. Table 3 presents the step-by-step prediction of group membership for the three susceptibility groups.

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Insert Table 3 about here

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Table 1

## Discriminating Variables in Predicting Group Membership

<u>Variable No.</u>	<u>Variable Description (in order of entry into analysis)</u>
5	Betts' Questionnaire Upon Mental Imagery (QMI)
12	Preference for an Imagic Cognitive Style Test (PICS)
15	Number of errors on the Stroop Color and Word Test (Card C)
28	Number of correct answers (forced choice) for the 2nd story heard on the Selective Attention Task
30	Reported certainty of answers (forced choice) for the 2nd story heard on the Selective Attention Task
29	Reported certainty of answers (forced choice) for the 1st story heard on the Selective Attention Task
27	Number of correct answers (forced choice) for the 1st story heard on the Selective Attention Task
3	Personal Experiences Questionnaire (PEQ)
33	Number of intrusions in Free Recall for the 1st story heard on the Selective Attention Task
16	Number of reported intrusions on the modified Van Nuys Meditation-Absorption Task

Table 2  
 Step-by-Step Percentage of Correct Classification  
 for the Discriminant Analysis

Step	Entered	Removed	<u>F</u>	<u>df</u>	<u>p</u>	Change in V	<u>p</u>	Overall % of of correct classification
1	V05		18.70	2,57	.0000	37.3950	.0000	56.67
2	V12		10.10	4,112	.0000	10.4282	.0054	56.67
3	V15		7.88	6,110	.0000	10.7716	.0046	61.67
4	V28		6.60	8,108	.0000	8.4590	.0146	65.00
5	V30		5.99	10,106	.0000	12.3745	.0021	70.00
6	V29		5.27	12,104	.0000	7.4455	.0242	70.00
7	V27		4.71	14,102	.0000	6.7504	.0342	71.67
8	V03		4.35	16,100	.0000	8.2101	.0165	80.00
9	V33		3.98	18,98	.0000	6.4350	.0401	78.33
10	V16		3.68	20,96	.0000	2.8423	.2414	78.33
11		V33	3.98	18,98	.0000	-6.2524	.0439	78.33

Table 3

Prediction of Group Membership for Each Step of the  
Discriminant Analysis (for the Three Susceptibility Groups)

ACTUAL MEMBERSHIP<sup>a</sup>

Step	<u>Low</u>			<u>Medium</u>			<u>High</u>		
	Predicted Low	Membership <sup>b</sup> Med	High	Predicted Low	Membership Med	High	Predicted Low	Membership Med	High
1	12(60)	6(30)	2(10)	6(30)	7(35)	7(35)	0(0)	5(25)	15(75)
2	11(55)	9(45)	0(0)	6(30)	8(40)	6(30)	0(0)	5(25)	15(75)
3	12(60)	8(40)	0(0)	5(25)	10(50)	5(25)	0(0)	5(25)	15(75)
4	13(65)	7(35)	0(0)	5(25)	11(55)	4(20)	0(0)	5(25)	15(75)
5	14(70)	6(30)	0(0)	3(15)	12(60)	5(25)	0(0)	4(20)	16(80)
6	15(75)	5(25)	0(0)	4(20)	11(55)	5(25)	0(0)	4(20)	16(80)
7	15(75)	5(25)	0(0)	3(15)	12(60)	5(25)	0(0)	4(20)	16(80)
8	17(85)	3(15)	0(0)	2(10)	14(70)	4(20)	0(0)	3(15)	17(85)
9	17(85)	3(15)	0(0)	2(10)	14(70)	4(20)	0(0)	4(20)	16(80)
10	17(85)	3(15)	0(0)	2(10)	14(70)	4(20)	0(0)	4(20)	16(80)
11	17(85)	3(15)	0(0)	2(10)	14(70)	4(20)	0(0)	4(20)	16(80)

<sup>a</sup> n = 20 for each group

<sup>b</sup> values in parentheses represent percentages



As can be seen from Table 3, not one of the high susceptible subjects had been incorrectly classified as a low susceptible at any step of the analysis. Further, by the last relevant step (Step 8), only three highs (15%) are incorrectly classified into the medium susceptible group. A similar pattern emerged for the low susceptible subjects with the exception that two lows were initially classified into the high group (See Step 1). It is noteworthy that the classifications of subjects at Step 1 was based on the Betts' QMI; it has been noted previously that some low susceptible subjects possess high vividness of imagery (e.g., Perry, 1973; Sutcliffe, Perry, & Sheehan, 1970). Throughout the remaining steps, however, all incorrectly classified lows were classified into the medium susceptible group and by Step 8, only three lows (15%) were incorrectly classified. Consistent with the concept that hypnotic susceptibility lies along a continuum of cognitive skills, the lowest prediction rate and the greatest classification overlap was found for the medium susceptible subjects. Notwithstanding, by Step 8, 14 mediums (70%) were classified correctly, with 2(10%) and 4(20%) mediums being classified incorrectly into the low and high groups respectively.

Three group centroids were established for each of the two discriminant functions. Since all of the first eight steps of the analysis were found to be relevant from a predictive viewpoint, all subsequent values derive from the analysis up to that point. The group centroid represents the most typical location of a case (subject) relative to his or her group in the discriminant function space. A comparison of the

group centroids on a particular function indicates how far apart the groups are along that dimension. Further, the group centroids are presented in standard form<sup>?</sup> (z scores). The group centroids on the first discriminant function for the high, medium and low susceptible groups respectively were -1.40652, -.29204, and 1.69857. Examination of the group centroid values reveals that the medium susceptible group is closer to the high susceptible group along the dimension defined by the first discriminant function (difference = 1.114 standard deviations) than it is to the low susceptible group (difference = 1.991 standard deviations). This finding is consistent with the groups' respective differences in hypnotizability scores since the mean SHSS:C score for the medium subjects was found to be the relatively high value of 7.9. Again, this finding is consistent with the concept of hypnotizability as a plurality of cognitive skills. The second function group centroids, on the other hand, demonstrate no discernible pattern. They were found to be -.19536, .30474, and -.10938 for the high, medium, and low susceptible groups respectively. The distribution of subjects within the discriminant function space is illustrated in Figure 1.

---

Insert Figure 1 about here

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As can be seen in Figure 1, there is some overlap between the groups. Since discriminant analysis makes prediction of group membership for each subject in an all-or-none fashion, it is of interest to know how probable it is that a particular subject belongs to his/her

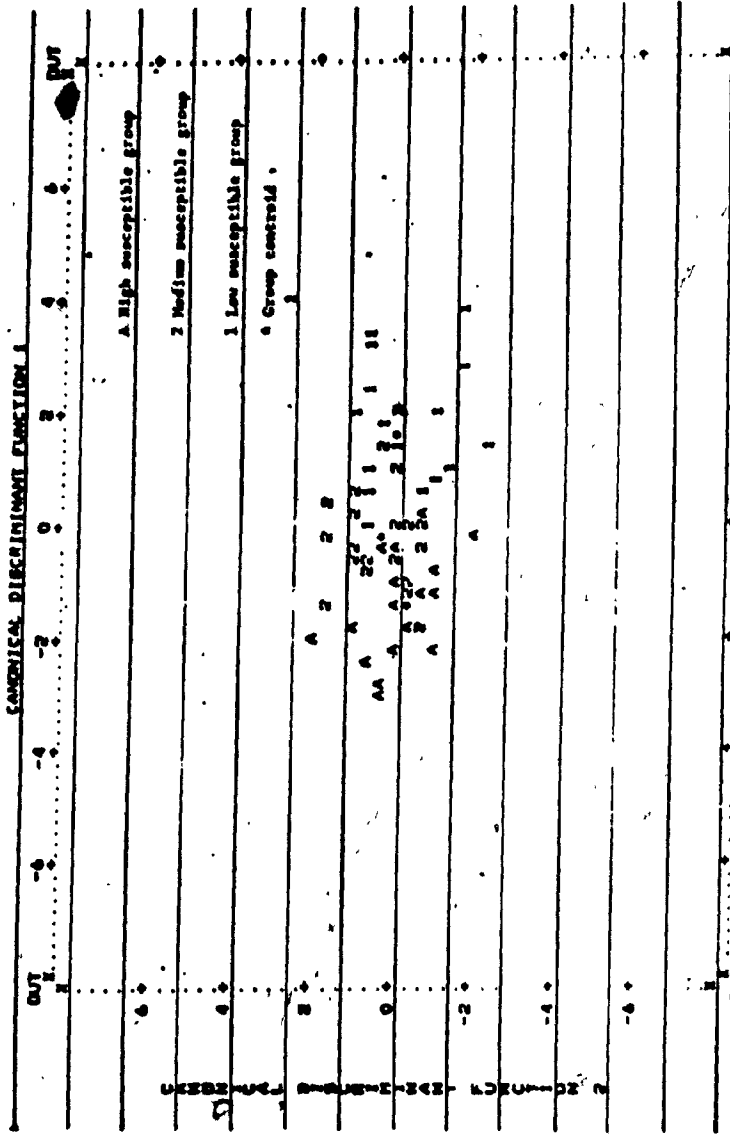


Figure 1: Distribution of Subjects within the Discrimination Function Space Showing the Clustering of Each Group Around its Respective Group Centroid

respective predicted group. This is of interest especially for the misclassified subjects. Consequently, the probability that an actual member of the predicted group would be as far from the group centroid as the case being considered was calculated for each misclassified subject. These probabilities are presented in Table 4.

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Insert Table 4 about here

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With two exceptions (subjects 28 and 43), the probabilities presented in Table 4 are relatively high. Most of these subjects, then, are not "borderline" cases. This finding suggests that while the discriminating variables are very good discriminators (by virtue of their 80% correct classification rate), other variable(s) appear to be necessary to complete the picture. If most of the misclassified subjects had been found to be borderline cases, it could have been argued that the measuring instruments were not sufficiently fine to correctly classify some subjects. Since this was not found to be so, the argument that additional variable(s) remain to be delineated is more viable. This argument is supported further by the finding that 63.62% of the proportion of the variance in the first discriminant function was explained by the groups, leaving 36.38% of the variance unexplained.

It should be noted that the sequence in which variables are selected to enter the analysis is not necessarily indicative of their relative importance as discriminators. The importance of each variable is reflected by its corresponding standardized discriminant function coefficient. When the sign is ignored, each coefficient represents the

Table 4

Probability that a Member of the Predicted Group  
Would be as Far Away from the Centroid as Each  
Misclassified Subject

Misclassified Subject Number	Actual Group Membership	Predicted Group Membership	P
6	Low	Med	.91
13	Low	Med	.61
16	Low	Med	.92
24	Med	High	.87
28	Med	High	.10
29	Med	High	.98
32	Med	Low	.78
33	Med	High	.92
37	Med	Low	.87
42	High	Med	.89
43	High	Med	.49
53	High	Med	.99

relative contribution of its associated variable to the discriminant function. The sign merely denotes whether the variable is making a positive or a negative contribution. The standardized coefficient values for the first discriminant function are presented in Table 5. Variables have been rearranged in descending order of their discriminatory power. Also included in Table 5 are the corresponding unstandardized coefficients. These values are multiplied by the raw values of the associated variables and are then summed in order to arrive at a discriminant score. After adding a constant to adjust for the grand means, a score is obtained which is identical to the one computed with standardized coefficients and standardized data. As such, the unstandardized values would facilitate calculation of discriminant scores, and hence prediction, for a new sample of unclassified subjects.

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Insert Table 5 about here

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Examination of the standardized coefficients presented in Table 5 reveals that variables 5 (Betts' QMI), 15 (number of Stroop errors), 27 (number of correct answers -- 1st story), and 30 (certainty of answers -- 2nd story) are making a positive contribution to the discriminant function. Since the low susceptible group centroid is located at the positive end of the space defined by the discriminant function (See Figure 1), high scores on these variables serve to draw each individual subject's discriminant score towards the low susceptible group centroid. (Of course, each subject's final score is determined by consideration of all the discriminant variables). Variables 3 (PEQ), 12

Table 5

The Standardized and Unstandardized Discriminant  
Function Coefficients Associated with the  
Eight Predictor Variables

Variable Number	Description	Standardized Coefficient	Unstandardized Coefficient
30	Reported certainty of answers (forced choice) for the 2nd story heard on the Selective Attention Task	.78822	.04257991
05	Betts' QMI	.59886	.02262458
28	Number of correct answers (forced choice) for the 2nd story heard on the Selective Attention Task	-.57180	-.2290914
12	PICS	-.52268	-.09739934
29	Reported certainty of answers (forced choice) for the 1st story heard on the Selective Attention Task	-.50666	-.02459304
15	Number of Errors on the Stroop Color and Word Test (Card C)	.46644	.1579936
27	Number of correct answers (forced choice) for the 1st story heard on the Selective Attention Task	.35661	.1419962
03	PEQ	-.33301	-.1019533
			Constant: -.4326029

(PICS), 28 (number of correct answers -- 2nd story), and 29 (certainty of answers - 1st story) are making a negative contribution to the discriminant function and consequently high scores on these variables serve to draw each subject's discriminant score towards the high susceptible group centroid. These results will be examined more extensively in the discussion section.

#### Differences Among the Group Means

As was noted in the introduction, most previous studies have attempted to correlate scores on single measures of various cognitive skills such as imagery, absorption, and selective attention with hypnotizability and/or have compared these scores among hypnotic susceptibility groups. Accordingly, one-way analyses of variance (ANOVAS) and correlation coefficients were calculated for the various measures in the present study in order to place the present results in the context of the current literature.

Seven of the 20 measures employed in the present study demonstrated significant one-way ANOVAS. Table 6 presents the measures of central tendency for these seven variables along with the pairwise comparisons found to differ significantly by Tukey's Honestly Significant Difference Test (HSD)<sup>4</sup>. The reader is referred to Table 6 throughout this section. (See Appendix 0 for the source tables and the measures of central tendency for the variables not demonstrating significant differences among the groups).

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Insert Table 6 about here

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Table 6

Measures of Central Tendency for the Seven Variables  
 Demonstrating Significant One-Way Analyses of Variance

Variable Description	Susceptibility Group <sup>ab</sup>		
	Low	Medium	High
Betts' Questionnaire Upon Mental Imagery (QMI)	112.60 (a,b) (36.964)	81.45(a) (22.924)	61.85(b) (14.492)
Paivio's Individual Differences Questionnaire (IDQ) Factor 2 (Habitual Use of Imagery)	9.85(a) (3.543)	11.30 (2.130)	11.90(a) (1.804)
IDQ Factor 6 (Vividness of Dreams, Daydreams, and "Imagination")	4.00(a) (1.717)	4.80 (1.240)	5.60(a) (0.681)
Preference for an Imagic Cognitive Style Test (PICS)	7.75(a) (7.078)	11.05(b) (4.893)	15.60(a,b) (3.515)
Differential Personality Questionnaire, Scale Ab (DPQ Ab)	18.85(a,b) (7.083)	23.80(a) (4.720)	27.80(b) (3.518)
Personal Experiences Questionnaire (PEQ)	9.95(a,b) (4.236)	12.70(a) (2.922)	13.95(b) (2.350)
Concordia Questionnaire on "Fantasy" Experiences	10.55(a) (4.617)	13.55 (4.442)	15.95(a) (4.685)

<sup>a</sup>Group Means are indicated first, under which their Standard Deviations are indicated in parentheses.

<sup>b</sup>Across rows, means with the same subscript, a or b, represent a significant difference at  $p < .05$  level (2-tailed) at least.

The seven variables are as follows:

(i) Sheehan's (1967) shortened version of the Betts' QMI ( $F(2,57) = 18.70$ ;  $p < .0001$ ).

Tukey's post-hoc HSD pairwise comparison method revealed significant differences between the high and low groups and between the medium and low groups ( $HSD(57) = 25.39$ ;  $p = .01$ ) but not between the high and medium groups, although the difference was in the expected direction. The direction of the group differences are consistent with the concept of a plurality of cognitive skills among subjects of varying susceptibility levels, with the high susceptible subjects, as a group, reporting the highest levels of vividness of imagery.

(ii) Paivio's IDQ Factor 2 (Habitual Use of Imagery) (Paivio & Harshman, in press) ( $F(2,57) = 3.23$ ),  $p < .05$ ).

Significant differences were observed between the high and low groups ( $HSD(57) = 1.99$ ;  $p = .05$ ). As Isaacs (Note 3) has noted, most studies investigating the relationship between imagery and hypnotizability have focused on subjects' imagery abilities as assessed by imagery scales like the QMI. From the work of J. Hilgard (1970/1979; 1974; 1979) and Wilson and Barber (Note 1; 1982), however, we know that the nature of the relationship between imagery ability and hypnotizability becomes clearer when the extent to which individuals use their imagery skills in their daily lives is considered. Results concerning Paivio's Factor 2 are consistent with this concept since examination of the items of this factor (e.g., I often use mental images or pictures to help me remember things (True = + score)), reveals the appropriateness of its

identifying label." Notwithstanding, the relatively small magnitude of the difference between the mean scores of the high and low susceptibility groups (2 points within a range of 13 items), while statistically significant, suggests cogently that hypnotizability cannot be explained along the single dimension of imagery, even when both its use and abilities among subjects are considered.

