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Inventory and Task Predictors of Hypnotic Susceptibility

Robert Nadon

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in

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ABSTRACT

Inventory and Task Predictors of Hypnotic Susceptibility

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The present study sought to extend findings in the literature which indicate that hypnotic susceptibility is related to measures of imagery, absorption, fantasy experiences, and sleep processes. Accordingly, a battery of inventories and tasks was administered to subjects of low, medium, and high hypnotic susceptibility.

The main findings of a discriminant analysis indicated that absorption and cognitive style inventories discriminated between high and low hypnotizable subjects but classified medium hypnotizable subjects at chance levels only. High hypnotizability corresponded to high absorption in daily activities and a preference for an imagic cognitive style. Classification of the medium hypnotizable subjects improved by the addition to the discriminant equation of a measure of sleep processes and one of belief in the supernatural. Medium hypnotizable subjects reported less cognitive control over dream patterns and believed less in supernatural phenomena than highly hypnotizable subjects. An additional finding suggested that a tendency to feel anxious in social

contexts may be inimical to hypnotic responding. Results are discussed in terms of the nature of hypnosis and of their applicability to the sports/athletics and clinical contexts.

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The field of hypnosis has a rich history that parallels much of the development of psychological and psychiatric thought since the 18th century. Early investigators argued, in various forms, that hypnotic phenomena were elicited through the power and/or talent of the hypnotist. It was only towards the end of the 19th century that scientific interest shifted from emphasis upon the skills of the hypnotist to the abilities of the hypnotized person. Since then, two major viewpoints have sought to elucidate the fact of individual differences in response to hypnotic suggestion within the general population (Laurence & Nadon, 1986). One early school of thought viewed hypnosis as an altered state of consciousness, the depth of which was thought to increase as the number and the difficulty of the suggested behaviors increased (Bernheim, 1886; Binet, 1896). In contrast, Delboeuf (1890) presented hypnosis as a motivationally-based set of behaviors most parsimoniously explained by subjects' desires to conform to the suggested situation. These contrasting viewpoints are reflected to some extent by present-day formulations:

> Hypnosis may be defined as a social interaction in which one person (designated the subject) responds to suggestions offered by another person (designated the hypnotist) for experiences which involve alterations in perception and memory. In the classic case, these experiences are accompanied by feelings of involuntariness bordering

> on compulsion, and subjective conviction bordering on delusion. Even the most highly responsive subjects, however, appear to retain some degree of veridical awareness and voluntary control, so that their behavior and experience represents a curious blending of illusion and reality -- what Orne (1959) has referred to as "trance logic" (Kihlstrom, 1982, p. 182).

Alternatively,

> ...hypnotic responding is viewed as a contextually supported strategic enactment. According to this formulation, hypnotic behavior does not occur automatically, and like other social behavior it can be usefully described as goal-directed action. However, a central demand of the hypnotic situation is that subjects define their responses as involuntary "happenings" rather than self-initiated. The experience of involuntariness does not arise because strategic acts are transformed to automatic ones. Instead, it reflects an interpretation that subjects make about their own behavior. This interpretation, in turn, is fostered and legitimized by various aspects of the hypnotic situation; most importantly, by the wording of the test suggestions (Spanos, 1982 a, p.199).

These theoretical disagreements concerning the phenomenology of hypnosis notwithstanding, there is a consensus among present-day researchers concerning the distribution of hypnotic responsiveness in the general population. Hypnotic susceptibility has been shown to be a relatively stable characteristic of the individual (Hilgard, 1965; Perry, 1977a). Further, it has been repeatedly demonstrated that from 10 to 15% of all individuals are highly responsive to hypnotic procedures (capable of experiencing difficult suggestions such as posthypnotic amnesia and

various hallucinations); a further 10 to 15% are almost completely unresponsive and the remaining majority of individuals is able to experience some of the subjective alterations that are at the core of a hypnotic procedure, and to varying degrees (Bernheim, 1886; Faria, 1819; Hilgard, 1965).

Hypnotic subjects are described as being willing to cooperate with the hypnotist by engaging in a shift of their cognitive orientation from a pragmatic and objective one to one of involvement in imagination and fantasy (Gill & Brenman, 1959; Hilgard, 1977a; Perry, 1983; Shor, 1959/1965; 1962/1965; 1970; 1979; Spanos & Barber, 1974). Further, extensive investigation of the cognitive skills of individuals outside of the hypnotic context has led to a certain degree of consensus concerning the nonhypnotic correlates of hypnotic responsiveness (Hilgard, 1975; Spanos & Barber, 1974). This consensus has been facilitated primarily by the development of standardized scales that have allowed for reliable measures both of hypnotic responding [e.g., the Stanford Scales of Hypnotic Susceptibility (Weitzenhoffer & Hilgard, 1959; 1962)] and of subject characteristics thought to be related to it [e.g., the Tellegen "Absorption" Scale (Tellegen & Atkinson, 1974)]. This state of affairs contrasts with that of the last century when the subject characteristics implicated in responding to hypnosis were the focus of much debate. In order to place present-day thinking in historical perspective, a brief outline of the main theoretical formula-

tions of the 18th and 19th centuries is necessary.

Theories of Hypnosis (1778-1893)

Franz Anton Mesmer (1734-1815), a Austrian physician, is generally credited with introducing what is now called hypnosis to European society; using the term "animal magnetism", he began what was to become a very successful clinical practice in Paris in 1778. Despite his success (or perhaps because of it), his unorthodox and dramatic clinical style was attacked energetically by the established medical, scientific, and religious authorities. His practice was dealt a fatal blow in 1784 by a French Royal Commission which included the American Ambassador to France Benjamin Franklin, the French chemist Lavoisier, the physician Guillotin, and the astronomer Bailly, among others.