(iii) Paivio's IDQ Factor 6 (Vividness of Dreams, Daydreams, and "Imagination") (Paivio & Harshman, in press) ( $F(2,57) = 7.76; p < .001$ ).

Results concerning Factor 6 demonstrated a pattern similar to that reported for Factor 2. The high and low group means were found to differ significantly ( $HDS(57) = 1.23; p = .01$ ), although the absolute magnitude of the difference was found to be relatively small (1.6 within a range of 6 items). This may partially be due to the small number of items composing the scale. Stated differently, however, high susceptible subjects report, on average, experiencing high vividness of various forms of imagination for 5.6 of the 6 items (93%). While this represents a very high frequency of reported experiences, low susceptibles were also found to report quite high frequencies (4 of 6 or 75%). One item (#10 - My daydreams are sometimes so vivid I feel as though I actually experience the scene.) is particularly reminiscent of Shor's (1960) study on the frequency of naturally occurring "hypnotic-like" experiences among college students. It will be recalled that many individuals, regardless of susceptibility, report high frequencies of these types of experiences (Shor et al., 1962). Accordingly, the present results add

substance to the impression that a multidimensional approach is needed when attempting to differentiate levels of hypnotizability on the basis of experiences outside the hypnotic context.

(iv) The Preference for an Imagic Cognitive Style Test (PICS) (Isaacs, Note 3) ( $F(2,57) = 10.79; p < .0001$ ).

Significant differences were found between the high and medium groups ( $HSD(57) = 4.09; p = .05$ ) and between the high and low groups ( $HSD(57) = 5.15; p = .01$ ). Although the medium and low groups did not differ significantly, the observed difference was in the expected direction. Overall, the results indicate that the high susceptible subjects are not only able to experience high vividness of imagery within their thoughts, but that they prefer to do so. Further, the results concerning the PICS indicate that these subjects are able to become highly absorbed in thoughts that are elicited from an external source (i.e. the experimenter). Moreover, the reports of their "thinking" experiences reveal relative effortlessness and contain little verbalization. The reports of low susceptible subjects reveal a quite different pattern. These latter subjects, for the most part, experience relatively low vividness of imagery and low degree of absorption in their thoughts, accompanied by high verbalization and high effort. Further, for those low susceptible subjects able to experience relatively high vividness of imagery, some combination of scores on the three other parts of the test serves to lower their overall scores relative to the high susceptibles (See the Method section and Appendix L for scoring information). As with the other measures already discussed, the medium group's mean score

fell between the low and high group means, indicating that these subjects possess a relatively high degree of the skills under consideration but not to the same extent as the high susceptibles.

(v to vii) The remaining three variables concern the three inventories of personal experiences outside the hypnotic context: the Differential Personality Questionnaire, Scale Ab (DPQ: Ab) (Tellegen and Atkinson, 1974) ( $F(2,57) = 14.21; p < .0001$ ), shortened version of the Personal Experiences Inventory (PEQ) (Evans, Note 4) ( $F(2,57) = 7.35; p < .001$ ), and Concordia's Questionnaire on "Fantasy" Experiences (Nadon & Nogrady, Note 5) ( $F(2,57) = 6.97; p < .002$ ).

Results for these three inventories follow the pattern already established for the previous measures, namely that the absolute values of the group means range from the lowest values for the low susceptible group, followed by the medium and high group values. For the DPQ:Ab, significant differences were observed between the high and low groups ( $HSD(57) = 5.10; p = .01$ ), and between the medium and low groups ( $HSD(57) = 4.06; p = .05$ ). Results concerning the PEQ revealed significant differences between the high and low groups ( $HSD(57) = 3.13; p = .01$ ) and between the medium and low groups ( $HSD(57) = 2.49; p = .05$ ). Finally, the Concordia Questionnaire on "Fantasy" Experience results revealed significant differences between the high and low groups ( $HSD(57) = 4.40; p = .01$ ). These three inventories considered, results of the present study support the generalization that high susceptible subjects report a relatively high degree of "absorption" in non-hypnotic activities such as appreciation of nature or art, involvement in

reading, and that enjoyment of "fantasy" has played a major part in both their childhood and adult lives. This generalization notwithstanding, subjects of low and medium susceptibility also report many of the same experiences, although with less frequency. The advantages of forced-choice questionnaires over the more detailed interview approach lie in the precise quantification of scores; the main disadvantage, of course, lies in the loss of some information. Consideration of present results along with the interview work of J. Hilgard (1970/1979; 1974; 1979) and Wilson and Barber (Note 1; 1982), however, serves as a strong indication that various experiences and cognitive skills outside the hypnotic context are relevant to hypnotic responsiveness.

In summary, comparison between the observed group mean scores on the various tests revealed that high susceptible subjects, as a group, reported relatively high levels of vividness of imagery and that they prefer an imagery-dominated thinking style as opposed to a verbally-dominated one. Further, these subjects' reports reflect that the use of these skills in their everyday lives allows for high absorption in various aesthetic and sensory experiences. Finally, their reports reveal that "fantasy" beliefs and experiences have played an important role in their childhoods and that these beliefs and experiences continue to exercise influence in their adult lives. Overall, reports of the low susceptible subjects reveal the opposite general tendency; these subjects' mean scores were found to differ significantly from those of the highs for all of the measures reported in this section. Finally,

"Imagination") also demonstrated a significant overall correlation value ( $r_{\text{tris}} = .51$ ) that was contributed to equally by male and female subjects. It is not clear why the burden of the relationship for Factor 2 was carried by the female subjects; the only other study that has attempted to relate Factors on the IDQ with hypnotizability (Isaacs, Note 3) found an overall significant relationship between a 10-item version of the SHSS:C and Factor 6 but not for Factor 2. Both factors, however, demonstrated significant relationships with total "absorption" ratings for items on the SHSS:C. Clearly, more research is needed in order to clarify the relationship between hypnotizability and factors on the IDQ.

The significant positive correlation value observed for IDQ Factor 1 (Good Verbal Expression and Fluency) ( $r_{\text{tris}} = .34$ ) is puzzling. Since Isaacs (Note 3) found no relationship between hypnotizability and Factor 1 and since the burden of the relationship in the present study was carried by the female subjects, this observed value must be regarded as tentative. It is not clear from previous research or theoretical formulations why this factor might be related to hypnotizability, although recent work by P. Bowers (1979) with creative individuals may provide some clarification of this finding; this potential link will be elaborated upon in the discussion section. Further, as Isaacs (Note 3) has indicated, preference for an imagic cognitive style (over a verbal one) in no way influences verbal fluency. Accordingly, the observed relationship between verbal fluency and hypnotizability does not contradict the concept of a relationship between hypnotic susceptibility and imagery abilities and/or preferences.

the medium susceptible subjects, as a group, were found to differ significantly from the high and/or low groups on the QMI, PICS, DPQ:Ab, and PEQ. These results further indicate that these subjects possess more of the cognitive skills that have been associated with hypnotizability than the low subjects but not to the same extent as the highs.

#### Correlational Data

Subjects in the present study represent a highly selective sample since they were classified a priori into three discrete stratified groups on the basis of rigorously defined susceptibility levels. Accordingly, the present sample differs in nature from most other studies reporting correlations between hypnotic susceptibility and various measures where stratification was not attempted. Therefore it was decided that the most appropriate correlation measure for the present sample was the triserial r (Jenkins, 1956). This statistic, like the biserial r, is intended for the use with two continuous variables, one of which has been divided into discrete groups.<sup>5</sup> Table 7 presents the triserial correlation coefficients for the total sample, for the male subjects, and for the female subjects, between hypnotic susceptibility and the various measures employed in the present study. All reported values are two-tailed. (See Appendix P for intercorrelations between all variables).

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Insert Table 7 about here

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As can be seen from Table 7, the seven variables that demonstrated significant differences among the group means also demonstrated significant correlation coefficients for the total sample. In addition, significant triserial r values were observed for Paivio's IDQ Factor 1 (Good



Table 7  
 Triserial  $r$  Coefficients Between Hypnotic Susceptibility  
 and Each of the 20 Variables

Variable Number	Description	Correlation with Susceptibility		
		All Subjects <sup>a</sup>	Males <sup>b</sup>	Females <sup>b</sup>
2	Differential Personality Questionnaire, Scale Ab (DPQ:Ab)	.64**	.69**	.63**
3	Personal Experiences Questionnaire (PEQ)	.50**	.47**	.55**
4	Concordia Questionnaire on "Fantasy" Experiences	.49**	.47**	.50**
5	Questionnaire Upon Mental Imagery (QMI)	-.69**	-.65**	-.72**
6	Paivio's Individual Difference Questionnaire (IDQ) Factor I (Good Verbal Expression and Fluency)	.34**	.24	.44*
7	IDQ Factor 2 (Habitual Use of Imagery)	.35**	.33	.57**
11	IDQ Factor 6 (Vividness of Dreams, Daydreams, and "Imagination")	.51**	.52**	.49**
12	Preference for an Imagic Cognitive Style Test (PICGS)	.58**	.61**	.50**
13	Random-Number Generation Task (RNG)	.16	.15	.17
14	LOG <sup>a</sup> (time to read Card C/ time to read Card B) for Stroop Color and Word Test	.02	-.34	.44*
15	Errors on Stroop Color and Word Test (Card C)	-.32*	-.37*	-.28
16	Number of reported intrusions on the modified Van Nuys Meditation-Absorption Task	-.18	-.27	-.05

27	Number of correct answers (forced choice) for the 1st story heard on the Selective Attention Task	-.13	-.12	-.13
29	Certainty of answers (forced choice) for the 1st story heard on the Selective Attention Task	.17	.28	.06
28	Number of correct answers (forced choice) for the 2nd story heard on the Selective Attention Task	.24	.08	.37*
30	Certainty of answers (forced choice) for the 2nd story heard on the Selective Attention Task	.08	.14	.02
31	Information bits recalled for the 1st story heard on the Selective Attention Task	.11	.26	-.05
33	Number of intrusions in free recall for the 1st story heard on the Selective Attention Task	-.09	-.04	-.16
32	Information bits recalled for the 2nd story heard on the Selective Attention Task	-.08	-.28	.10
34	Number of intrusions in free recall for the 2nd story heard on the Selective Attention Task	-.14	.20	-.47*

a N = 60

b N = 30

\*\* p < .01

\* p < .05

Verbal Expression and Fluency) (Paivio & Harshman, in press) and for number of errors on the interference card (Card C) of the Stroop Color and Word Test (Stroop, 1935). These will be discussed in turn along with any observed differences between the correlation values for the male and female subjects.

Sheehan's (1967) version of the Betts' QMI emerged as demonstrating the highest absolute correlation coefficient value in relation to hypnotic susceptibility of all the measures employed in the present study. Further, the burden of the relationship was carried equally by the male and female subjects. The observed triserial  $r$  value of  $-.69$  for the total sample further indicates the relevance of imagery abilities to hypnotic susceptibility. This relatively high absolute value of the coefficient may partially be reflecting the nature of the sample. As has been noted, research findings concerning the relationship between the QMI and hypnotizability have been varied (See Sheehan, 1979, for a review). The ability to form images, however, has remained central to the concept of hypnotizability as a "package" of cognitive skills both in empirical work and in theoretical formulations. Results of the present study support this generally accepted view.

Paivio's IDQ Factor 2 (Habitual Use of Imagery) (Paivio & Harshman, in press) demonstrated a moderate but significant correlation with susceptibility for the entire sample ( $r_{\text{tris}} = .35$ ). The burden of the relationship, however, was carried by the female subjects ( $r_{\text{tris}} = .57$ ). The male subjects' data did not reveal a significant relationship. Paivio's IDQ Factor 6 (Vividness of Dreams, Daydreams, and

Indeed, a significant relationship was observed between preference for an imagic cognitive style (as measure by the PICS) (Isaacs, Note 3) and hypnotic susceptibility ( $r_{\text{tris}} = .58$ ). Further, the relationship was observed for both male and female subjects. This finding replicates Isaacs' (Note 3) observed significant  $r$  value of .29 between the PICS and the 10-item SHSS:C.

Significant positive correlations were also observed for the three inventories on personal experiences: DPQ:Ab (Tellegen & Atkinson, 1974) ( $r_{\text{tris}} = .64$ ), PEQ (Evans, Note 4), ( $r_{\text{tris}} = .50$ ), and the Concordia Questionnaire on "Fantasy" Experiences (Nadon & Nogrady, Note 5) ( $r_{\text{tris}} = .49$ ). Further, these relationships were observed for both the male and female subjects. The DPQ:Ab is the only one of the three inventories for which correlation values with hypnotic susceptibility are available. Since values ranging from .27 to .46 have been reported (Finke & Macdonald, 1978; Isaacs, Note 3; Tellegen & Atkinson, 1974), the present value of .64 is clearly consistent with the general finding of a relationship between the DPQ:Ab and hypnotizability. Again, the relatively high absolute value of the coefficient may be due to the nature of the sample.

The significant negative correlation values observed for the total sample and for male subjects for number of errors on the interference card of the Stroop Color and Word Test (Stroop, 1935) is of interest ( $r_{\text{tris}} = -.32$  for the total sample;  $r_{\text{tris}} = -.37$  for the male subjects). Since errors on the Stroop Test reflect difficulty with the selective attention task, this finding is consistent with "attention"

models of hypnotizability (Graham & Evans, 1977; Karlin, 1979). The "attention" explanation is tentative, however; Saunders (1980) has reviewed evidence with "captive" and "volunteer" samples that indicate performance superiority for volunteer subjects in terms of the time to read Card C divided by the time to read Card B ratio. He interpreted the data as indicating that subjects who perform well on the task are more willing to tolerate experimental stress, as measured by the Stroop Test. Since a relationship between hypnotizability and the ratio of the time to read Card C divided by the time to read Card B was found for the female subjects only in the present study ( $r_{\text{tris}} = .44$ ), indicating a positive relationship between hypnotizability and interference on the task, the findings may reflect poor tolerance to experimental stress being associated with hypnotizability for the female, but not for the male, subjects. Accordingly, the observation that the number of errors on the interference card was negatively correlated with susceptibility for the male subjects only may at least partially reflect this finding.

#### Summary of the Discriminant, ANOVA, and Correlation Analyses

It is useful at this point to integrate the results thus far. Table 8 presents a summary of the results for the three types of analyses.

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Insert Table 8 about here

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Table 8

Summary of Significant Results Obtained  
on the Three Different Analyses

Variable Number	Description	Analysis <sup>a</sup>		
		Discriminant	One-Way ANOVA	Correlation
5	Betts' Questionnaire Upon Mental Imagery (QMI)	***	***	**
12	Preference for an Imagic Cognitive Style Test (PICS)	**	***	**
3	Personal Experiences Questionnaire (PEQ)	*	***	**
15	Errors on Stroop Color and Word Test (Card C)	**		*
27	Number of correct answers (forced choice) for the 1st story heard on the Selective Attention Task	**		
29	Reported certainty of answers (forced choice) for the 1st story heard on the Selective Attention Task	*		
28	Number of correct answers (forced choice) for the 2nd story heard on the Selective Attention Task	*		
30	Reported certainty of answers (forced choice) for the 2nd story heard on the Selective Attention Task	**		
2	Differential Personality Questionnaire Scale Ab (DPQ:Ab)		***	**
4	Concordia Questionnaire on "Fantasy" Experiences		**	**
7	Paivio's Individual Difference Questionnaire (IDQ) Factor 2 (Habitual Use of Imagery)		*	**

11 IDQ Factor 6 (Vividness of  
Dreams, Daydreams, and  
"Imagination")

\*\*\*

\*\*

6 IDQ Factor 1 (Good Verbal  
Expression and Fluency)

\*\*

\*\*\*\*p <.001  
\*\*\*p <.01  
\*p <.05

Note that three of the variables (QMI, PICS, and PEQ) demonstrated significant relationships with the criterion variable, hypnotic susceptibility, regardless of which analysis was used. Some of the other variables demonstrated significant univariate correlations with hypnotic susceptibility and/or demonstrated significant differences among the groups (univariate analyses) but did not emerge from the multivariate discriminant analysis. These apparent paradoxes are resolved when one considers the nature of the two respective types of analyses and the questions which each of them attempts to answer.