In a series of well-conceived naturalistic experiments, the Commissioners demonstrated that there was no basis for Mesmer's theory of a universal magnetic fluid. They concluded that the "power" of the operator was irrelevant to the manifestation of magnetic phenomena; these were accounted for in terms of the magnetized person's tendency to imitate the behavior of others who had been exposed to magnetic procedures, to physical contact between magnetist and patient, and to the patients' "imagination". This can now be seen as an embryonic psychological theory, but at the time imagination was a pejorative

term. The general tone of the Franklin Commission report was dismissive of animal magnetism. Indeed, it argued that since animal magnetism did not exist, it could not have curative value (Sheehan & Perry, 1976). Some of Franklin's personal correspondance, however, suggests that he was aware of the curative aspects of imagination but was reluctant to state it publicly for fear of encouraging quackery (McConkey & Perry, 1985). It was thus left to later investigators to advocate a psychological theory of hypnosis and of therapeutic cure.[1]

Mesmer's theory was modified also, almost from the start, by many of his students. The Marquis de Puysègur (1751-1825), the most prominent among them, argued that the most important agent of magnetic cure was the power of the magnetist's will. Although he considered that the establishment of a therapeutic relationship ("rapport") was necessary for cure, he argued that two characteristics of the hypnotist were the crucial elements: a willingness to help his patient and a belief in his ability to do so (Ellenberger, 1970). This position predates the views of some present-day clinical practitionners who argue that their skills as hypnotists and as therapists are more important determinants of clinical hypnotic responsiveness than are the hypnotic capacities of their patients (e.g., J. Barber, 1980; 1982).

De Puysègur, however, did not ever break completely with Mesmer's theory of physical fluid. It was the Abbè de Faria (1756-1819) who first advocated a uniquely psych-

ological theory of magnetic phenomena. Faria, a Catholic priest, rejected unequivocally Mesmer's doctrine. Rather, he emphasized both the imaginative capacities of his patients, which he argued were present in greater abundance in highly responsive individuals ("natural èpoptes"), and the patients' beliefs and expectations. Further, he was the first to document the differential distribution of responsiveness to "lucid sleep" (his term for hypnosis) in the population (Ellenberger, 1970; Sheehan & Perry, 1976).

Although Faria's theory met largely with ridicule during his lifetime, it gradually gained acceptance as the 19th century wore on. Alexandre Bertrand (1795?-1831), a physician, argued for the acceptance of Faria's views in the 1820's. A psychological explanation of hypnotic phenomena that emphasized personal characteristics of the hypnotized person, however, only gained general acceptance approximately 60 years later.

The events that led to this acceptance are rooted in the debate between the two major schools of medical thought in France between 1882 and 1893. Serious scientific discussion on hypnosis was rare before this time. It was Jean-Martin Charcot (1835-1893), one of the most eminent neurologists of the day, who gave credibility to the subject by presenting his findings with hysterical patients at the prestigious Académie des Sciences in Paris in 1882.

Charcot, at the Salpêtrière Hospital in Paris, argued that hypnosis was a pathological condition consisting of three successive stages, each possessing its own neurological "signs". He argued further that this neurological pathology was found only in "hysterics". Believing that his patients, all women who suffered from hysteria, were unconscious when hypnotized, however, he openly discussed his expectations and theories in their presence. According to present knowledge, Charcot's scientific "discoveries" resulted from explicit demand characteristics (Orne, 1962) placed upon his patients so that they were, in effect and unbeknown to him, trained subjects. This argument was presented convincingly by Hippolyte Bernheim (1837-1919), the leader of the Nancy school, in his first book on the subject (Ellenberger, 1970; Sheehan & Perry, 1976).

De la suggestion dans l'état hypnotique et dans l'état de veille was published in 1884 and marked the beginning of what was to become a caustic debate between Charcot and Bernheim. Because of his reputation as a major medical thinker, Bernheim gave respectability to the psychological explanation of hypnosis that had been proposed earlier by Auguste Ambroise Liébeault (1823-1904). Liébeault's views had been disregarded by his medical colleagues who considered him , "to be a quack (because he hypnotized) and a fool (because he did not charge any fees)" (Ellenberger, 1970, p. 86).

Bernheim and Liébeault argued that Charcot's "neuro-

logical signs" were spurious findings which were the products of a flawed methodology. According to their view, hypnotic susceptibility represented primarily a capacity to respond to suggestion. They argued further that "hypnotic sleep" differed little from natural sleep with the exception that hypnotized subjects were able to respond to suggestion and remained in rapport with the hypnotist. This argument crystallized earlier views of de Puységur and Faria who had emphasized also the similarities between sleep and hypnosis. Further, James Braid (1795-1860), an English surgeon, had coined the term "hypnosis", from the Greek, hypnos, to sleep in 1843. Thus, the growing consensus among 19th century investigators began pointing towards hypnosis as a sleep-like state that was characterized by responsiveness to suggestion.

Although modern studies have clearly shown that, unlike nocturnal sleep, the EEG patterns of hypnotized persons do not differ from those of subjects who are awake, alert, and have their eyes closed (Evans, 1979; Sarbin & Slagle, 1979; Spanos, 1982 b), Bernheim's conceptualization of hypnotic responding has stood the test of time. He stated:

> It is wrong to believe that the subjects influenced are all weak-nerved, weak-brained, hysterical, or women. Most of my observations relate to men, whom I have chosen on purpose to controvert this belief. Without doubt, impressionability varies. Common people, those of gentle disposition, old soldiers, artisans, people accustomed to passive obedience, have seemed to me, as

> well as to M. Liébeault, more ready to receive the suggestion than preoccupied people, and those who often unconsciously oppose a certain mental resistance (1886).

Although the language of this passage reflects the social biases of 19th century Europe, it indicates that Bernheim was aware of the influences of both context and subject preconceptions on hypnotic responsiveness. Interestingly, this passage was published before William James' Principles of Psychology (1890), Pierre Janet's L'Automatisme Psychologique (1889), and Josef Breuer and Sigmund Freud's Studies on Hysteria (1893); it testifies to Bernheim's psychological sophistication.

Bernheim recognized also that although a willingness to be hypnotized was a necessary prerequisite for hypnotic responsiveness, it was not sufficient. Accordingly, he argued that people differed in their ability to transform ideas into acts, a capacity that he believed was the essence of hypnotic susceptibility:

> Some people are very susceptible to these sensory suggestions; They are endowed with lively imaginations, that is to say, they have a great aptitude for mentally creating an image of the suggestions induced by speech, vision, and touch, and this image projected to the exterior through the peripheral nerves of the corresponding organs, reproduces an actual sensation, as vivid as if it had an objective cause in these same organs; for example, the pain of a stump, which is referred to a member which no longer exists. Such may be the effect of imagination (1886).

The controversy between the two great schools ended with the death of Charcot in 1893. By this time, the

Nancy view of hypnosis and of hypnotic susceptibility was generally accepted by the scientific and medical communities. Interest in the phenomenon, however, waned partially because of Freud's acceptance, followed by his rejection of it as a therapeutic tool, and partially because of the advent of behaviorism during the early part of the 20th century. The publication of C. L. Hull's classic Hypnosis and Suggestibility in 1933 renewed scientific interest in the phenomenon by placing the study of hypnosis on a firm experimental basis. It was the development of the Stanford Hypnotic Susceptibility Scales (Weitzenhoffer & Hilgard, 1959; 1962), however, that provided a reliable measure of hypnotizability and thus allowed for a more extensive scientific study of hypnosis than had previously been possible.

The Stanford Hypnotic Susceptibility Scales

Although Hull (1933) recognized the advances that had been made by the 19th century medical investigators, he felt that the interests of "applied science" would best be served if "pure science" were able to keep pace. Accordingly, he offered insightful criticisms of previous hypnosis research and conducted experiments which were designed to investigate "principles and relationships [of hypnosis] rather than treatments and cures" (Hull, 1933, p. ix). Extensive research with hypnosis did not begin in earnest, however, until after the second world war (Hil-

gard, 1965). At that time, investigators began to turn their attention to uncovering the personality characteristics which were thought to be related to individual differences in hypnotic susceptibility.

The two major hypnosis measures in use during this period were the Davis and Husband (1931) and the Friedlander and Sarbin (1938) scales. The influence of the behavioral trend in psychology, however, led to the rejection of the former scale since it lacked both quantification precision and a standardized induction procedure. In contrast, the Friedlander-Sarbin scale was better standardized and was more internally consistent. The main obstacle to the use of the Friedlander-Sarbin scale in the search for personality correlates of hypnotizability lay in the skewed distribution of the scores; most subjects fell in the low to low-medium range (Hilgard, 1965).

In an attempt to respond to the need for a more psychometrically valid measure of hypnotizability, Weitzenhoffer and Hilgard developed the Stanford Hypnotic Susceptibility Scales (1959; 1962). They attempted to sample a broad range of hypnotic suggestions in the manner of the earlier Friedlander-Sarbin scale, and developed a pass/fail scoring criterion that was based on strict behavioral observations (Hilgard, 1965; 1978-1979).

Two equivalent 12-item forms were developed initially for single subject administration [Stanford Hypnotic Susceptibility Scales, Forms A and B (SHSS:A and B) (Weitzenhoffer & Hilgard, 1959)]. The hypnotic phenomena that are

sampled by these scales can be subsumed under three categories: Ideomotor items attempt to tap the ability to respond to suggestions that involve motor movements (e.g., a suggestion for arm heaviness); these are among the most easily experienced hypnotic suggestions and are "passed" by most subjects. Challenge items involve more difficult hypnotic suggestions; subjects are first given a suggestion and are then challenged to contradict their experience (e.g., "Your arm is stiff and rigid; try to bend it). Finally, cognitive items are among the most difficult hypnotic suggestions; these are passed by a relatively small percentage of subjects (e.g., hallucinations in various sensory modalities and posthypnotic amnesia) (Sheehan & McConkey, 1982).

In an attempt to avoid potential order effects, items of varying difficulty were distributed over the entire testing session on Forms A and B. This allowed for relatively unresponsive subjects to experience success with at least some suggestions throughout the session. Further, in order to facilitate the screening process for experimental studies, a group version of these scales was developed later by Shor and E. C. Orne [The Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A) (1962)].