Let us first consider the simple case of correlation between two variables (in the present context, between hypnotic susceptibility and each of the other measures on an individual basis). The variable correlating most highly with hypnotic susceptibility in the present study was found to be the QMI, i.e., the QMI represents the best single discriminator since it accounts for more predicted variance among the groups than any other single variable. Consequently, the QMI was chosen at the first step of the discriminant analysis. Once the first variable is chosen, the analysis seeks to find the best combination of the first variable with one of the other variables that together can account for the greatest amount of predicted variance relative to all possible pairs. At this point, a reexamination of the significant simple correlation coefficient values between hypnotic susceptibility and each of the other variables is in order. Table 9 presents these values in order of decreasing absolute values.

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Insert Table 9 about here

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Table 9

The Nine Variables Demonstrating Significant Relationships  
with Hypnotic Susceptibility (All Subjects)

Variable Number	Description	Triserial $r$	% of Predicted Variance
5	Betts' Questionnaire Upon Mental Imagery (QMI)	-.69**	47.6
2	Differential Personality Questionnaire Scale Ab (DPQ:Ab)	.64**	41.0
12	Preference for an Imagic Cognitive Style Test (PICS)	.58**	33.6
11	Paivio's Individual Difference Questionnaire (IDQ) Factor 6 (Vividness of Dreams, Daydreams, and "Imagination")	.51**	26.0
3	Personal Experiences Questionnaire (PEQ)	.50**	25.0
4	Concordia Questionnaire on "Fantasy" Experiences	.49**	24.0
7	IDQ Factor 2 (Habitual Use of Imagery)	.35**	12.3
6	IDQ Factor 1 (Good Verbal Expression and Fluency)	.34**	11.6
15	Errors on Stroop Color and Word Test (Card C)	-.32*	10.2

\*\*p < .01; \*p < .05

It will be recalled that the variable chosen at the second step of the discriminant analysis was the PICS. The question arises as to why the DPQ:Ab was not chosen at this step since, by itself, it is a better discriminator than the PICS by virtue of its higher correlation value with hypnotic susceptibility (See Table 9). The answer lies in the joint consideration of the QMI and each of these two variables. Closer examination reveals that the DPQ:Ab is supplying information that is already supplied by the QMI to a greater extent than the PICS since the DPQ:Ab is more highly correlated with the QMI ( $r = -0.72$ ;  $p < .001$ ;  $r = -0.49$ ;  $p < .001$ , respectively). Hence, relative to the PICS, the DPQ:Ab is supplying less new information. Stated differently, the combination of the QMI and the PICS variables contributes to greater overall separation of the groups at this point in the analysis than does the combination of the QMI and the DPQ:Ab.

At the third step of the discriminant analysis, the Number of Errors on Card C of the Stroop Color and Word Test variable was chosen. Again, the question arises as to why it, and not one of the six variables that individually account for more predicted variance, was chosen. As can be seen in Table 9, the DPQ:Ab, Paivio's Factor 6, the PEQ, Concordia's Questionnaire on "Fantasy" Experiences, and to a lesser extent, Paivio's Factors 1 and 2, all correlate more highly with hypnotic susceptibility on an individual basis than does the Stroop Errors variable. The answer to this question also lies in the consideration of intercorrelations among variables. Examination of the multiple correlations between the QMI and PICS on the one hand with each of these

reveals that the Stroop Errors variable is supplying the greatest amount of non-redundant information contributing to the overall separation of the groups. Table 10 presents the multiple correlation values.

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Insert Table 10 about here

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As can be seen in Table 10, the Stroop Errors variable does not correlate with the QMI and the PICS. Further, as Table 9 illustrates, it is correlated with hypnotic susceptibility ( $r_{\text{tris}} = -0.32; p < .05$ ). Therefore, the Stroop Errors variable was chosen at the third step of the discriminant analysis since it could account for the greatest amount of predicted variance among the groups that had not yet been explained.

The subsequent inclusion of variables in the discriminant analysis follows the same logic. Further, as Hand (1981) has indicated, it is not necessary that variables demonstrate significant univariate relationships with the criterion variable in order to emerge as good multivariate discriminators. He adds: "It is often the case that two individual variables are, by themselves, not very good discriminators. Taken in conjunction, however, they may be highly effective (p. 122)." This appears to be the case with the next four variables to emerge from the discriminant analysis in the present study. It will be recalled that these variables all pertain to the Selective Attention Task and that none of them demonstrated significant univariate correlations with hypnotic susceptibility or significant differences among the group means. Finally, at the last relevant step of the analysis (Step 8), the PEQ was included.

Table 10

Multiple Correlation Values Between the QMI and the PICS and Each of the Seven Other Variables Demonstrating Significant Relationships with Hypnotic Susceptibility

Variable Number	Description	R	F	df	p
2	Differential Personality Questionnaire Scale Ab (DPQ:Ab)	.72	30.68	2, 57	<.01
11	Paivio's Individual Difference Questionnaire (IDQ) Factor 6 (Vividness of Dreams, Daydreams, and "Imagination")	.69	25.90	2, 57	<.01
3	Personal Experiences Questionnaire (PEQ)	.61	16.89	2, 57	<.01
4	Concordia Questionnaire on "Fantasy" Experiences	.49	9.00	2, 57	<.01
7	IDQ Factor 2 (Habitual Use of Imagery)	.57	13.72	2, 57	<.01
6	IDQ Factor 1 (Good Verbal Expression and Fluency)	.30	2.82	2, 57	<.10
15	Errors on Stroop Color and Word Test (Card C)	.09	< 1	2, 57	N.S.

In summary, the variables not included in the discriminant analysis by the final step have been left out by virtue of the redundancy of information they supply. As Klecka (1980) has indicated:

... two or more of the variables may share the same discriminating information even though they are individually good discriminators. When some of these are employed in the (discriminant) analysis, the remainder are redundant. Although they may be good discriminators on their own, these redundant variables do not contribute to the analysis, because their unique contributions are insufficient ... One way to eliminate unnecessary variables is by using a stepwise procedure to select the most useful discriminating variables (pp. 52-53).

#### Additional Analyses

Since J. Hilgard's (1970/1979; 1974; 1979) studies have revealed that a relatively high proportion of high susceptible subjects report having received moderately severe to severe punishment as children, data on item #21 of the Concordia Questionnaire on "Fantasy" Experiences were analyzed. The item asks subjects to check a point along a 100 centimetre line to describe the severity of the discipline imposed upon them as children by their parents. At one end of the continuum is the description "Extremely loose" with "Extremely severe" representing the opposite end. "Just Right" describes the middle position. (See Appendix E). No significant relationship between subjects' reports on this single item and hypnotizability, however, was observed ( $\chi^2 (2) = 1.898$ ;  $p > .05$ ). (See Table 11).

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Insert Table 11 about here

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It should be noted that the percentage of high susceptible subjects reporting relatively severe discipline (8 of 20 or 40%) compares favorably with the 50% (21 of 42) incidence reported by J. Hilgard (1974). In her study, only 13% (2 of 15) of the low susceptibles, however, reported having received moderately severe punishment and none reported severe punishment. This is contrasted by the present incidence of 25% (5 of 20) reported by the low susceptibles. Since Hilgard's criterion of high and low hypnotic susceptibility was almost identical to the criterion in the present study, the difference in results is not likely due to differences in the respective samples. The observed differences are more likely due to the fact that the present analysis is based on data from a single inventory item as opposed to Hilgard's more sensitive interview approach. Accordingly, more research is needed to quantify more precisely the relationship between severity of discipline and hypnotizability.

Data gathered from subjects' reports on the modified Van Nuys meditation-absorption task were analyzed also. After subjects had undergone the task, they were asked to describe the experience of imagining their chosen scene (See Appendix K). Data concerning the question, "Did you feel as if you were there?" revealed a significant relationship between subjects' answers and hypnotizability ( $\chi^2 (2) = 22.96; p < .001$ ). No significant relationship was found, however, between answers to the question, "Did you feel as if you were observing the scene, like watching a movie?" and hypnotic susceptibility ( $\chi^2 (2) = 2.67, p > .05$ ). (See Tables 12 and 13).

Table 11

Chi-Square Analysis Comparing Reported Severity of  
Discipline Imposed on Subjects as Children by their  
Parents and Hypnotic Susceptibility

		Hypnotic Susceptibility		
		High	Medium <sup>a</sup>	Low
Severity of Discipline <sup>b</sup>	High	8	4	5
	Low	12	15	15

$$\chi^2(2) = 1.898; p > .05$$

<sup>a</sup>one medium subject did not answer the question.

<sup>b</sup>high reported severity was defined as the top 1/3 of the continuum (i.e., a check mark between the 67 and 100 cm points); low severity was defined as a checkmark on the lower 2/3 of the continuum.

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Insert Tables 12 and 13 about here

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Results concerning the first question must be interpreted cautiously. Given a single question, potential demand characteristics (Orne, 1962) may have a disproportionately great effect on subjects' answers. Since subjects' hypnotizability had already been assessed, high susceptibles may have felt that the "right" answer was to indicate that they felt as if they were "there" and vice versa for the low susceptibles. Data concerning another question, however, may indicate otherwise. Subjects were asked to report any senses they may have experienced subjectively while imagining the scene. Since virtually all subjects reported "seeing" the scene, only senses other than sight were considered in the analysis. It is possible that the demand characteristics of the situation require high susceptible subjects to report experiencing more senses relative to the low susceptibles. A one-way ANOVA, however, revealed no differences among the group means ( $F(2,57) < 1; p > .05$ ). The high susceptibles reported a mean of 1.70 senses ( $S.D. = 1.302$ ), the mediums reported a mean of 1.50 senses ( $S.D. = 1.318$ ), and the lows reported a mean of 1.20 senses ( $S.D. = 1.322$ ).

A tentative explanation of why high susceptible subjects, relative to most medium and low susceptibles, feel as if they are "there" when simply asked to imagine a scene without a prior hypnotic induction may reside within the concept of hypnotizability as a "package" of cognitive skills that are available to the person outside the hypnotic context. As previously noted, this formulation holds that low and medium susceptible subjects possess some, but not all, of the skills necessary for



Table 12

## Chi-Square Analysis Comparing Reported Subjective

## Experiences on the Modified Van Nuys Task

(Did you feel as if you were there?)

## and Hypnotic Susceptibility

		Hypnotic Susceptibility		
		High	Medium	Low
Report	yes	19	7	5
	no	1	13	15

$$\chi^2 (2) = 22.96; p < .001$$

Table 13

Chi-Square Analysis Comparing Reported Subjective  
Experiences on the Modified Van Nuys Task  
(Did you feel as if you were observing the scene,  
like watching a movie?) and Hypnotic Susceptibility

		Hypnotic Susceptibility		
		High	Medium	Low
Report	yes	5	8	10
	no	15	12	10

$$\chi^2 (2) = 2.67; p > .05$$

hypnotic susceptibility. High susceptibles, on the other hand, are seen according to this view as possessing most, if not all, of the required skills in great abundance. Accordingly, higher order chi-square analyses between hypnotic susceptibility and various combinations of two measures considered jointly were performed. Since imagery ability was considered to be crucial to the capacity for imagining a scene to the extent that it felt subjectively real, results of the shortened version of the QMI (Sheehan, 1967) were compared with the PICS (Isaacs, Note 3) and the DPQ:Ab (Tellegen & Atkinson, 1974). Due to the relatively small sample size, however, 50% of the cells were calculated to have expected frequencies of less than five when all three susceptibility groups were considered separately. Accordingly, the medium and low cells were collapsed. Note that the division of score ranges on the QMI, PICS, and the DPQ:Ab are expressed in dichotomies, high corresponding to the highest 1/3 of the relative range of actual scores and low corresponding to the remaining 2/3 of the range. (See Tables 14 and 15).

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Insert Tables 14 and 15 about here

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As can be seen in Table 14, a significant relationship was observed between hypnotic susceptibility, vividness of imagery, and preference for an imagic cognitive style ( $\chi^2 (1) = 29.48; p < .001$ ). Fourteen of the high susceptibles (70%) scored in the top 1/3 of scores on both the QMI and the PICS while only one high (5%) scored in the bottom 2/3 of both scales. This is contrasted by the medium and low susceptible subjects, five of whom or 12.5% (all mediums) scored in the top 1/3 of both

Table 14

Chi-Square Analysis Comparing Scores on the  
QMI, PICS, and Hypnotic Susceptibility

PICS	Hypnotic Susceptibility			
	High		Not High	
	High Vividness (40 to 84)	Low Vividness (85 to 173)	High Vividness (40 to 84)	Low Vividness (85 to 173)
High (13 to 22)	14	1	5	5
Low (-9 to 12)	4	1	14	16

$$\chi^2 (1) = 29.48; p < .001$$

Table 15

Chi-Square Analysis Comparing Scores on the  
QMI, DPQ:Ab, and Hypnotic Susceptibility

DPQ:Ab	Hypnotic Susceptibility			
	High		Not High	
	QMI			
	High Vividness (40 to 84)	Low Vividness (85 to 173)	High Vividness (40 to 84)	Low Vividness (85 to 173)
High (24 to 34)	16	1	11	6
Low (0 to 23)	2	1	8	15

$$\chi^2 (1) = 30.56; p < .001$$

scales and 16 of whom or 40% (6 mediums and 10 lows) scored in the bottom 2/3. Table 15 illustrates a similar pattern between hypnotic susceptibility, vividness of imagery, and absorption in experiences outside the hypnotic context ( $\chi^2 (1) = 30.56; p < .001$ ). Sixteen of the highs (80%) scored in the top 1/3 on both the QMI and the DPQ:Ab with only one high scoring in the bottom 2/3 of both scales. Of the medium and low susceptible subjects, only 11 or 27.5% (7 mediums and 4 lows) scored in the top 1/3 of both scales with 15 of these subjects or 37.5% (4 mediums and 11 lows) scoring in the bottom 2/3. These data testify further to the importance of the relationship of vividness of imagery to hypnotic susceptibility. Further, high susceptibles also appear to enjoy exercising these imagery skills as indicated by their preference for an imagic cognitive style and they appear to typically experience high involvement on a non-verbal level in experiences such as appreciation of nature and of reading. Whether these preferences contribute to the development of hypnotizability or are consequences of it remains to be delineated more fully. J. Hilgard's (1970/1979; 1974; 1979) work, however, indicates strongly that if these types of preferences are nurtured in childhood they likely lead to hypnotic susceptibility in adulthood. It should be noted, however, that some low and especially medium susceptible subjects demonstrate this pattern also.

Finally, a significant relationship was observed between hypnotic susceptibility, preference for an imagic cognitive style, and reports of high absorption in non-hypnotic activities ( $\chi^2 (1) = 27.57; p < .001$ ). (See Table 16).

~~Insert~~ Table 16 about here

Table 16

Chi-Square Analysis Comparing Scores on the  
PICS, DPQ:Ab, and Hypnotic Susceptibility

DPQ:Ab	Hypnotic Susceptibility			
	High		Not High	
	PICS			
	High 13 to 22	Low -9 to 12	High 13 to 22	Low -9 to 12
High (22 to 34)	13	4	4	13
Low (0 to 23)	2	1	6	17

$$\chi^2 (1) = 27.57; p < .001$$

As can be seen in Table 16, 13 of the high susceptible subjects (65%) scored in the top 1/3 of both the PICS and the DPQ:Ab with only one high (5%) scoring in the bottom 2/3 of both scales. This is contrasted by the medium and low susceptibles; only four of these subjects or 10% (all mediums) scored in the top 1/3 of both scales and 17 of them or 42.5% (6 mediums and 11 lows) scored in the bottom 2/3.

These results suggest that high susceptibles' more extensive involvement in subjective experiences outside the hypnotic context is related to their preference for an imagic cognitive style. This observation sharply contrasts the pattern demonstrated by the low susceptibles, none of whom demonstrated this association and 11 of whom demonstrated the reverse pattern.



## DISCUSSION

The main hypothesis of the present study, that post-hoc classifications ("predictions") of subjects into susceptibility groups would be improved by the use of multiple, as opposed to any single predictor, was supported. Further, results of the present study confirm the heuristic value of conceptualizing hypnotizability as a "package" of cognitive skills. Results will be discussed in terms of their relevance to the domain of hypnosis and to the clinical context.

### Discriminant Analysis

A strong relationship was observed between the obtained discriminant function and the hypnotic susceptibility groups as evidenced by the proportion of variance in the discriminant function that was accounted for by the groups (63.62%). A further indication of the adequacy of the discriminant function is revealed by the high rate of correct classification (80%) obtained in the present study. The eight discriminating variables of the discriminant function were found to relate to imagery abilities (Betts' Questionnaire Upon Mental Imagery (QMI) (Sheehan, 1967)), preference for an imagic cognitive style (Preference for an Imagic Cognitive Style Test (PICS) (Isaacs, Note 3)), tolerance for absorption in "unusual" experiences in daily life (Personal Experiences Questionnaire (PEQ) (Evans, Note 4)), and various aspects of selective attention as indexed by the number of errors on the interference card of the Stroop Color and Word Test (Golden, 1978; Stroop, 1935) and performance on four of the variables of the selective attention task designed for the present study. Thus, while some variance remains unexplained,

these results point to the value of considering diverse cognitive skills when attempting to predict hypnotic responsiveness on the basis of non-hypnotic tests.

Interpretation of the standardized coefficients of four of the discriminating variables is relatively straightforward. In most cases, high hypnotic susceptibility was found to be related to vivid imagery, preference for an effortless and highly absorbed imagic cognitive style, reports of "unusual" experiences, and relatively few errors on the Stroop Test. This overall picture was found also for the medium susceptible subjects, although to a lesser extent, and the opposite was found to typify the performance of low susceptibles. These results are consistent with previous findings and will be discussed more extensively in subsequent sections.

By contrast, the four Selective Attention Task discriminant variables require examination. It will be recalled that a positive contribution (i.e., towards the low susceptible group centroid) was made by variable 27, the number of correct answers to the forced-choice questions for the first story. Further, variable 29, the degree of certainty to these answers, contributed in the opposite direction. The reverse was observed for the results concerning the two second story forced-choice variables. Why a relatively high degree of correctness was found to be related to low hypnotic susceptibility for the first story and to high hypnotic susceptibility for the second story while the reverse pattern was observed for degree of certainty is unclear. Since the free recall variables for both stories (bits recalled and intrusions

in recall) did not emerge as discriminators, these results may reflect the nature of the questionnaires rather than potential differences in the selective attention abilities of subjects of varying susceptibility levels. In keeping with Karlin's (1979) view that perception of the difficulty of this type of selective attention task is an important consideration when assessing subjects' performances, more research incorporating this variable is needed to clarify this finding. A more detailed discussion of the various imagination, absorption, and selective attention variables follows.

#### Imagination, Imagery, Fantasy, and Hypnotizability

Since the reports by the two French Royal Commissions in the latter part of the 18th century, imagination has been considered central to the concept that hypnotizability involves various subject characteristics. Results of the present study shed additional light on the importance of imagination-related skills to hypnotizability.

Results with the shortened version of the Betts' QMI (Sheehan, 1967) confirm the importance of imagery abilities to hypnotic susceptibility. Indeed, the QMI emerged as the best single predictor of hypnotic susceptibility. These results are consistent with previous empirical work. They differ from most previous results (e.g., J. Hilgard, 1974; Perry, 1973; Sutcliffe et al., 1970), however, by virtue of the stronger relationship observed in the present study between the QMI and hypnotic susceptibility.

This observed superior strength of the relationship between vividness of imagery and hypnotizability appears to be due to the

performances of the high susceptibles. As has been observed in previous studies, low vividness of imagery in the present study was associated with low hypnotic susceptibility. Of the 18 subjects who were initially classified by the discriminant analysis as low susceptibles based on their relatively low levels of imagery vividness, 12 (66.67%) were, in fact low susceptibles. Further, none of the high susceptibles demonstrated low vividness of imagery by this criterion. Where the present results differ from most other studies is that high vividness of imagery was also predictive of high hypnotic susceptibility. Of the 24 subjects initially classified as high susceptibles based on their relatively high levels of imagery vividness, 15 (62.50%) were indeed high susceptibles. That is, high vividness of imagery was approximately equally predictive of high susceptibility as low vividness of imagery was of low susceptibility.

A possible explanation for these results is that subjects may have learned incidentally, through their relatively extensive experience with hypnosis, to use whatever imagery abilities that they may have possessed initially. According to the present conceptualization, experience with hypnosis would likely affect the imagery abilities of high susceptible subjects to a greater extent than subjects of lesser hypnotic susceptibility since the former are seen as possessing the necessary skills in greater abundance. Consequently, the high vividness of imagery reports may have become more "predictive" of their hypnotic susceptibility.

Alternatively, the nature of the present sample may at least partially account for these findings. Firstly, the present study represents the first attempt to stratify subjects on an a priori basis into susceptibility groups and to include the passing of the posthypnotic amnesia item on the SHSS:C as the criterion for high hypnotic susceptibility. Since posthypnotic amnesia has been regarded as one of the core phenomena of hypnosis since it was first documented by de Puységur in 1784, its use as a partial indicator of high hypnotic susceptibility in the present study may, in effect, have contributed to the selection of a more highly susceptible sample of high susceptibles than is usually reported. The contribution of the present screening procedures to the present results with the QMI, however, is an empirical issue that requires further investigation.

Notwithstanding, this hypothesis receives support from the present results with the Differential Personality Questionnaire, Scale Ab (DPQ:Ab) (Tellegen & Atkinson, 1974). Previous studies that have investigated the relationship between reports of absorptive experiences on this inventory and hypnotizability have yielded correlation values between .27 and .46 (Finke & Macdonald, 1978; Isaacs, Note 3; Tellegen & Atkinson, 1974). Thus the present observed value of .64 represents a stronger relationship between these two variables than has thus far been reported. Since the DPQ:Ab attempts to tap high involvement in day-to-day experiences and activities, it is less probable that prior exposure to hypnotic procedures would affect subjects' reports to the same extent as is potentially the case with reports on the QMI. Further,

chi-square analyses revealed that almost all of the high susceptible subjects in the present study reported both high levels of imagery vividness and high frequencies of absorptive experiences. These findings suggest further that the high susceptibles in the present study may constitute a more highly select sample of hypnotically responsive individuals than has been investigated in the past.

The observed combination of imagery abilities and high involvement in day-to-day experiences is further complemented by the additional finding that high susceptible subjects prefer a predominantly imagery-oriented thinking style to a verbal one as evidenced by the results obtained on the PICS (Isaacs, Note 3). This finding replicated the recent work by Isaacs and represents an important additional mediating variable of hypnotic responsiveness not directly considered in virtually all previous studies. The J. Hilgard (1970/1979; 1974; 1979) and Wilson and Barber (Note 1; 1982) studies, however, suggest that the fantasy in which highly susceptible individuals are engaged is mediated through imagery-related thinking styles. A case in point is the report by one of J. Hilgard's (1974) high susceptibles (quoted in the introduction) who often subjectively becomes part of the action when she reads a story. The subject's report, "I'm somebody who's there ... in the middle of the action (p. 141)," is noteworthy for the apparently highly absorbed and non-verbal quality of the fantasy. Further, the observations by Wilson and Barber (1982) that 75% of their hypnotic "virtuosos" report encounters with spiritual apparitions and that 85% report realistic out-of-body experiences suggest strongly that high susceptible subjects possess highly attuned skills relating to vividness.

of imagery in numerous sensory modalities and that these skills come to be deployed in non-hypnotic contexts. Experiences with these types of occurrences may help to explain why most highly susceptible individuals report a high degree of involuntariness in their responses to hypnotic suggestions (P. Bowers, 1978). If, as the present results suggest, highly susceptible individuals typically use hypnotic-like skills accompanied by a high degree of involvement in their everyday lives, responding to hypnotic suggestions may largely involve performance of well-practised skills in an ideal environment.

Results on the other imagination-related measures employed in the present study serve to confirm and to extend these results. The findings of significant overall differences among the groups on Paivio's Individual Difference Questionnaire (IDQ) Factors 2 and 6 (Habitual Use of Imagery; Vividness of Dreams, Daydreams, and "Imagination") as well as significant correlations with hypnotic susceptibility are clearly consistent with the present conceptualization of hypnotizability as a "package" of cognitive skills. Results obtained with the shortened version of the PEQ (Evans, Note 4) demonstrating a significant relationship between hypnotic susceptibility and reports of high involvement in "unusual" experiences are also consistent with this view. Further, results concerning the Concordia Questionnaire on "Fantasy" Experiences support the developmentally oriented work of J. Hilgard (1970/1979; 1974; 1979) who has demonstrated a relationship between hypnotizability and fantasy experiences in childhood and the work of Wilson and Barber (1982) who have shown that this relationship persists into adulthood

among high susceptibles. Replication of the present results with these inventories, however, is needed to more firmly establish their usefulness in the present context.

It is relevant at this point to discuss the moderate relationship observed overall between hypnotic susceptibility and Paivio's IDQ Factor 1 (Good Verbal Expression and Fluency). Examination of this scale reveals that most of the 16 items pertain to self-perception of the ease in which various verbal skills are used (e.g., I am able to express my thoughts clearly; True = + score). A study with creative writers (P. Bowers, 1979) may help to clarify this finding. Of the nine subjects involved in the study, all four high and one low susceptible subjects "reported that the experience of writing under hypnosis was like that of writing particularly well (p. 569)". Several months later, however, these subjects rated the quality of the writing as either average or below average. If, as the present and other results suggest (Nogrady, McConkey, Laurence, & Perry, 1983), highly hypnotizable individuals are able to have hypnotic-like experiences outside the hypnotic context, it may be that the present results with Factor 1 reflect individuals' perceptions of their verbal skills rather than the skills themselves.

#### Selective Attention, Absorption, and Hypnotizability

An overall pattern between hypnotizability and performance on the various selective attention and absorption tasks in the present study was not demonstrated. A tentative explanation is offered for this general lack of significant findings.<sup>6</sup> As will presently be discussed, a subjective experience of effortlessness on the part of high susceptibles



when performing demanding cognitive tasks, a variable that was not rigorously assessed in the present study, may prove to be an important mediator in hypnotic responsiveness.

Of the selective attention and absorption tasks in the present study, only the number of errors on the interference card of the Stroop Color and Word Test variable (Golden, 1978; Stroop, 1935) demonstrated a significant overall relationship with hypnotizability. Further, results concerning the four variables of the selective attention task designed for the present study that emerged from the discriminant analysis have proven to be difficult to interpret. Previous results demonstrating superiority of high susceptibles on the Random Number Generation Task (RNG) (Graham & Evans, 1977) were not replicated. Finally, reports of intrusions on the modified Van Nuys Absorption-Meditation Task (Van Nuys, 1973) did not reveal a significant relationship with hypnotizability.

The relationship observed between the Stroop errors variable and hypnotic susceptibility may provide a clue to the nature of these findings. (The reader will recall that although a significant relationship was not observed for the female subjects, the negative direction was consistent with the overall relationship). It should be noted that the Stroop errors variable is an absolute measure as opposed to the relative measure of the ratio between the times to read Cards C and B. Further, since errors on the Stroop test indicate a lack of continuity in the reading of the stimuli, performance on this variable may be conceptualized in terms of effortfulness, with high number of errors corresponding

to high effort. Consequently, although the relative degree of interference on the task was not found to be related to hypnotizability, the observed negative relationship between susceptibility and errors may indicate that high susceptibles experienced the task as being less difficult.

The hypothesis that degree of effort is an important variable to be considered when assessing subjects' performances on some selective attention tasks receives support also from Karlin (1979), and from spontaneous comments of subjects in the present study. Karlin (1979) found a relationship between hypnotizability and subjects' performances on an auditory selective attention task when subjects' perceived difficulty of the task was considered also. Further, subjects' spontaneous comments to the present experimenter about the RNG task may indicate that low susceptible subjects, whose performance on the task was equivalent to the performance of the high susceptibles, nevertheless experienced greater difficulty with it. Some low susceptibles reported using complex numerical strategies; some of the highs, in contrast, reported using imagination-related strategies such as allowing numbers to appear one at a time in their mind's eye. Accordingly, systematic assessment of subjects' perceptions of these tasks and of their preferred strategies is needed in future work to more adequately examine this hypothesis.

In a related area of enquiry, Evans (Note 4) has suggested that the construct of "cognitive flexibility" may be as important a consideration in the search for hypnotizability correlates as performance on cognitive

tasks. He cites factor-analytic studies on subjective sleep patterns (Evans, 1977) that suggest that sleep efficiency may be conceptualized along three different uncorrelated dimensions: difficulty in falling asleep, difficulty in staying asleep, and the ability to maintain volitional control over sleep processes. Although detailed exposition of the research is beyond the scope of this discussion, it appears, nevertheless, that high susceptible subjects are able to exercise greater flexibility of control of their sleep patterns and that this flexibility may be indicative of an overall cognitive style. Evans (Note 4) states:

It is apparent that the ability to achieve deep hypnosis and the ability to fall asleep easily and virtually at will share some common mechanisms. It is hypothesized that this mechanism involves individual differences in the ability to maintain control over the level of functioning or state of consciousness that seems appropriate to the person at the time. This control mechanism apparently involves the ability to change readily from one kind of psychological state or activity to another or to maintain a flexibility in changing psychological sets (p. 5).

This hypothesized ability to change psychological sets may also share common mechanisms with the concept of "functional fixedness" that originated with Duncker (1945). According to this concept, the tendency to perceive objects in familiar terms ("sets") inhibits problem solving when it is necessary to perceive the objects concerned in a different manner. Similarly, low hypnotizables' hypothesized inferior cognitive

flexibility may under some circumstances, cause them to demonstrate inferior performance on selective attention tasks, or failing that, to require a relatively greater amount of effort on their part to perform the task.

Finally, the notion of superior cognitive flexibility among high hypnotizables is consistent with E. Hilgard's neo-dissociation theory (1973a, 1973b, 1977a, 1977b, 1979). According to the theory, individuals who are highly responsive to hypnosis are thought to have the ability to shift from one "cognitive subsystem" to another, according to the situation, more easily than less susceptible individuals. Further, recent evidence (Laurence, Nadon, Nogrady, & Perry, in press) indicates that among high susceptibles, those who demonstrate greater cognitive flexibility as evidenced by their manifestation of the hidden observer effect, are also more likely to incorporate a hypnotic suggestion into memory and to come to accept it as a veridical memory. This suggests that superior cognitive flexibility may actually lower performance rates on some selective attention tasks, especially those requiring cognitive labelling of "relevant" information and its subsequent recall. Clearly, the concepts of "cognitive flexibility" and "perceived effort" will require more rigorous operationalization in future studies if these potentially important variables are to be explored more adequately.

### Hypnotizability in the Clinical Context

Although some clinicians regard hypnotic susceptibility as irrelevant to treatment outcome when hypnosis is used (e.g., Gill & Brenman, 1959; Weitzenhoffer, 1957), this view has frequently been challenged (See Bowers, 1977). In light of results obtained with different pathologies, alleviation of non-voluntary disorders such as asthma, chronic pain, and migraines seems to be related to hypnotizability whereas habit disorders such as smoking, alcoholism, and overeating do not seem to be (Perry, Gelfand, & Marcovitch, 1979). The relationship between hypnotizability and the alleviation of some disorders that are not under voluntary control appears to be probabilistic; the more hypnotically susceptible an individual is, the more likely he or she will gain benefit from a treatment involving hypnosis. Further, it has been suggested that hypnotic susceptibility per se may be related to treatment outcome, even when hypnosis is not used (Bowers & Kelly, 1979).

Cases where low susceptible individuals respond to a hypnotic treatment intervention are of particular interest. (See for example Barnes, Note 6, where a hypnotically unresponsive ex-police officer who was bed-ridden for the greater part of each day for four years due to a lower back injury, responded in a remarkable fashion to a treatment involving hypnosis.) The positive results reported for low susceptibles in the clinic are not likely due to hypnosis per se since the individuals concerned are not hypnotizable. Although results may partially be mediated through a placebo response, an additional mediating factor may involve aspects of cognitive skills. Although low susceptibles do not

appear to possess the combination of imagination, absorption, and selective attention skills to the same extent as high susceptibles, they may nevertheless possess a sufficient degree of the skills relevant to a particular positive therapeutic outcome (Diamond, Note 7). Viewed in this manner, the hypnotic procedure may essentially serve to teach these individuals how to use their skills most efficiently.

In a more research-oriented vein, two studies to date have examined the relationship between hypnotizability and the outcome of treatment not involving hypnosis. A study by Nace, Warwick, Kelley, and Evans (1978) revealed that of 32 soldiers with a variety of non-psychotic psychiatric disorders, those who were more highly hypnotizable showed significantly greater therapeutic change during a 10-session treatment program. A subsequent 6-month follow-up, however, revealed no significant differences between high and low hypnotizable patients. No evidence of relapse was observed for the highs; rather, the initial effect appears to have been due to the tendency for low susceptibles to improve more slowly.

A more recent unpublished study (Horne, Evans, & Orne, 1982; reported in Evans, Note 4) revealed that hypnotic susceptibility was related to greater symptom severity at admission to a psychiatric hospital. Further, while only high susceptibles showed significant improvement on the Hopkins Symptom Checklist at discharge (6 months) and at follow-up (2 years), they also demonstrated a more frequent rate of rehospitalization.

The results of these two studies suggest that hypnotizability (and

its cognitive correlates) may be related to the onset of various psychopathological disorders and to eventual treatment outcome in a complex manner not yet fully understood. Indeed, recent research investigating the relationship between hypnotizability and phobic behavior (Foenander, Burrows, Gerschman, & Horne, 1980; Frankel & Orne, 1976; Gerschman, Burrows, Reade, & Foenander, 1979; John, Hollander, & Perry, 1983) may indicate the presence of similar cognitive mechanisms underlying both hypnosis and the development of phobic symptoms. Further, Frankel (1980) has suggested that teaching the phobic patient how to control the alterations in perception he or she may experience in the presence of the feared stimulus often results in positive therapeutic outcome.