In order to tap more adequately what Hilgard (1973) has termed the "domain" of hypnosis, Weitzenhoffer and Hilgard (1962) developed a more stringent 12-item scale,

Form C (SHSS:C). Although Hilgard (1965) has indicated that this scale can be used independently of the other scales, initial administration of SHSS:A or B or HGSHS:A can provide a useful introduction to hypnotic procedures (Evans, 1979). Further, the group administration can provide an economical screening measure on which to base judgements concerning how subjects will score on Form C. Like its predecessors, Form C samples the three main categories of hypnotic suggestion but contains more suggestions of the cognitive type than the earlier forms. Consequently, it possesses a higher "ceiling", i.e, fewer subjects are grouped together at the higher end of the scale. Similar to "intelligence" measures, items are administered in an approximate ascending order of difficulty, a desirable psychometric property. Further, provision can be made to discontinue testing after a subject "fails" three consecutive suggestions. This provision is based on the assumption, supported by empirical observations, that subjects who fail most of the suggestions in an "easier" category are not able, by and large, to experience the more difficult suggestions that are administered later in the testing session (Hilgard, 1965).

Criticisms of the Stanford Scales

The Stanford scales served to stimulate scientific interest in hypnosis and have been the models for measures of hypnotic susceptibility that were developed later for other purposes and/or contexts. The strengths of the scales lie primarily in the standardized procedures, in

the detailed and objective scoring criteria, and in their statistical robustness (Sheehan & McConkey, 1982). Accordingly, they have been described as the "dominant assessment instruments in the field" (K. Bowers, 1981, p.43) and have been the standard against which all other susceptibility scales are measured (Kihlstrom, 1985). Their emphasis on behavior, the inclusion of challenge items, and length of administration time (approximately one hour) however, have led to the criticisms that they neglect the phenomenological aspects of hypnosis and that they are ill-suited to application in clinical contexts (Sacerdote, 1982 a and b; Stern, Spiegel, and Nee, 1978-1979). These criticisms have been answered by E. and J. Hilgard (E. Hilgard, 1982; J. Hilgard & E. Hilgard, 1979) who have sought to balance these clinical concerns with the need for reliable clinical research by developing standardized scales that are designed for use in therapeutic contexts. Further, Frankel and his colleagues (Frankel, 1982; Frankel, Apfel, Kelly, Benson, et al., 1979) have argued that the Stanford scales are not perceived as threatening by patients providing that they are placed in the context of measuring instruments designed, as are other psychological tests, to aid in the development of the most appropriate treatment strategy.

Shor (1979) has described other approaches to measurement that he considered were more suited to the study of the subjective aspects of hypnotic responsiveness.

Various scales have been developed in attempts to assess "hypnotic depth" (Field, 1965; LeCron, 1953; Tart, 1970; 1979) and imaginative processess in or out of hypnosis (Barber & Glass, 1962; Wilson & Barber, 1978-1979). It is unclear, however, the extent to which all of the various scales are measuring the same construct, although correlations among them have usually been in the moderate range (approximately 0.60) (Kihlstrom, 1985). Whereas flexible procedures and reliance on verbal reports of subjective experience possess obvious advantages in the clinic and in some research contexts, they confound to some extent hypnotic responsiveness and subjective experience (Laurence & Nadon, 1986; Shor, 1979). Indeed, Sheehan and McConkey (1982) have argued that the choice of a particular scale over others depends largely on one's purpose.

A different critique has been offered by one of the founders of the Stanford scales. Weitzenhoffer (1980) has indicated that one of the implicit assumptions of the scales is that hypnotic behavior is an accurate index of the underlying depth and nonvolition experienced during hypnosis. Since nonvolition is not assessed directly by the scales, however, he has argued that they do not tap the "classic suggestion effect" that was described by 19th century investigators, notably Bernheim. He has argued further that the emphasis of the scales on behavior has resulted in a notion of hypnosis that is vastly different from that conceptualized by 19th century thinkers and that a more complete understanding of hypnotic phenomena has

been constrained by this emphasis.

These criticisms have been answered convincingly by Hilgard (1981) who noted that the purpose of the scales was to measure "hypnotic talent", not hypnotic depth. Despite the fact that early investigators used the two terms interchangeably (19th century scales of hypnotic susceptibility scales were called "depth" scales), research has shown that they represent two distinct, albeit related, constructs (Perry & Laurence, 1980; Radtke & Spanos, 1981; Shor, Pistole, Easton, & Kihlstrom, 1984). Like other transient aspects of hypnotic performance such as motivation and expectancies, experiences of hypnotic depth can vary according to context and to other situational variables (Laurence & Nadon, 1986; Shor, 1979). K. Bowers (1981) has reported, however, that the total score on SHSS:C taps "on average" the underlying nonvolitional dimension that has traditionally been associated with hypnotic procedures. Further, he reported that it appears to tap the "classic suggestion effect about twice as well as individual SHSS:A items do" (p. 42). Thus, although there is some discrepancy between nonvolitional experience and behavior on an item-to-item basis, particularly with "less cognitive" scales, the more stringent SHSS:C appears to offer the best combination of psychometric rigor and sampling of hypnotic phenomena of the available hypnotizability scales. As Hilgard (1965) has noted, these are particularly relevant considerations in studies which

attempt to correlate paper-and-pencil inventories with hypnotic responsiveness.

Nonhypnotic Correlates of Hypnotic Susceptibility

Beginning in the 1940's, researchers attempted to document what was then called the hypnotizable "personality". Since hypnotic susceptibility has been shown to be a stable characteristic among adults,[3] it is not entirely surprising that research along these lines continued for approximately two decades. Correlations between existing personality inventories and measures of hypnotic susceptibility, however, were found to be non-existent, very small, or unreliable (Barber, 1964; Bowers, 1976; Hilgard, 1965). These disappointing results led researchers to develop nonhypnotic inventory measures and tasks which attempted to tap cognitive processes and individual cognitive styles thought to be related to hypnotic responding.

Imagery, Absorption, and Hypnotic Susceptibility

Two aspects of the hypnotic experience have been emphasized to varying degrees by current theoretical accounts of hypnotic susceptibility: imagination (and the related skill, imagery) and degree of involvement in the suggestions (what may be termed absorption) (Nadon, 1983). From this perspective, hypnotic responsiveness can be conceptualized as a "cognitive skills" dimension, along which individuals differ. This approach does not ignore context but rather seeks to isolate the pattern(s) of

cognitive skills that allow subjects to respond to hypnotic procedures. Indeed, studies that have investigated nonhypnotic measures of these skills have led to a certain degree of convergence concerning the subject characteristics that are related to hypnotic susceptibility (Hilgard, 1975; Spanos & Barber, 1974). These studies and the underlying theories of hypnosis that have guided the research have been reviewed by Nadon (1983); a summary of the empirical work is presented here.

Research on vividness of imagery in relation to hypnotic susceptibility has concentrated primarily on self-report inventories such as the shortened version of the Betts' Questionnaire Upon Mental Imagery (QMI) (Betts, 1909), developed by Sheehan (1967), Marks' Vividness of Visual Imagery Questionnaire (VVIQ) (Marks, 1973; See Richardson, 1969). In the initial study that used the shortened version of the QMI (Sheehan, 1967), Sutcliffe, Perry, and Sheehan (1970) found an overall significant relationship between subjects' reports of imagery vividness and SHSS:C; on closer examination, however, the relationship was found for male but not for female subjects. In contrast, J. Hilgard (1970/1979) found a significant relationship between the two measures for female but not for male subjects. To complicate matters further, Perry (1973) and Morgan and Lam (1973) failed to replicate the earlier findings for either sex. A general trend in the studies, however, is that poor imagers have generally been found to fall in the low range of hypnotic susceptibility

whereas good imagers have shown a more diffuse pattern across all levels of hypnotizability (Perry, 1973).

Isaacs (1982) has recently developed a self-report scale [Preference for an Imagic Cognitive Style Test (PICS)] that attempts to tap individual preferences for an imagic cognitive style, rather than imagery vividness. His results revealed that high susceptible individuals [as measured by the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A)] tended to report an imagic and effortless style of thinking; low susceptible subjects, in contrast, tended to report a verbal and effortful style. Isaacs noted that the bipolarity of the results was not a necessary outcome of the test since subjects are not forced to choose between the two styles; the test allows for the various aspects of their thinking style to be assessed independently.

In another line of inquiry, As and Shor and their colleagues (As, 1963; As & Lauer, 1962; As, O'Hara, & Munger, 1962; Lee Teng, 1965; Shor, 1960; Shor, Orne, & O'Connell, 1962) developed inventories that attempted to tap "hypnotic-like" experiences in daily life. These experiences included a capacity for intense involvement in nature, music, and art (e.g., Have you ever been 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?). Attempts to relate reports on the As and the Shor inventories to hypnotic susceptibility have yielded low to moderate correlations (between .25 and .50) (As, 1963; As & Lauer, 1962; Shor et al., 1962; 1966; Lee Teng, 1965; see also Evans, 1982, for a shortened version of the Shor inventory).

Tellegen and Atkinson (1974) argued, however, that the results obtained with the As and Shor inventories required further clarification since the test items were selected on an a priori theoretical basis rather than through empirical dimensional analyses. Accordingly, Tellegen and Atkinson (1974) developed a 34-item inventory on the basis of factor analyses with two samples. The inventory, which has been labelled the Tellegen "Absorption Scale" (TAS) correlated significantly with HGSHS:A scores (.27 and .42 for the first and second samples, respectively). Further, this relationship has been replicated (Finke & Macdonald, 1978; Spanos & McPeake, 1975; Roberts, Schuler, Bacon, Zimmerman, & Patterson, 1975).

Nogrady, McConkey, Laurence, and Perry (1983) have argued from a different perspective for the need to clarify the relationship between hypnotic responsiveness and preferred thinking style. They have argued that individual differences in a preference for self-conscious reflection, as measured by the Public and Private Self-Consciousness Scale (Fenigstein, Scheirer, and Buss, 1975)

may be related to individual differences in styles of response to hypnotic suggestions. Similarly, Evans (1982) has argued that a tendency to indulge in absorptive fantasies may be related to absent-minded behavior among high hypnotizable subjects. Indeed, one study (Markowsky and Evans, 1978) found that high hypnotizable subjects were late for appointments more often than less hypnotizable individuals.

It was unclear from the literature review, however, the extent to which the various correlates of hypnotic susceptibility were statistically redundant. Accordingly, Nadon (1983) administered a battery of imagery and absorption measures to subjects of low, medium, and high hypnotic susceptibility to investigate this issue. The hypothesis that classification of subjects into susceptibility groups would be improved by the use of multiple nonhypnotic measures, as opposed to any single measure, was supported. Three measures were found to significantly predict subjects' hypnotic susceptibility classifications on the basis of a multivariate discriminant analysis. A measure of vividness of imagery [Sheehan's (1967) shortened version of the Betts' Questionnaire Upon Mental Imagery (QMI)], imagery preference [Isaacs' (1982) Preference for an Imagic Cognitive Style Test (PICS)], and a variant of selective attention [errors on the interference card of the Stroop Color and Word Test (Stroop, 1935)] classified 61.67% of the subjects correctly.