In summary, although hypnotizability has been demonstrated to be a relatively stable trait that is not modifiable with practice and/or training (Hilgard, 1965; Perry, 1977), various skills that are related to hypnotic susceptibility appear to some extent to be amenable to training (Diamond, Note 7; Frankel, 1980). Consequently, assessment of hypnotizability in the clinical context may prove useful in the development of treatment strategies that would attempt to use the person's cognitive skills in the most efficient manner. Further, this skills-oriented approach possesses the additional desirable aspect of placing supportive emphasis on the individuals' ability to achieve therapeutic change, an aspect of psychotherapy that has been emphasized by numerous clinicians for certain situations (e.g., Valins & Nisbett, 1972).

### Conclusion

In conclusion, the present results suggest that highly hypnotizable individuals bring a number of cognitive skills with them to the hypnotic situation and that through an interaction with expectancies and various contextual variables, these skills allow them to experience the various distortions in memory, mood, and/or perception that are associated with hypnosis. Further, investigation of these skills may allow psychologists to gain more insight into the workings of the mind, which of course is the ultimate goal of psychology. As well, a more complete understanding of these skills will surely contribute to the development of innovative therapeutic strategies in the clinical context.



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Footnotes

<sup>1</sup>The continued popular success of animal magnetism as a treatment modality was no doubt due to it obtaining a sufficient rate of success in cases where the traditional curing methods of the time had failed. As one eloquent and satisfied patient of this period stated:-

If it is to illusion to which I owe the health I believe I enjoy, I humbly entreat the experts who see so clearly not to destroy it; that they may enlighten the universe, that they leave me with my error, and that they permit my simplicity, my frailty, and my ignorance to make use of an invisible agent, which does not exist but which cures me

(Podmore 1909/1963, p. 65)

<sup>2</sup>The criterion for classifying subjects into the three generally accepted susceptibility groups differs widely across studies. As evidenced in the introduction, many studies base their classifications solely on scores obtained on the HGSHS:A. As was noted in the Method section, this measure of hypnotizability correlates only moderately with the more stringent SHSS:C. Further, some studies classify subjects scoring in the 0-4 and 8-12 ranges on either the HGSHS:A or the SHSS:C as low and high susceptibles respectively. The present study's classification criterion, therefore, was more stringent than that used in many studies, ensuring that only those subjects who had failed most of the empirically easy motor items were classified as low susceptibles and that only those

subjects who had passed most of the empirically difficult cognitive items were classified as high susceptibles. Further, the medium susceptible subjects in the present study range from low mediums (SHSS:C scores of 5 and 6) to high mediums (scores of 9 and 10), thus further differentiating the present sample from those in many studies. In essence, the present sample represents highly distinct groups<sup>1</sup> of subjects who have been stratified into three equal sized hypnotic susceptibility groups on an a priori basis.

<sup>3</sup>Note that the range of variable numbers extends from 02 to 34. Only 20 variables, however, were entered into the discriminant analysis. The remaining variables were either used for identification purposes or contained redundant information.

<sup>4</sup>For Tukey's Honestly Significant Difference (HSD) pairwise comparison method, values are calculated for various probability levels. In order for two respective group means to be found to differ significantly, the difference between them must exceed the calculated HSD values reported in the text.

<sup>5</sup>The formula for triserial r, when the high and low groups are equal is as follows:

$$r_{\text{tris}} = \frac{M_h - M_l}{S.D.} \cdot \frac{p}{2y}$$

where  $M_h$  = mean of high group

$M_l$  = mean of low group

S.D. = standard deviation of all scores

$p$  = proportion

$y$  = normal curve ordinate

The standard error is given by the formula:

$$SE_{tris} = \frac{\sqrt{pq} / y - r^2 - .50 + p}{\sqrt{N}}$$

where  $p$  = proportion in one tail and  $q = 1 - p$

<sup>6</sup>It should be emphasized that with the exception of the RNG task, the selective attention and absorption tasks in the present study were either modified from previous studies, or represent the first attempt to relate performance on them to hypnotizability. As such, failure to observe significant relationships between the tasks and hypnotizability may be reflecting the undemonstrated construct validity and/or reliability of the tests.

**APPENDIX A****The Betts' Vividness of****Imagery Scale (QMI)****Sheehan's (1967) Shortened Version**

THE BETTS QMI VIVIDNESS OF IMAGERY SCALE

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_ TELEPHONE: \_\_\_\_\_

Instructions for Doing Test

The aim of this test is to determine the vividness of your imagery. The items of the test will bring certain images to your mind. You are to rate the vividness of each image by reference to the accompanying rating scale, which is shown at the bottom of the page. For example, if your image is "vague and dim" you give it a rating of 5. Record your answer in the brackets provided after each item. Just write the appropriate number of each item. Before you turn to the items on the next page, familiarize yourself with the different categories on the rating scale. Throughout the test, refer to the rating scale when judging the vividness of each image. A copy of the rating scale will be printed on each page. Please do not turn to the next page until you have completed the items on the page you are doing, and do not turn back to check on other items you have done. Complete each page before moving on to the next page. Try to do each item separately independent of how you may have done other items.

The image aroused by an item of this test may be -

Perfectly clear and as vivid as the actual experience	..... Rating 1
Very clear and comparable in vividness to the actual experience	..... Rating 2
Moderately clear and vivid	..... Rating 3
Not clear or vivid, but recognizable	..... Rating 4
Vague and dim	..... Rating 5
So vague and dim as to be hardly discernible	..... Rating 6
No image present at all, you only "knowing" that you are thinking of the object	..... Rating 7

An example of an item on the test would be one which asked you to consider an image which comes to your mind's eye of a red apple. If your visual image was moderately clear and vivid you would check the rating scale and mark "3" in the brackets as follows:

<u>Item</u>	<u>Rating</u>
5. A red apple	(3)

Now turn to the next page when you have understood these instructions and begin the next test.

Think of some relative or friend whom you frequently see, considering carefully the picture that rises before your mind's eye. Classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the Rating Scale.

<u>Item</u>	<u>Rating</u>
1. The exact contour of face, head, shoulders and body	( )
2. Characteristic poses of head, attitudes of body, etc.	( )
3. The precise carriage, length of step, etc. in walking	( )
4. The different colours worn in some familiar costume	( )

Think of seeing each of the following, considering carefully the picture which comes before your mind's eye; and classify the image suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the Rating Scale.

5. The sun as it is sinking below the horizon ( )

Rating Scale

The image aroused by an item of this test may be -

Perfectly clear and vivid as the actual experience	..... Rating 1
Very clear and comparable in vividness to the actual experience	..... Rating 2
Moderately clear and vivid	..... Rating 3
Not clear or vivid, but recognizable	..... Rating 4
Vague and dim	..... Rating 5
So vague and dim as to be hardly discernible	..... Rating 6
No image present at all, you only "knowing" that you are thinking of the object	..... Rating 7



Think of each of the following sounds, considering carefully the image which comes to your mind's ear, and classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the Rating Scale.

<u>Item</u>	<u>Rating</u>
6. The whistle of a locomotive	( )
7. The honk of an automobile	( )
8. The mewling of a cat	( )
9. The sound of escaping steam	( )
10. The clapping of hands in applause	( )

Rating Scale

The image aroused by an item of this test may be -

Perfectly clear and vivid as the actual experience	..... Rating 1
Very clear and comparable in vividness to the actual experience	..... Rating 2
Moderately clear and vivid	..... Rating 3
Not clear or vivid, but recognizable	..... Rating 4
Vague and dim	..... Rating 5
So vague and dim as to be hardly discernible	..... Rating 6
No image present at all, you only "knowing" that you are thinking of the object	..... Rating 7

Think of "feeling" or touching each of the following, considering carefully the image which comes to your mind's touch, and classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the Rating Scale.

<u>Item</u>	<u>Rating</u>
11. Sand	( )
12. Linen	( )
13. Fur	( )
14. The prick of a pin	( )
15. The warmth of a tepid bath	( )

Rating Scale

The image aroused by an item of this test may be -	
Perfectly clear and as vivid as the actual experience	..... Rating 1
Very clear and comparable in vividness to the actual experience	..... Rating 2
Moderately clear and vivid	..... Rating 3
Not clear or vivid, but recognizable	..... Rating 4
Vague and dim	..... Rating 5
So vague and dim as to be hardly discernible	..... Rating 6
No image present at all, you only "knowing" that you are thinking of the object	..... Rating 7

Think of performing each of the following acts, considering carefully the image which comes to your mind's arms, legs, lips, etc., and classify the images suggested as indicated by the degree of clearness and vividness specified on the Rating Scale.

<u>Item</u>	<u>Rating</u>
16. Running upstairs	( )
17. Springing across a gutter	( )
18. Drawing a circle on paper	( )
19. Reaching up to a high shelf	( )
20. Kicking something out of your way	( )

Rating Scale

The image aroused by an item of this test may be -

Perfectly clear and vivid as the actual experience	..... Rating 1
Very clear and comparable in vividness to the actual experience	..... Rating 2
Moderately clear and vivid	..... Rating 3
Not clear and vivid, but recognizable	..... Rating 4
Vague and dim	..... Rating 5
So vague and dim as to be hardly discernible	..... Rating 6
No image present at all, you only "knowing" that you are thinking of the object	..... Rating 7

Think of tasting each of the following considering carefully the image which comes to your mind's mouth, and classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the Rating Scale.

<u>Item</u>	<u>Rating</u>
21. Salt	( )
22. Granulated (white) sugar	( )
23. Oranges	( )
24. Jelly	( )
25 Your favorite soup	( )

Rating Scale

The image aroused by an item of this test may be -	
Perfectly clear and vivid as the actual experience	..... Rating 1
Very clear and comparable in vividness to the actual experience	..... Rating 2
Moderately clear and vivid	..... Rating 3
Not clear and vivid, but recognizable	..... Rating 4
Vague and dim	..... Rating 5
So vague and dim as to be hardly discernible	..... Rating 6
No image present at all, you only "knowing" that you are thinking of the object	..... Rating 7

Think of smelling each of the following, considering carefully the image which comes to your mind's nose and classify the images suggested.

by each of the following questions as indicated by the degrees of clearness and vividness specified on the Rating Scale.

<u>Item</u>	<u>Rating</u>
26. An ill-ventilated room	( )
27. Cooking cabbage	( )
28. Roast beef	( )
29. Fresh paint	( )
30. New leather	( )

Rating Scale

The image aroused by an item of this test may be -	
Perfectly clear and vivid as the actual experience	..... Rating 1
Very clear and comparable in vividness to the actual experience	..... Rating 2
Moderately clear and vivid	..... Rating 3
Not clear and vivid, but recognizable	..... Rating 4
Vague and dim	..... Rating 5
So vague and dim as to be hardly discernible	..... Rating 6
No image present, you only "knowing" that you are thinking of the object	..... Rating 7

Think of each of the following sensations, considering carefully the image which comes before your mind, and classify the images suggested as indicated by the degrees of clearness and vividness specified on the Rating Scale.

<u>Item</u>	<u>Rating</u>
31. Fatigue	( )
32. Hunger	( )
33. A sore throat	( )
34. Drowsiness	( )
35. Repletions as from a very full meal	( )

Rating Scale

The image aroused by an item of this test may be -	
Perfectly clear and vivid as the actual experience	..... Rating 1
Very clear and comparable in vividness to the actual experience	..... Rating 2
Moderately clear and vivid	..... Rating 3
Not clear or vivid, but recognizable	..... Rating 4
Vague and dim	..... Rating 5
So vague and dim as to be hardly discernible	..... Rating 6
No image present at all, you only "knowing" that you are thinking of the object	..... Rating 7

APPENDIX B

Paivio's Individual Difference Questionnaire (IDQ)

INDIVIDUAL DIFFERENCE QUESTIONNAIRE

Name: \_\_\_\_\_ Date: \_\_\_\_\_

INSTRUCTIONS

The statements on the following pages represent ways of thinking, studying and problem solving, which are true for some people and not for others. Read each statement and decide whether or not it is true with respect to yourself. Then indicate your answer in the appropriate column.

If you agree with the statement or decide that it does describe you, answer TRUE. If you disagree with the statement or feel that it is not descriptive of you, answer FALSE. Answer the statements as carefully and honestly as you can. The statements are not designed to assess the goodness or badness of the way you think. They are attempts to discover the methods of thinking you consistently use in various situations. There are no right or wrong answers.

Answer every statement either true (T), or false (F), even if you are not completely sure of your answer. Please choose one of the alternatives, the one that best applies.









63. My dreams are extremely vivid.
64. I have better than average fluency in using words.
65. I read a great deal.
66. I am continually aware of sentence structure.
67. My thinking often consists of mental pictures or images.
68. I do not form a mental picture of people or places when reading of them.
69. I often have difficulty in explaining things to others.
70. My daydreams are rather indistinct and hazy.
71. I find it easier to learn from a demonstration than from written instructions.
72. I often enjoy the use of mental pictures to remember things.
74. When remembering a scene I use verbal descriptions rather than mental pictures.
75. I take great pains to express myself with precision and accuracy in both verbal speech and written work.
76. I have never done well in learning languages.
77. The proper use of words is secondary to the ideas and content of speech or writing.
78. I have a better memory for things I have read, rather than things I have experienced.
79. I am disturbed by people who quibble about word usage.
80. I have difficulty producing associations for words.
81. I often have ideas that I have trouble expressing in words.
82. I think that puns are the lowest form of humour.
83. Just before falling asleep I often find myself picturing events that have happened.
84. I prefer to read instructions about how to do something, rather than have someone show me.

T

F

85. I am a good story teller.

86. I spend very little time attempting to increase my vocabulary.

T	F
---	---

**APPENDIX C****Tellegen's Differential Personality Questionnaire****Scale Ab (DPQ:Ab)**

Auke Tellegen, Ph.D.

University of Minnesota, 1978

**DIFFERENTIAL PERSONALITY QUESTIONNAIRE: Scale Ab**

In this booklet you will find a series of statements a person might use to describe his or her characteristics. Each statement is followed by two choices - True and False. Read the statement and decide which choice better describes you. Then circle your answer on the answer sheet.

Please answer every statement, even if you are not completely sure of the answer. Read each statement carefully, but don't spend too much time deciding on the answer.

In making your answers on the answer sheet, please be sure that the number of the statement in the booklet is the same as the number on the answer sheet.

1. Sometimes I feel and experience things as I did when I was a child.
2. I can be greatly moved by eloquent or poetic language.
3. While watching a movie, a television, show or a play, I may become so involved that I forget about myself and my surroundings and experience the story as if it were real and as if I were taking part in it.
4. If I stare at a picture and then look away from it, I can sometimes "see" an image of the picture, almost as if I were still looking at it.
5. Sometimes I feel as if my mind could envelop the whole world.
6. I like to watch cloud shapes change in the sky.
7. If I wish, I can imagine (or daydream) some things so vividly that they hold my attention as a good movie or story does.
8. I think I really know what some people mean when they talk about mystical experiences.
9. I sometimes "step outside" my usual self and experience an entirely different state of being.
10. Textures - such as wool, sand, wood - sometimes remind me of colors or music.
11. Sometimes I experience things as if they were doubly real.
12. When I listen to music, I can get so caught up in it that I don't notice anything else.
13. If I wish, I can imagine that my body is so heavy that I could not move it if I wanted to.
14. I can often somehow sense the presence of another person before I actually see or hear him or her.
15. The crackle and flames of a wood fire stimulate my imagination.
16. It is sometimes possible for me to be completely immersed in nature or in art and to feel as if my whole state of consciousness has somehow been temporarily altered.
17. Different colors have distinctive and special meanings for me.
18. I am able to wander off into my own thoughts while doing a routine task and actually forget that I am doing that task, and then find a few minutes later that I have completed it.
19. I can sometimes recollect certain past experiences in my life with such clarity and vividness that it is like living them again or almost so.



20. Things that might seem meaningless to others often make sense to me.
21. While acting in a play, I think I could really feel the emotions of the character and "become" him or her for the time being, forgetting both myself and the audience.
22. My thoughts often don't occur as words but as visual images.
23. I often take delight in small things (like the five-pointed star shape that appears when you cut an apple across the core or the colors in soap bubbles).
24. When listening to organ music or other powerful music, I sometimes feel as if I am being lifted into the air.
25. Sometimes I can change noise into music by the way I listen to it.
26. Some of my most vivid memories are called up by scents and smells.
27. Certain pieces of music remind me of pictures or moving patterns of color.
28. I often know what someone is going to say before he or she says it.
29. I often have "physical memories"; for example, after I've been swimming I may still feel as if I'm in the water.
30. The sound of a voice can be so fascinating to me that I can just go on listening to it.
31. At times I somehow feel the presence of someone who is not physically there.
32. Sometimes thoughts and images come to me without the slightest effort on my part.
33. I find that different odors have different colors.
34. I can be deeply moved by a sunset.