Other nonhypnotic measures were found also that provided significant univariate discrimination but which were statistically redundant to the three measures that had emerged from the discriminant analysis. These were Paivio's (1971) Individual Differences Questionnaire Factors 2 (Habitual Use of Imagery) and 6 (Vividness of Dreams, Daydreams, and "Imagination"), Tellegen "Absorption" Scale (TAS) (Tellegen and Atkinson, 1974), Personal Experiences Questionnaire (Evans, 1982), and the Questionnaire on "Fantasy" Experiences (Nadon, 1983).

In summary, results of Nadon (1983) supported the view in the literature of the relevance of imagic, imaginative, and absorption cognitive processes with respect to hypnotic susceptibility. High hypnotizable subjects reported on average significantly higher vivid imagery, more fantasy-type experiences and greater absorption in daily activities, and a preference for an imagic cognitive style. Finally, the results suggested that measures of "absorption" (such as the TAS) may be redundant in statistical terms with self-report measures of imagery vividness (such as the Betts' QMI). The inconsistent results concerning the relationship between imagery vividness and hypnotizability, however, suggested the need to investigate this issue further.

Dissociation, Sleep, Belief in the Supernatural, Creativity, and Hypnotic Susceptibility

Using hypnotic phenomena as a point of departure, E.

Other nonhypnotic measures were found also that provided significant univariate discrimination but which were statistically redundant to the three measures that had emerged from the discriminant analysis. These were Paivio's (1971) Individual Differences Questionnaire Factors 2 (Habitual Use of Imagery) and 6 (Vividness of Dreams, Daydreams, and "Imagination"), Tellegen "Absorption" Scale (TAS) (Tellegen and Atkinson, 1974), Personal Experiences Questionnaire (Evans, 1982), and the Questionnaire on "Fantasy" Experiences (Nadon, 1983).

In summary, results of Nadon (1983) supported the view in the literature of the relevance of imagic, imaginative, and absorption cognitive processes with respect to hypnotic susceptibility. High hypnotizable subjects reported on average significantly higher vivid imagery, more fantasy-type experiences and greater absorption in daily activities, and a preference for an imagic cognitive style. Finally, the results suggested that measures of "absorption" (such as the TAS) may be redundant in statistical terms with self-report measures of imagery vividness (such as the Betts' QMI). The inconsistent results concerning the relationship between imagery vividness and hypnotizability, however, suggested the need to investigate this issue further.

Dissociation, Sleep, Belief in the Supernatural, Creativity, and Hypnotic Susceptibility

Using hypnotic phenomena as a point of departure, E.

Hilgard (1973, 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 rubric 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 subsystems 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.

Evans and his colleagues have investigated the dissociative aspects of cognitive functioning across a broad range of phenomena. Sleep experiences and behaviors have been central to this work; Evans (1982) has argued that individual differences related to the voluntary control of various sleep processes may reflect a broader ability to control subjective alterations of consciousness such as hypnosis.

One series of studies (Evans, Gustafson, O'Connell, M. Orne, & Shor, 1966; 1969; 1970) investigated this hypothesis by studying the responses of sleeping subjects to suggestions such as "whenever I say the word 'itch' your nose will feel itchy until you scratch it." The capacity to respond at later times to this type of suggestion, without showing EEG signs of arousal, was significantly related to subjects' levels of hypnotic susceptibility. A fourth study (Perry, Evans, O'Connell, E. Orne, & M. Orne, 1978), however, failed to replicate this finding.

Evans (1979) has argued that these discrepant findings may be reconciled by other data which suggest that the capacity to respond to suggestions administered during sleep may require both high hypnotic susceptibility and the ability to control sleep processes. He found that subjects who reported being able to fall asleep easily and to exercise control over their dreaming patterns were, on average, more highly hypnotizable than subjects who scored

low on the control of sleep dimension. Not all highly hypnotizable subjects, however, reported having this ability.

Similarly, Belicki and Bowers (1982) reported a study on experimental manipulation of dream patterns. Half of the subjects in the study were asked to attend to dreams in which they were "either by themselves or with few people"; the remaining subjects were instructed to attend to dreams where there were "many people". Further, half of the subjects received the instructions just prior to going to sleep and the other half upon awakening; subjects were asked to record their dreams in a diary. Independent raters scored subjects' reports on a 12-point Time Spent with People Scale that was developed for the study.

Subjects in the presleep/few people group scored significantly lower on the scale (7.13) than subjects in the other three groups who did not differ from each other (10.58, 10.86, 10.97). Thus the former subjects gave evidence of dream change, as opposed to report distortion, since subjects who had received the same instructions postsleep did not demonstrate a similar low score on the rating scale. The authors attributed the lack of a significant difference between the two "many people" groups to a ceiling effect of the scale. From a dissociative perspective, it is interesting to note that the subjects who gave evidence of dream change reported no awareness, on postexperimental inquiry, of the experimental manipulation.

Further, a dream change index (treatment-baseline) correlated significantly with HGSHS:A scores (r = .36).

In another line of inquiry, J. Hilgard (1970/1979; 1974; 1979) has conducted extensive interviews with hundreds of subjects prior to hypnosis. She 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 and physical adventures. Further she has speculated that this capacity for imaginative involvement may be developed in childhood as responses to unpleasant environments (e.g., severe punishment or isolation). She has emphasized, however, that not all highly hypnotizable individuals had unpleasant experiences early in life. Rather, some of these individuals appeared to have developed their imaginative capacities through the guidance of caring and creative parents who involved their children in imaginative activities. Thus, she has hypothesized that there may be "multiple pathways" to the development of high hypnotic susceptibility.

Two studies have confirmed and extended Hilgard's observations concerning the development of fantasy skills among highly hypnotizable individuals. Diamond and Taft (1975) found that hypnotic susceptibility was significantly related to dissociative experiences in daily life, an enjoyment of internally-generated arousal, and a belief in the supernatural, as assessed by the Taft Experience Questionnaire (1969; 1970). Similar findings have been re-

ported by Wilson and Barber (1982) on the basis of extensive interviews with 26 very highly hypnotizable women ("virtuosi"). Eighty-five percent of these women reported fantasies as being so realistic that they tended to confuse memories of fantasies with memories of real events; 60% reported having had symptoms of "phantom pregnancy" at least once in their lives; 85% reported realistic out-of-body experiences; and 75% reported encounters with spiritual apparitions. Further, results of two recent studies suggest that individual differences in enjoyment of fantasy and belief in magic may be apparent in children beginning at four years old, and that the relationship between individual differences on these dimensions and hypnotizability may already be developed at age six (Allen, 1985; Fanurik, Le Baron, & Zeltzer, 1985).

Finally, three studies have found a relationship between measures of creativity and hypnotizability (K. Bowers & van der Meulen, 1970; K. Bowers, 1971; Perry, Wilder, & Appignanesi, 1973) female subjects only. A more recent study (P. Bowers, 1978), however, found an overall significant relationship between a composite score of creativity and hypnotic susceptibility that did not differ between sexes.

The Present Study

The primary aim of the present study was to investigate the possibility that individual differences on var-

ious nonhypnotic measures could account for variance in subjects' hypnotizability classifications over that accounted for by Nadon (1983). A further aim was to attempt replication of the main univariate and discriminant analysis results of the earlier study. Accordingly, various measures of imagery preferences and abilities, sleep and dream patterns, imaginative processes, creativity, and cognitive style were administered to low, medium, and high hypnotizable subjects.

METHOD

Subjects

Fifty-nine subjects participated in the present study. Based on a rigorous assessment of their hypnotic susceptibility, described in the following section, subjects were divided into three groups. The mean ages for each group were as follows: 10 male and 10 female low susceptible subjects ($\bar{x}$ = 23.1; S.D. = 6.67), 9 male and 10 female medium susceptible subjects ($\bar{x}$ = 22.4; S.D. = 3.20), and 10 male and 10 female high susceptible subjects ($\bar{x}$ = 24.3; S.D. = S.D. = 8.31). The mean ages for the 29 male and 30 female subjects, respectively, were 22.0 (S.D. = 2.85) and 24.6 (S.D. = 2.85). Across all subjects the mean age was 23.2 (S.D. = 6.40), with ages ranging from 17 to 56.

Hypnosis Testing

All subjects underwent two hypnosis sessions prior to their participation in the present study. They were screened initially on the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A) of Shor and E. Orne (1962). Based on their HGSHS:A scores, 69 subjects were invited to participate in a second hypnosis session on a slightly modified version of the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C) of Weitzenhoffer and Hilgard (1962).[4] Of these subjects, 43 participated on the HGSHS:A as part of an undergraduate research methods course, 10 participated in an Introduction to Psychology

course, and 16 were recruited from advertisements in university newspapers.

Subjects were classified into three groups on the basis of their SHSS:C scores. Those whose scores ranged from 0-4 were classified as low susceptibles; subjects who scored from 5-10 (without posthypnotic amnesia) were classified as medium susceptibles; subjects who scored from 9-12 (with posthypnotic amnesia) were classified as high susceptibles. Subjects were invited to participate in the subsequent experimental session on a first-come basis with the restriction that 10 males and 10 females were required for each susceptibility group.[5] If a subject scored within a hypnotizability range in which 10 subjects had already satisfied the selection criteria, he/she was thanked, debriefed, and told that the results of the experiment would be made available to him/her on request. This occurred in the case of 10 subjects.

Subjects who were recruited from university advertisements were paid the nominal fee of $6 for their participation on HGSHS:A; the remaining subjects participated voluntarily as part of their undergraduate courses. All subjects were paid $6 for their participation on SHSS:C. The susceptibility means for the experimental sample of 59 subjects are presented in Table 1.

INSERT TABLE 1 ABOUT HERE

TABLE 1

Susceptibility Data
for the Three Groups*

			HGSHS:A		SHSS:C	
Susceptibility		N	Range	Mean	Range	Mean
Low	Female	10	0-9	3.10 (2.64)	0-4	1.60 (1.18)
	Male	10	0-10	3.20 (3.29)	0-4	1.50 (1.18)
	Total	20	0-10	3.15 (2.91)	0-4	1.55 (1.15)
Medium	Female	10	5-11	8.70 (2.21)	5-10	7.00 (1.49)
	Male	9	3-10	7.75 (2.71)	6-10	7.75 (1.36)
	Total	19	5-11	8.28 (2.42)	5-10	6.95 (1.39)
High	Female	10	8-11	10.00 (0.94)	9-12	10.10 (0.99)
	Male	10	5-12	10.00 (2.11)	9-12	10.80 (1.23)
	Total	20	5-12	10.00 (1.59)	9-12	(10.45) (1.15)

*Standard deviations are included in parentheses below the mean values.