**APPENDIX D****Shor's Personal Experiences Questionnaire (PEQ)****(shortened version)**

PERSONAL EXPERIENCES QUESTIONNAIRE

Form CA-79

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Description and Instructions

A great many phenomena are considered common and everyday in one culture and bizarre or even pathological in another. Hallucinations, for example, are eventually experienced by every male Crow Indian during his maturation process - he must see his Guardian Spirit in order to become a man. In our society, however, when an individual has such an experience, he rarely reports it since he feels it is at best peculiar. Yet the Yogi or Zen Buddhist deliberately seeks mystical or transcendental experiences which are considered in their culture among the highest expressions of the human intellect.

It is hard to get honest reports on things which are sometimes intensely personal. The present questionnaire is based on extensive interview data with normal subjects where it became obvious that such experiences are very common even though rarely spoken of. Please take this questionnaire seriously as we are concerned with getting a true approximation of the incidence of some of these experiences in a normal college population.

We are interested in experiences which have happened spontaneously in the natural course of living, and not as a result of special techniques such as hypnosis, the experimental sensory-deprivation

situation, or by means of drugs that cause hallucinations (such as lysergic acid, marijuana, or mescaline). Experiences which occurred only in dreams or as the result of special techniques should be labeled as such.

Read through each question, and beside each item where a yes or no response choice is provided, rate yourself as to whether you have ever had the experience described by placing a circle around the appropriate yes or no descriptor. Give additional information only if a simple yes or no cannot be given. Please answer every question.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

- |     |   |     |    |
|-----|---|-----|----|
| 1.  | Have you ever had the experience of walking in your sleep?  | YES | NO |
| 2.  | Can you put yourself to sleep?  | YES | NO |
| 3.  | Have you almost fallen asleep while you were driving on a quiet, level stretch of road?   | YES | NO |
| 4.  | Have you ever been able to make a daydream seem real?   | YES | NO |
| 5.  | When there are sounds that you do not want to listen to can you block them from your mind so that they are no longer important to you?  | YES | NO |
| 6.  | Have you ever actively stared at something and had it slowly (or suddenly) become very strange before your eyes?  | YES | NO |
| 7.  | Have you ever had strange images - vivid, and real as life - flow into your mind, seemingly out of nowhere?   | YES | NO |
| 8.  | Have you ever thought that you had said something when actually you had only thought about saying it?   | YES | NO |
| 9.  | Have you ever thought you heard something, like someone calling your name or the telephone ringing, and then on checking found it was just your imagination?  | YES | NO |
| 10. | Have you ever had the experience of being caught up by music or in art (for example) in the mountains, at the ocean, viewing sculpture, etc.) and had a feeling of awe, inspiration, and grandeur sweep over you?   | YES | NO |
| 11. | Have you ever had the experience of being caught up by music or dancing so that you became enraptured by it and had it live and express itself through you so that you as yourself seemed to cease to be during it? | YES | NO |
| 12. | Have you ever had the experience of seeming to watch yourself from the distance as if in a dream?   | YES | NO |
| 13. | Have you ever been lulled into a groggy state or put to sleep by a lecture or concert even though you were not otherwise fatigued or tired?   | YES | NO |
| 14. | Have you ever found yourself staring at something and for the moment forgotten where you were?  | YES | NO |
| 15. | Have you every been so lost in thought that you did not understand what people said to you even when you nodded token agreement?  | YES | NO |

16. Have you ever become so absorbed in listening to music that you became lost in imagination? YES NO
17. Have you ever walked up the aisle after a particularly absorbing movie and felt still so much in the movie that your walking up the aisle was unreal or like a dream? YES NO
18. Have you ever had the experience of reading a novel (or watching a play), and while doing so actually forget yourself, your surroundings, and even the fact that you are reading (or watching) and begin to actually live the story with such great reality and vividness that it becomes temporarily almost reality for you? Or actually seemed to become reality for you? YES NO

APPENDIX E

Concordia Questionnaire on "Fantasy" Experiences

The following questions are about certain aspects of your childhood and of your present life. Please answer all the questions in #1 to 4. (The questions in #5 are optional). All answers are strictly confidential. Try to be as accurate as possible since we would like your answers to be a reflection of what is happening in your everyday life.

Thank-you.



## 1. Consider your earliest clear memory.

(a) At what age was it? \_\_\_\_\_

(b) How certain are you that this memory actually happened in the way you see it now? Please tick anywhere on the line.



(c) When you think about this memory, do you feel as if you are re-experiencing it? Yes \_\_\_\_\_ No \_\_\_\_\_

(d) When you think about this memory, do you feel as if you are re-experiencing it in some sort of detached way?

Yes \_\_\_\_\_ No \_\_\_\_\_

## 2. As a child:

(a) Did you believe in magical beings such as Santa Claus, fairies, leprechauns, elves, the Easter Bunny, etc.? Yes \_\_\_\_\_ No \_\_\_\_\_

(b) Did you ever "see" or "hear" Santa Claus, fairies, etc.? Yes \_\_\_\_\_ No \_\_\_\_\_

(c) When people read to you and/or told you stories, did they get involved in the make-believe along with you? Yes \_\_\_\_\_ No \_\_\_\_\_

(d) Did you at times live in a make-believe world? Yes \_\_\_\_\_ No \_\_\_\_\_

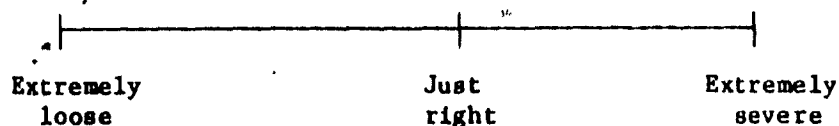
(e) Did you have an imaginary companion such as an imagined person, animal or object which you talked to, shared your feelings with, or took along with you? Yes \_\_\_\_\_ No \_\_\_\_\_

(f) If yes, did your imaginary companion have a "life" of its own even when you were not there? Yes \_\_\_\_\_ No \_\_\_\_\_

(g) Did you occasionally pretend and in some sense believe that you were someone else such as a member of another family, a prince or princess, a husband or wife, or an orphan? Yes \_\_\_\_\_ No \_\_\_\_\_

(h) When you were punished as a child, did you withdraw into an imaginary world? Yes \_\_\_\_\_ No \_\_\_\_\_

(i) How severe would you describe the discipline that your parents imposed upon you? Please tick anywhere on the line.



3. As an adult:
- (a) Do you still feel basically the same way as you did when you were a child? Yes \_\_\_\_\_ No \_\_\_\_\_
- (b) Do you still feel more like a child inside? Yes \_\_\_\_\_ No \_\_\_\_\_
- (c) Do you still in some sense believe in magical beings such as fairies, etc.? Yes \_\_\_\_\_ No \_\_\_\_\_
- (d) Which of the two following descriptions best describes your involvement in a story when you are reading?  
 \_\_\_\_\_ I become so involved that I become part of the story.  
 \_\_\_\_\_ I am involved in the story but I am always aware that I am reading.
- (e) Which of the two following descriptions best describes your involvement in a story that you are watching on film?  
 \_\_\_\_\_ I become so involved that I become part of the story.  
 \_\_\_\_\_ I am involved in the story but I am always aware that I am watching a film.
- (f) When watching intense physical and/or emotional scenes on TV or in movies, do you sometimes react physically and/or emotionally? Yes \_\_\_\_\_ No \_\_\_\_\_
- (g) Do you at times live in a make-believe world? Yes \_\_\_\_\_ No \_\_\_\_\_
- (h) Do you occasionally imagine you are someone else?  
 Yes \_\_\_\_\_ No \_\_\_\_\_
- (i) When life around you becomes unpleasant, do you withdraw into an imaginary world? Yes \_\_\_\_\_ No \_\_\_\_\_
- (j) Have you ever developed symptoms of an illness that turned out to be imaginary? Yes \_\_\_\_\_ No \_\_\_\_\_
- (k) Have you ever had a phantom pregnancy? Yes \_\_\_\_\_ No \_\_\_\_\_
- (l) Do you sometimes find yourself believing imaginary events?  
 Yes \_\_\_\_\_ No \_\_\_\_\_
- (m) Were you ever afraid that your imagining would become so real that you would be unable to stop it? Yes \_\_\_\_\_ No \_\_\_\_\_
- (n) Would your life be less complete if you were never able to imagine again? Yes \_\_\_\_\_ No \_\_\_\_\_
- (o) When you are recounting an event to someone, do you tend to embellish the story and come to believe the embellished account? Yes \_\_\_\_\_ No \_\_\_\_\_

4. (a) Have you ever walked or talked in your sleep? Yes \_\_\_\_ No \_\_\_\_
- (b) Is it sometimes difficult for you to determine whether a memory is of an actual past event or of an imagined one?  
Yes \_\_\_\_ No \_\_\_\_
- (c) Have you ever experienced religious, spiritual, or psychic healing? Yes \_\_\_\_ No \_\_\_\_
- (d) Have you ever had personal experiences with extrasensory phenomena? Yes \_\_\_\_ No \_\_\_\_
- (e) Have religion or spiritual ideas played a major part in your life? Yes \_\_\_\_ No \_\_\_\_
5. (Optional)
- (a) Do you have fantasies involving other persons? Yes \_\_\_\_ No \_\_\_\_
- (b) Do you have sexual fantasies? Yes \_\_\_\_ No \_\_\_\_
- (c) Have you ever had orgasm solely through your imagination?  
Yes \_\_\_\_ No \_\_\_\_

**APPENDIX F****Instructions for the Random-Number Generation Task (RNG)**

When I ask you to begin, start calling out numbers at the same rate as the metronome is now beating. Just call out numbers, in random order, using the numbers from 1 to 10 inclusive. Certainly you are familiar with the concept of randomness. For example, if you were to throw a die many times, each of the six numbers would occur in random sequence. Although it might not happen in a few throws, over a large number of throws, each number would occur about as often as every other number and in no particular order. Your task is, as it were, to imagine a 10-sided die, with the numbers 1 to 10 on the sides. Without thinking about it too much, call out the numbers that you think of in random fashion at a constant rate of 1 number per second. The metronome is set at that rate and your task is to call out numbers at random in pace with it. If you should find yourself ahead of or behind the metronome, just try to get in pace with it again. Remember to use all the numbers from 1 to 10 inclusive. If you have any questions, I'd be glad to answer them now.

**APPENDIX G****Calculation Example for the Random-Number Generation Task (RNG)**

**Calculation of Random Number Index (RNG): Illustrative Example**

In response to these instructions, a female volunteer subject verbalized the following 100 responses (1/sec) in a baseline trial:

7; 1; 5; 8; 3; 4; 10; 9; 6; 2;  
1; 4; 7; 9; 5; 2; 3; 10; 8; 6;  
7; 2; 1; 5; 4; 9; 6; 1; 10; 4;  
2; 3; 7; 8; 9; 4; 5; 6; 2; 10;  
8; 9; 4; 3; 7; 5; 6; 1; 9; 8;  
8; 9; 4; 3; 7; 5; 6; 1; 9; 8;  
3; 4; 6; 10; 9; 8; 7; 2; 3; 1;  
9; 4; 5; 7; 10; 6; 9; 2; 8; 7;  
8; 5; 1; 6; 4; 3; 9; 5; 6; 1;  
8; 10; 7; 5; 9; 2; 4; 3; 8; 1;  
9; 7; 6; 3; 2; 7; 10; 9; 5; 1;

Illustrative Example of Randomization Matrix Used in the Calculation of  
the Random Number Generation Index (RNG) for a volunteer Subject:

Baseline Performance\*

	R <sub>j</sub>										
R <sub>i</sub>	1	2	3	4	5	6	7	8	9	10	f <sup>i</sup>
1				1	2	1	1	1	3	1	10
2	2			3	1			1	1	1	10
3	1	1		2	1			2	1	11	10
4		1	3		2	1	1		1	1	10
5	2	1		1		3	1	1	1		10
6	3	2	1	1			1			11	10
7	1	2	1		2	1		1	1	2	11
8	1		2			1	2		2	1	9
9		2		3	3	2	1	2			13
10				1		1	1	2	3		8
f <sub>j</sub>	10	9	10	10	10	10	11	9	13	8	100

\*Subject's 100 responses are tabulated on the preceding page.



$$\begin{aligned}
 \text{RNG} &= \frac{\sum(f_{ij}) \cdot \log(f_{ij})}{\sum(f_i) \cdot \log(f_i)} \\
 &= \frac{\sum(2 \log 2 + 3 \log 3 + 2 \log 2 + \dots + 2 \log 2 + 3 \log 3)}{\sum(10 \log 10 + 9 \log 9 + 10 \log 10 + \dots + 13 \log 13 + 8 \log 8)} \\
 &= \frac{21.6869}{100.3376} \\
 &= .216
 \end{aligned}$$

Note - As  $1 \log 1 = 0$ , and thus where frequency of Cell<sub>ij</sub> is 0 or 1, these do not directly enter calculations.

APPENDIX H

Questions for Story A

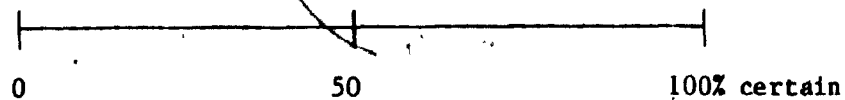
Please write down everything you can remember about the story to which you were asked to attend. Include all details even if you are not sure of them.

Please answer each question by circling the appropriate letter.

Indicate also how certain you are of your answers by ticking anywhere along the certainty line below each question.

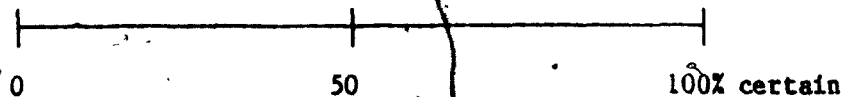
1. King Charles had always been:

- (a) a hypochondriac.
- (b) fond of physical exercise.
- (c) careless about his health.



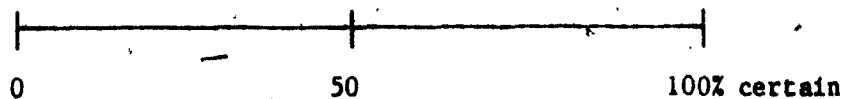
2. His walks in St. James Park were taken:

- (a) in the early morning.
- (b) at midday.
- (c) after lunch.



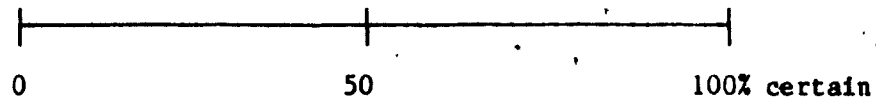
3. King Charles walked in St. James Park:

- (a) with some of the bourgeoisie.
- (b) for three or four hours a day.
- (c) when he was sick to improve his health.



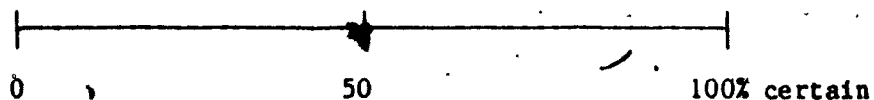
4. Those who were admitted to King Charles' company during his walks:

- (a) were resentful of him.
- (b) had difficulty keeping up with him.
- (c) humored him when he acted in a way unbecoming of a king.



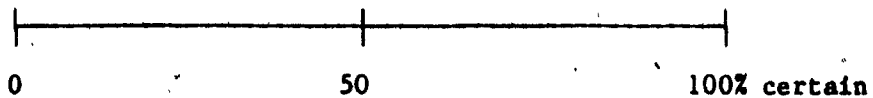
5. At the beginning of the year 1684:

- (a) self-indulgence had already undermined the king's physique.
- (b) there was no indication that the king had not long to live.
- (c) the king was known to be suffering from a fatal disease.



6. At the end of the year 1684, the king:

- (a) suffered an acute attack of illness.
- (b) was seriously ill.
- (c) was slightly unwell.



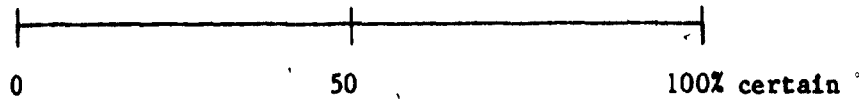
7. King Charles was living at this time in:

- (a) Buckingham Palace.
- (b) St. James Palace.
- (c) Whitehall Palace.



8. The illness from which King Charles suffered in 1684:

- (a) did not restrict his activities.
- (b) was proved to simply be an attack of gout.
- (c) was not diagnosed with certainty.



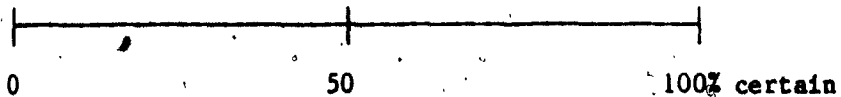
9. King Charles:

- (a) treated those around him with contempt.
- (b) took 50% of the peasants' earnings.
- (c) was naturally strong.



10. King Charles:

- (a) walked among the people so that he could get to know them.
- (b) appointed the Committee for Public Safety to study the properties of mercury.
- (c) became ill-tempered due to confinement.



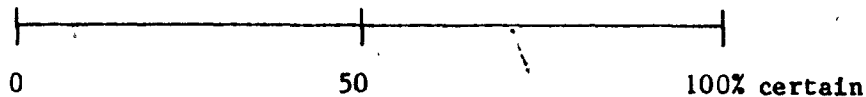
11. During the period 1684-1685, King Charles' power:

- (a) was diminishing because the people began to revolt.
- (b) was as it had always been, enough to maintain the throne.
- (c) was greater than it had ever been.



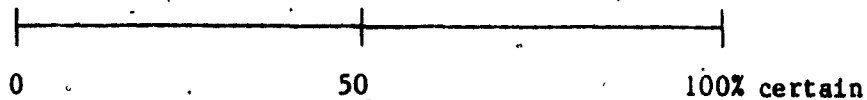
12. On the night of February 1st, 1685:

- (a) there was no suggestion that the king was unwell.
- (b) the king did not sleep very soundly.
- (c) the king slept perfectly well throughout the night.



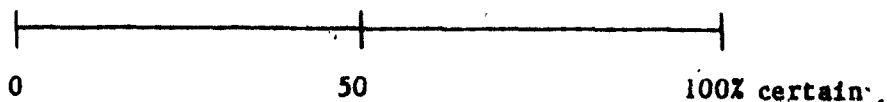
13. During that evening:

- (a) some grave persons went to pay their duties to their sovereign.
- (b) an English baronet went to pay his duties to his sovereign.
- (c) neither of the above.



14. During that evening, the king:

- (a) played cards with twenty courtiers.
- (b) complained of not feeling well.
- (c) sat toying with a beautiful French actress.



15. Immediately after the blood-letting:

- (a) the queen was present at the king's bedside.
- (b) the Duchess of York was present at the king's bedside.
- (c) the Duchess of Portsmouth was present at the king's bedside.





APPENDIX I

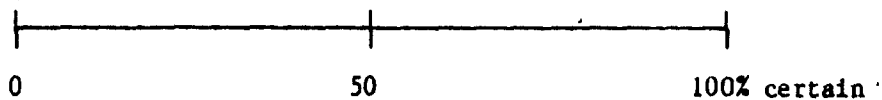
Questions for Story B

Please write down everything you can remember about the story to which you were asked to attend. Include all details even if you are not sure of them.

Please answer each question by circling the appropriate letter.  
Indicate also how certain you are of your answers by ticking anywhere  
along the certainty line below each question.

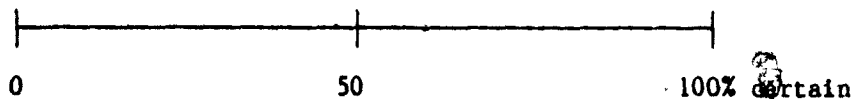
1. After the peasants had paid all their taxes they were left with:

- (a) less than a quarter of their earnings.
- (b) slightly less than half their earnings.
- (c) only half of their earnings.



2. According to this passage, the nobles in 18th century France:

- (a) were mindful of their health even in their pleasures.
- (b) paid very little in taxes.
- (c) were resentful of the monarchy.



3. The common people:

- (a) of Europe and America at first approved of the Revolution.
- (b) of Europe only at first approved of the Revolution.
- (c) of Europe never approved of the Revolution.

4. Many of the bourgeoisie:

- (a) spent time trying to gain favor with the monarchy.
- (b) spent part of their time idly flinging corn to ducks in the park.
- (c) had sympathy for the working class.



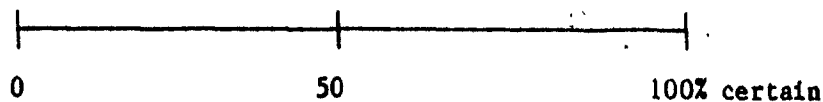
5. Louis XVI:

- (a) set up the Committee for Public Safety.
- (b) suffered from gout.
- (c) neither of the above.



6. It is suggested in this passage that:

- (a) the revolutionaries were misguided but sincere idealists.
- (b) some revolutionaries use the opportunity of civil unrest to gain power for themselves.
- (c) most revolutionaries use the opportunity of civil unrest to gain power for themselves.



## 7. The Committee for Public Safety:-

- (a) was elected by the revolutionaries.
- (b) was interested in the properties of mercury.
- (c) accepted bribes from those condemned to death.



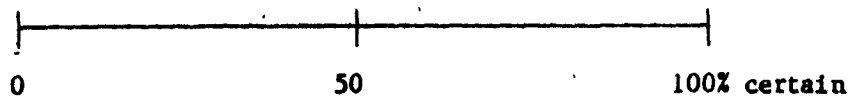
## 8. Sir Percy Blakeney:

- (a) was the Scarlet Pimpernel.
- (b) was mistaken by Chauvelin for the Scarlet Pimpernel.
- (c) knew the Scarlet Pimpernel.



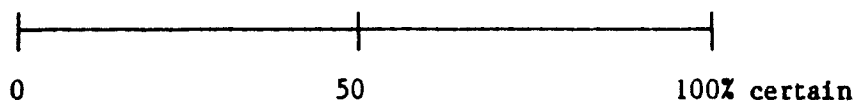
## 9. Which of the following is a character in the Scarlet Pimpernel stories?

- (a) Baroness Orczy.
- (b) Baron Orczy.
- (c) neither of the above.



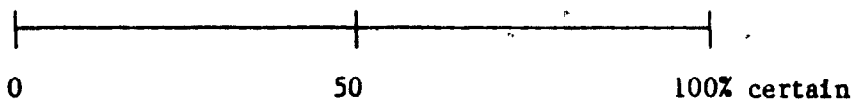
## 10. Marguerite St. Just:

- (a) was an actress.
- (b) kept company with gamblers and revellers.
- (c) was lazy and pleasure seeking.



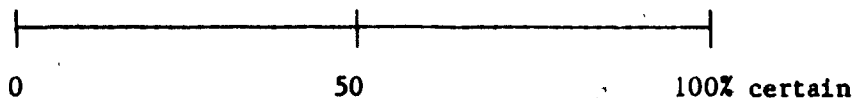
## 11. Sir Percy's wife:

- (a) Was told that her husband was the Scarlet Pimpernel.
- (b) knew that her husband was the Scarlet Pimpernel.
- (c) did not know that her husband was the Scarlet Pimpernel.



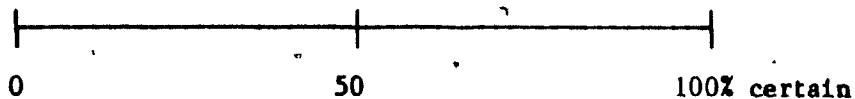
## 12. The Scarlet Pimpernel carried out his work:

- (a) under orders from the English government.
- (b) under orders from no one.
- (c) under orders from a few French nobles.



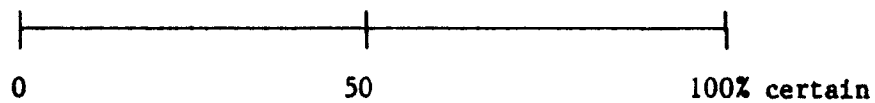
## 13. Citizen Chauvelin, a representative of the Republican government:

- (a) sunk to depths of baseness to keep the revolution alive.
- (b) was head of the Committee for Public Safety.
- (c) his face grew black when he encountered the Scarlet Pimpernel.



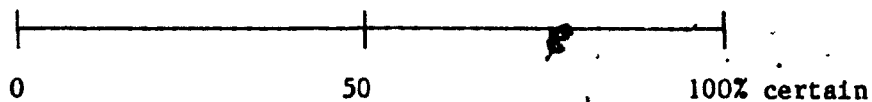
14. According to this passage, during the reign of terror:

- (a) opponents, royalists, and peasants were executed.
- (b) only opponents and royalists were executed.
- (c) only opponents and peasants were executed.



15. The slogan of the revolutionaries was:

- (a) Liberty and Equality for all.
- (b) Justice, Liberty, Fraternity.
- (c) Liberty, Equality, Fraternity.



APPENDIX J

Instructions for the Modified Van Nuys Meditation-Absorption Task



The purpose of this session is to study your attention style. Some people are able to focus their attention readily on one thing while others tend to scan over a number of things. Of course, we all do both of these, focusing and scanning, to some degree but generally a preferred mode develops. In this task, I am going to ask you to close your eyes and to imagine a real place where you enjoy being. I am going to rely on your report of the extent to which you were or were not able to keep your attention focused on the image and I am going to ask you questions about what you imagined when the task is over.

o When you are doing this task, try to exclude all thoughts or feelings not directly related to the image. Focus all your attention on the image you have in your mind. You may imagine being in this place engaged in some activity, just taking in the scene, or anything else you would like to imagine. The important thing is to keep your attention focused on the image.

At some point you may find it difficult to keep your attention focused. Most people find that they experience the intrusion of some random thoughts. If this happens, I'd like you to signal it to me by raising the index finger of your right hand each time you experience an intrusion. Some extremely fleeting thought may cross your mind and not be counted as an intrusion as long as you do not get caught up in a stream of thought about it. An intrusion is counted whenever you find that you have gotten caught up on some thought or other and, by force of will, have to bring yourself back to the task of focusing on the image. It is as if you have momentarily forgotten the task or had a slight

lapse of consciousness and then suddenly remembered what you were supposed to be doing. It is very important that you report the intrusions as honestly as you can without getting caught up in trying to look good to me. I am only interested in studying your attention style as it is and I have no basis for making judgements of good or bad. So just do your best to report an intrusion whenever you notice that you are not concentrating on the image as fully as you might and you have to bring your attention back to the task.

The task will last ten minutes. First, I'll ask you to close your eyes and to get a "fix" on the image. I would like you to keep your eyes closed during the entire task. After one minute, I'll say, "Ready, begin." I will tell you when the ten minutes are up. Again, when you have completed the task, I will ask you some questions on what you have imagined during the ten minutes. If you have any questions, I would be glad to answer them now.

**APPENDIX K****Questions Following the Modified Van Nuys Meditation-Absorption Task**

Would you please write down the types of intrusions you experienced during the task? For example, you may have thought of someone you know or of a homework assignment. The descriptions need not be lengthy.

Would you please describe in your own words what you experienced and thought about during the task (excluding the intrusions). For example, what did you imagine? How vivid was the image? Could you "see" the image in your mind's eye? Did you experience any other senses (hearing, taste, touch, or smell)? Did you feel as if you were there? Did you feel as if you were observing the scene, like watching a movie?

APPENDIX L

Preference for an Imagic  
Cognitive Style Test (PICS)

## PICS Release 2.6

## Instructions to Subjects

The purpose of this questionnaire is to help determine your style of thinking and imagining. People differ greatly in the kind and amount of fantasy and imagery which engage them. We also differ in the role that these forms of imagination play in our lives. Most of us take our own thinking style for granted and only occasionally are made aware of it when we encounter a friend who seems to think quite differently. By working through this questionnaire you may become more attuned to the different ways in which people think and to your own style.

The first distinction to make is whether pictures or words trigger thought. A person who thinks with pictures generates mental images in solving problems, reading, and many other situations involving thought. People who do not think in pictures often describe their thought as more like hearing than seeing. They may experience their thoughts as an internal commentary. Thinking in these people seems more tied to language than to vision and their thoughts may be experienced as a kind of internal commentary. Some people do not experience either pictures or words and describe their thought as "just knowing".

People who do not think in pictures may still have pictures accompany their verbal thinking. That is, the pictures are there in addition to thinking. For people who think in pictures however, the thoughts are the pictures.

It is important to note that differences in thinking style are unrelated to general intelligence. Successful artists tend to think in

pictures, while lawyers tend to think in words. There is evidence that Einstein thought in pictures. Sherlock Holmes is an example of a word thinker. In many fields it is possible to be successful using either style of thinking and of course many people have a mixture of styles.

The difference in thinking style is also unrelated to your verbal ability. No matter what your thinking style, the output of that thinking can be expressed equally well by both types in speaking or writing. Performance does not depend on thinking style, but rather on how efficiently you use your preferred style. Poets and descriptive writers tend to think in pictures while other writers tend to think in words.

The next distinction to make concerns the clarity or vividness of mental images. In the rating scales you will be asked to use, we describe images as ranging from "vague" to "fairly clear", "quite clear" up to "so clear that it was almost real". In deciding how to rate your image, consider such things as your awareness of the relative positions of parts in your image; the detail present -- for example the detail of a person's facial expression or clothing or postures. Many people have images which are very vague in detail and are mainly composed of outlines or "cloudy" shapes that are positioned in space relative to each other. Other people are aware of much more detail and their images are more three-dimensional.

We have separate rating scales for the verbal and image parts of your thinking. But we also consider separately the degree to which you become involved or absorbed in your thinking. Some people may at times



have had the experience of being so involved in a daydream as to be unaware of someone entering the room or even calling your name.

Absorption refers to the amount of "shutting out" of other thoughts or • perceptions while being involved in something.

STYLE OF THINKING QUESTIONNAIRE

NAME: \_\_\_\_\_

RECALL OF EMOTIONAL EXPERIENCE

1. \_\_\_\_\_
2. While recollecting this experience, how did you feel?
  - A. Positive, happy
  - B. Neutral
  - C. Negative, sad
3. How intense was your original experience?  
Neutral 1 2 3 4 5 6 7 Very Intense
4. How intense was your feeling while recollecting?  
Neutral 1 2 3 4 5 6 7 Very Intense
5. Which part of your recollection held most of the feelings for you?
  - A. The images that came to mind while recalling.
  - B. The things I heard or said to myself while recalling.
  - C. Both equally carried the feelings.

PLEASE GO ON TO THE NEXT PAGE

6. Which description best characterizes the verbal part of your recollection?

- A. No words or language was involved.
- B. Vaguely aware of some words or inner speech.
- C. Fairly clear inner speech.
- D. Quite clear inner speech.
- E. Inner speech was so clear that it was almost like hearing it.

7. Which description best characterizes the imagery part of your recollection?

- A. No image.
- B. Vague image.
- C. Fairly clear.
- D. Quite clear.
- E. So clear that it was almost real.

8. Which description best matches your degree of absorption in your recollection?

- A. High absorption. Always involved with no extraneous thoughts.
- B. Mostly involved with my recollection; few other thoughts.
- C. Fairly involved; but also found my mind wandering.
- D. Only occasionally absorbed in my recollection.
- E. Many distractions. I lost contact with my recollection much of the time.

9. Which description best matches your thinking?

- A. It just popped into mind. No effort was needed to choose it.
- B. I had to think a little at first before knowing what to recall.
- C. It took quite a bit of searching around before I decided on what to recall.
- D. It took quite a bit of searching around and I was still somewhat unsure.
- E. I considered many possibilities and had difficulty deciding on one.

WAIT HERE FOR FURTHER INSTRUCTIONS

MEADOW

1. Which description best characterizes the verbal part of your inner experience?
  - A. No words or language was involved.
  - B. Vaguely aware of some words or inner speech.
  - C. Fairly clear inner speech.
  - D. Quite clear inner speech.
  - E. Inner speech was so clear that it was almost like hearing it.
  
2. Which description best characterizes the imagery part of your inner experience?
  - A. No image.
  - B. Vague image.
  - C. Fairly clear.
  - D. Quite clear.
  - E. So clear that it was almost real.
  
3. Which best describes your level of absorption?
  - A. High absorption. Always attentive with no extraneous thoughts.
  - B. Mostly involved with the experience; few other thoughts.
  - C. Fairly involved; but also found my mind wandering.
  - D. Only occasionally absorbed in my experience.
  - E. Many distractions. I lost contact with my experience of the meadow much of the time.

4. Which best describes the flow of thoughts after you closed your eyes?

- A. My thoughts flowed easily without any conscious decision about where to make them go.
- B. I had to make a few initial decisions and then my thoughts flowed from there.
- C. I had to make several decisions at various points about how to proceed.
- D. I made decisions for each step of my thoughts, sort of carefully planning the situation and considering alternatives.

WAIT HERE FOR FURTHER INSTRUCTIONS

PICTURE

These questions apply to your thinking after the picture was removed.

1. Which description best characterizes the verbal part of your inner experience?

- A. No words or language was involved.
- B. Vaguely aware of some words or inner speech.
- C. Fairly clear inner speech.
- D. Quite clear inner speech.
- E. Inner speech was so clear that it was almost like hearing it.

2. Which description best characterizes the imagery part of your inner experience?

- A. No image.
- B. Vague image.
- C. Fairly clear.
- D. Quite clear.
- E. So clear that it was almost real.

3. Which description best characterizes your level of absorption?

- A. High absorption. Always attentive with no extraneous thoughts.
- B. Mostly involved with my experience; few other thoughts.
- C. Fairly involved; but also found my mind wandering.
- D. Only occasionally absorbed in my experience.
- E. Many distractions. I lost contact with my experience of the picture most of the time.



4. Which best describes the flow of your thoughts after you closed your eyes?

A. My thoughts flowed easily without any conscious decision about where to make them go.

B. I had to make a few initial decisions and then my thoughts flowed from there.

C. I had to make several decisions at various points about how to proceed.

D. I made decisions for each step of my thoughts, sort of carefully planning the experience and considering alternatives.

Okay. You are now going to have several minutes during which I would like you to recall some experience from your own life which has had great personal significance for you. This experience may be entirely personal and private. You will not be asked about its content. I would like you to choose an experience which had a strong positive emotional impact on you. Just take a few moments now to close your eyes and think privately about this experience.

WAIT 2 MINUTES

No please turn to the next page of your response forms and answer the questions about your thinking style based on the recall you have just done.

Notice that the first question is followed by a blank line. I would like you to enter here your estimate of how much time passed from when you closed your eyes.

WAIT FOR COMPLETION

Next I would like you to think about a situation as I describe it to you:

You are walking alone in a meadow. It is early morning, about 6 o'clock or 6:30. Think about your experience there and what might happen.

PAUSE

Close your eyes now and just let this situation develop in your mind.

WAIT 1 MINUTE

Now please turn to the next page and fill out the section on the Meadow.

## WAIT FOR COMPLETION

I am now going to pass around some folders, each of which contains a picture. Please take one and pass the rest along. When you have a folder, check the label on the cover to make sure you have it right side up but DO NOT OPEN THE FOLDER YET. In a moment, I am going to ask you to open it and look at the picture for a short time. You will then have some time to relax and experience what it brings to mind.

Please open the folder and look at the picture.

SHOW THE PICTURE FOR 15 SECONDS

Okay, close the folder ... now close your eyes and relax.

WAIT 1 MINUTE

Now please fill out the section on the Picture.

## Scoring of PICS

Scoring was done on pages 2, 3, & 4 of this booklet. The first, second, and fourth questions on each page were scored as follows:

A = 1   B = 2   C = 3   D = 4   E = 5

Because of the wording of the third question, it was scored thus:

A = 5   B = 4   C = 3   D = 2   E = 1

The first question on each page rated verbal thinking (V); the second, imagery (I); the third, absorption (A); and the fourth, effort (E). To obtain the final score, verbal and effort were subtracted from imagery and absorption as shown in the following equation:

$$I + A - V + E = \text{PICS Score}$$

## APPENDIX M

Individual Scores for Each Subject

on all variables<sup>a</sup>

<sup>a</sup>The first 10 subjects listed for each group are female subjects; the second 10 subjects are male subjects.

## LOW SUSCEPTIBLE SUBJECTS

Ss		Variables																											
Ss	HGS	SHS	02	03	04	05	06	07	11	12	13 <sup>b</sup>	14 <sup>b</sup>	15	16	27	28	29 <sup>c</sup>	30 <sup>c</sup>	31	32	33	34							
01	00	02	18	09	09	122	01	11	1	012	333	114	01	13	07	10	741	781	06	13	08	01							
02	00	00	26	11	17	170	00	13	5	003	309	176	04	01	08	07	406	463	13	06	01	10							
03	00	00	22	11	18	072	07	12	6	012	315	254	13	07	05	04	491	576	02	03	11	11							
04	01	01	22	12	13	119	10	10	2	002	352	136	00	10	09	01	227	566	06	11	02	00							
05	02	02	15	03	07	098	12	10	5	011	333	104	00	04	06	10	332	649	04	16	04	02							
06	02	01	24	12	15	077	06	13	6	010	258	206	03	03	06	06	362	269	02	05	02	06							
07	01	01	18	12	07	150	14	09	4	022	321	161	02	00	11	05	667	199	18	04	04	02							
08	00	00	21	13	07	125	09	12	5	005	308	215	06	28	12	09	733	673	22	08	02	02							
09	00	00	29	15	16	071	03	11	4	011	331	252	03	06	13	04	483	489	06	08	00	08							
10	01	00	27	14	07	095	16	10	5	007	316	277	03	05	08	09	083	653	11	20	00	06							
11	03	01	17	03	05	171	04	02	2	004	248	222	01	13	06	11	048	291	01	12	00	00							
12	02	01	14	08	09	138	04	13	5	017	295	305	11	14	08	09	007	244	04	11	01	01							
13	05	02	26	12	12	072	16	13	5	002	329	304	03	06	11	06	420	296	03	05	10	00							
14	01	01	02	03	05	173	16	03	1	-03	270	228	06	14	10	05	555	027	04	05	01	02							
15	01	00	05	07	07	152	02	04	2	-09	322	315	08	05	04	04	321	494	01	13	03	01							
16	03	01	16	12	07	064	10	10	4	012	304	315	10	05	06	11	762	763	11	15	00	02							
17	02	01	25	12	19	084	06	13	4	009	366	283	04	14	10	10	259	671	02	12	04	02							
18	02	02	11	02	06	122	08	05	2	006	297	276	00	15	09	07	323	553	11	06	01	01							
19	02	02	21	16	17	073	10	13	6	006	373	267	06	11	04	07	285	637	05	16	03	00							
20	00	02	18	12	10	104	10	10	6	016	364	263	08	20	04	07	647	675	07	10	01	04							

## MEDIUM SUSCEPTIBLE SUBJECTS

Ss		Variables																											
Ss	HGS	SHS	02	03	04	05	06	07	11	12	13 <sup>b</sup>	14 <sup>b</sup>	15	16	27	28	29 <sup>c</sup>	30 <sup>c</sup>	31	32	33	34							
21	09	08	27	10	18	076	14	13	6	007	268	153	00	03	03	09	070	369	00	09	00	01							
22	10	10	17	12	14	117	05	13	6	016	345	227	01	03	09	06	133	178	04	07	01	03							
23	08	09	21	13	10	075	11	12	3	001	329	240	03	17	04	07	262	448	06	07	00	05							
24	10	06	29	18	18	053	11	13	6	018	309	171	03	03	06	07	708	737	05	13	11	06							
25	09	10	31	13	14	041	10	11	5	008	297	288	06	02	07	10	261	521	12	10	00	06							
26	09	07	24	17	17	120	10	11	5	012	317	395	03	05	07	11	299	607	08	24	03	01							
27		05	26	08	11	057	04	09	5	017	333	159	04	00	08	11	307	630	06	22	04	02							
28	09	05	25	07	07	086	09	13	6	016	325	304	02	00	06	03	241	177	04	00	01	01							
29	09	08	30	17	20	049	11	12	6	013	357	173	01	02	10	09	730	794	32	18	02	04							
30	11	09	22	14	15	108	06	12	2	009	309	220	02	04	08	10	617	479	06	09	00	00							
31	12	09	31	14	16	072	08	10	5	005	365	170	03	07	09	11	347	496	14	04	01	04							
32	10	09	28	13	20	089	03	13	5	012	359	280	09	03	12	08	565	485	14	08	03	01							
33	06	07	19	14	13	069	14	13	5	018	249	247	04	06	13	10	659	577	21	08	04	02							
34	07	05	21	12	13	079	12	11	6	009	267	153	01	02	10	11	520	515	21	23	03	03							
35	06	06	15	10	08	109	11	11	3	004	317	318	04	10	09	13	591	527	09	11	04	04							
36	03	08	22	12	08	068	09	12	5	016	339	305	08	05	08	09	443	412	09	03	01	00							
37	09	10	17	09	06	098	15	10	4	009	268	237	08	03	05	11	587	807	04	27	12	01							
38	10	10	22	15	12	084	12	10	4	007	247	223	02	02	06	11	529	477	15	16	06	02							
39	10	08	25	14	20	071	09	13	6	012	337	199	05	26	06	06	591	595	02	08	05	05							
40	07	07	24	12	11	108	16	04	3	012	329	138	01	12	02	08	157	493	01	08	04	00							

## HIGH SUSCEPTIBLE SUBJECTS

S <sub>s</sub>	Variables																																	
S <sub>s</sub>	HGS	SHS	02	03	04	05	06	07	11	12	13 <sup>b</sup>	14 <sup>b</sup>	15	16	27	28	29 <sup>c</sup>	30 <sup>c</sup>	31	32	33	34												
41	09	10	34	16	10	041	13	13	6	015	308	283	00	03	05	09	151	489	03	10	03	02												
42	10	12	23	13	19	083	13	13	6	011	303	176	01	02	11	09	759	629	24	16	02	05												
43	09	11	24	15	15	068	05	13	4	015	328	410	05	10	09	07	517	687	05	04	01	03												
44	12	10	34	17	21	054	15	13	6	012	230	362	03	07	08	14	285	561	10	29	07	00												
45	11	12	31	16	28	046	12	12	6	016	382	208	00	07	10	09	537	379	21	11	00	01												
46	10	10	29	16	17	040	15	12	6	022	293	270	00	03	07	10	333	759	06	10	01	03												
47	10	10	28	14	18	061	16	13	6	015	419	308	01	25	04	07	340	199	06	02	02	02												
48	12	11	30	16	16	056	14	13	6	019	317	183	04	04	09	10	359	583	02	16	06	03												
49	12	10	26	14	13	061	03	12	6	018	365	181	04	07	07	04	630	657	02	04	03	00												
50	09	12	32	15	11	049	14	13	6	012	374	244	01	02	08	09	723	757	07	07	00	01												
51	10	10	28	07	10	079	08	13	5	013	259	021	00	22	06	08	269	263	14	05	04	03												
52	10	11	28	15	17	091	11	13	6	019	450	174	03	03	10	05	665	349	06	00	02	03												
53	12	10	27	13	13	074	09	11	6	011	307	234	05	07	07	08	360	414	06	06	01	00												
54		11	29	14	17	061	12	11	6	020	333	118	03	01	05	12	645	905	03	04	02	00												
55	09	10	25	14	20	060	14	10	5	015	341	287	01	12	08	11	448	423	11	03	02	03												
56	09	11	26	16	16	049	11	13	6	021	269	405	08	04	06	08	575	677	09	05	03	03												
57	10	10	26	13	18	061	01	12	5	016	336	149	00	09	04	07	316	607	00	07	00	02												
58	09	11	31	12	12	056	14	06	4	010	307	271	03	04	07	11	367	367	15	06	02	02												
59	11	12	23	10	08	061	14	13	6	018	361	217	05	07	09	10	867	808	21	20	05	03												
60	06	11	22	13	20	086	15	09	5	014	361	233	03	04	05	08	357	423	01	04	04	05												

<sup>b</sup>Values to three decimal places

<sup>c</sup>Values to one decimal place

**APPENDIX N****Variables Not in the Discriminant****Analysis After the Final Step**



Variable Number	Description	F-to-enter Values
2	Tellegen's Differential Personality Questionnaire, Scale AB (DPQ:Ab)	.5830
4	Concordia Questionnaire on "Fantasy" Experiences	.2921
6	Paivio's Individual Difference Questionnaire (IDQ) Factor 1	.1303
7	Paivio's IDQ Factor 2	.3322
11	Paivio's IDQ Factor 6	.1603
13	Random-Number Generation Task (RNG)	.3206
14	Log (Time to read Card C/Time to read Card B) for Stroop Color and Word Test	.5036
31	Information bits recalled for 1st story heard on the Selective Attention Task	.5952
32	Information bits recalled for 2nd story heard on the Selective Attention Task	.8201
33	Intrusions in free recall for 1st story heard on the Selective Attention Task	.9664
34	Intrusions in free recall for 2nd story heard on the Selective Attention Task	.6516

## APPENDIX O

Measures of Central Tendency<sup>a</sup> and  
Source Tables for Variables Not  
Demonstrating Significant  
Differences Among the Group Means

<sup>a</sup>Each group's mean score is indicated first followed by the Standard deviation in parentheses.

## (i) Variable No. 6:

Paivio's Individual Difference Questionnaire (IDQ) Factor 1 (Good Verbal Expression and Fluency).

	Low 8.20 (5.001)	Medium 9.90 (3.417)	High 11.45 (4.211)		
Source	SS	df	MS	F	p
Between groups	105.70	2	52.85	2.91	.06
Within groups	1033.95	57	18.14		

## (ii) Variable No. 13:

Random-Number Generation Task (RNG).

	Low .317 (.034)	Medium .313 (.036)	High .332 (.053)		
Source	SS	df	MS	F	p
Between groups	.0040	2	.0020	1.14	.33
Within groups	.0993	57	.0017		

## (iii) Variable No. 14:

Log (Time to read Card C/Time to read Card B): Stroop Color and Word Test.

	Low .234 (.066)	Medium .230 (.069)	High .237 (.094)		
Source	SS	df	MS	F	p
Between groups	.0005	2	.0002	< 1	.96
Within groups	.3411	57	.0060		

## (iv) Variable No. 15:

Number of errors on Card C: Stroop Color and Word Test.

	Low 4.60 (3.817)	Medium 3.50 (2.565)	High 2.50 (2.236)		
Source	SS	df	MS	F	p
Between groups	44.13	2	22.07	2.53	.09
Within groups	496.80	57	8.73		

## (v) Variable No. 16:

Number of intrusions reported on the Modified Van Nuys Meditation-Absorption Task.

	Low 9.70 (6.868)	Medium 5.75 (6.324)	High 7.15 (6.310)		
Source	SS	df	MS	F	p
Between groups	160.43	2	80.22	1.90	.16
Within groups	2412.50	57	42.32		

## (vi) Variable No. 27:

Number of correct answers (forced choice) for 1st story heard on the Selective Attention Task.

	Low	Medium	High		
	7.95 (2.625)	7.40 (2.798)	7.25 (2.049)		
Source	SS	df	MS	F	p
Between groups	5.43	2	2.72	< 1	.66
Within groups	359.50	57	6.31		

## (vii) Variable No. 28:

Number of correct answers (forced choice) for 2nd story heard on the Selective Attention Task.

	Low	Medium	High		
	7.45 (2.781)	9.05 (2.373)	8.80 (2.308)		
Source	SS	df	MS	F	p
Between groups	29.63	2	14.82	2.38	.10
Within groups	355.10	57	6.23		

## (viii) Variable No. 29:

Reported certainty of answers (forced choice) for 1st story heard on the Selective Attention Task.

	Low	Medium	High		
	39.845 (22.083)	43.085 (20.410)	47.505 (19.211)		
Source	SS	df	MS	F	p
Between groups	591.40	2	295.70	< 1	.50
Within groups	24192.32	57	424.43		

## (ix) Variable No. 30:

Reported certainty of answers (forced choice) for 2nd story heard on the Selective Attention Task.

	Low	Medium	High		
	51.290 (19.748)	51.620 (16.435)	54.680 (19.182)		
Source	SS	df	MS	F	p
Between groups	139.76	2	69.88	< 1	.82
Within groups	19532.84	57	342.68		

## (x) Variable No. 31:

Information bits recalled for 1st story heard on the Selective Attention Task.

	Low	Medium	High		
	6.95 (5.744)	9.65 (8.002)	8.60 (7.059)		
Source	SS	df	MS	F	p
Between groups	74.10	2	37.05	< 1	.47
Within groups	2790.30	57	48.95		

## (xi) Variable No. 32:

Information bits recalled for 2nd story heard on the Selective Attention Task.

	Low	Medium	High		
	9.65 (4.913)	11.75 (7.496)	8.45 (7.045)		
Source	SS	df	MS	F	p
Between groups	111.60	2	55.80	1.29	.28
Within groups	2469.25	57	43.32		

## (xii) Variable No. 33:

Intrusions in free recall for 1st story heard on the Selective Attention Task.

	Low	Medium	High		
	2.90 (3.243)	2.25 (2.633)	2.35 (2.007)		
Source	SS	df	MS	F	p
Between groups	4.90	2	2.45	< 1	.72
Within groups	408.10	57	7.16		

## (xiii) Variable No. 34:

Intrusion in free recall for 2nd story heard on the Selective Attention Task.

	Low	Medium	High		
	3.25 (3.537)	3.55 (2.762)	2.40 (1.465)		
Source	SS	df	MS	F	p
Between groups	14.23	2	7.12	< 1	.39
Within groups	423.50	57	7.43		

APPENDIX P

Infercorrelations Between All Variables

For All Subjects (n = 60)