Measures

Tellegen "Absorption" Scale (TAS) (Tellegen & Atkinson, 1974) (See Appendix A)

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

The authors (1974) have reported factor analyses of 71 questionnaire items that embraced 5 broad content areas (absorption, dissociation, trust, impulsiveness, and relaxation). They found that seven subscales contained within the content areas loaded most highly on the first factor in two samples of 142 and 171 subjects. They labelled them absorption, fantasy absorption, dissociation, openness to experience, devotion-trust, and autonomy-criticality. The 34 items in the TAS are taken from these subscales. An additional subscale, sleep automatism, loaded on the same factor for the second sample only and was not included in the finalized TAS. Alpha internal consistency coefficients of reliability for each subscale ranged from 0.48 to 0.74. Also, Isaacs (1982) has reported an internal consistency alpha coefficient of 0.89 for the entire inventory.

A shortened 18-item version of Shor's Personal Experiences Questionnaire (PEQ) (Shor, Orne, & O'Connell, 1962) (Evans, 1982) (See Appendix B)

The 18 items on this inventory are similar in content to those of the TAS and were chosen on an a priori basis based on findings in the literature (Evans, 1982). All "yes" answers are summed, yielding a range of possible scores from 0-18.

Evans (1982) has hypothesized that the low to moderate correlations that have been found between hypnotizability and the TAS may be partially due to the latter's failure to differentiate between items that involve aspects of voluntary control and those that appear to involve more involuntary or automatic aspects of cognitive processing. Evans (personal communication, October 22, 1984) provided the scoring for the two PEQ subscales: a controlled absorption score is derived from items 2, 4, 5, 10, 11, 15, 16, 17, and 18; the remaining nine items form the automatic absorption score (items 1, 3, 6, 7, 8, 9, 12, 13, and 14).

Questionnaire on "Fantasy Experiences" (Nadon, 1983) (See Appendix C)

This inventory is a shortened version of an earlier questionnaire (Nadon & Nogrady, 1981) and is based on the initial study of hypnotic "virtuosi" reported by Wilson and Barber (1980; 1982). 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 high involvement in reading and watching a film, respectively. The remaining questions were scored positively for each yes answer, yielding a range of possible scores from 0-30.

Experience Questionnaire (Taft, 1969; 1970) (See Appendix D)

This 88-item inventory was designed to measure aspects of unusual personal experiences. Subjects are asked to rate each of the items on a 5-point scale that ranges from 0 ("Definitely untrue for me") to 4 ("Definitely true for me") with a midpoint of 2 ("Can't decide"). All items are summed, yielding nine subscale scores.

The items were either taken from published sources (As, O'Hara, & Munger, 1962; Shor, 1960) or were developed by the author. Factor analyses of earlier versions of the inventory suggested nine factors. The main findings of factor analysis with a sample of 254 adults were confirmed on reanalysis when 193 undergraduate students were added to the initial sample [N = 447; n (males) = 185; n (females) = 262]. Each of the subscales will be described in turn.

Peak Experiences (Items 1-10).

These items attempt to tap the extent to which individuals experience emotions such as awe, serenity, or

ecstasy in various life experiences. The construct is similar to As et al.'s (1962) "role absorption" and the subscale taps items similar in content to the Tellegen "Absorption" Scale (Tellegen and Atkinson, 1974). Further, Taft (1970) reported that respondants who came from "broken homes" were more likely to score high on this subscale, although he did not report the details.

Dissociated Experiences (Items 11-20).

These items are similar to the cluster of items that As et al. (1962) labelled "experience and tolerance for unusual states" (Taft, 1970). Unlike items on the Peak Experiences subscale, the reports of dissociated experiences did not refer to the presence of strong affect. Individuals from broken homes, however, were also more likely to score high on this subscale. Further, Diamond and Taft (1975) found a positive relationship between the subscale and hypnotizability as measured by the HGSHS:A ($r = 0.29$; $p < .05$).

Openness to Inner Experiences (Items 21-30).

These items are primarily concerned with fantasies, daydreaming, and night dreaming.

Belief in the Supernatural (Items 31-40).

These items attempt to tap a belief both in the supernatural and in the importance of intuitive and/or "mystical" experiences. Further, high scores were related to coming from a broken home for females, but not for males (Taft, 1970). Diamond and Taft (1975) reported a positive relationship between HGSHS:A and this subscale (r

= 0.26; $p < .05$).

Emotional Extraversion (41-50).

These items are similar in content to other measures of emotional extraversion. Taft (1970) reported that, "Higher scorers on [this subscale] tended to be extraverted in every sense of the word: sociable, exhibitionist, impulsive, aggressive, and enthusiastic" (p.181).

Intrinsic Arousal (Items 51-60).

This subscale contains items diverse in content but overall represents, "a rejection of the use of external stimulation to maintain arousal" (p. 181). Diamond and Taft (1975) reported a correlation of 0.27 with HGSHS:A ($p < .05$).

Controlled Adaptability (Items 61-70).

These items reflect primarily the extent to which individuals are able to adapt to environmental changes.

Intellectual Control (Items 71-80).

These items attempt to reflect a preference for a "logical" thinking style that coincides with, "persistence and creativity" (Taft, 1970, p. 182).

Cognitive Regression (Items 81-88).

These items reflect an enjoyment of "childlike" behaviors.

Vividness of Visual Imagery Questionnaire (VVIQ) (Marks, 1973) (See Appendix E)

The VVIQ contains 16 items, five of which are taken from the shortened version of the Betts' Questionnaire

Upon Mental Imagery (Sheehan, 1967) to be described in Part B. Subjects are asked to rate the "vividness of the image" evoked by each item on a scale ranging from 1 ("No image at all, you only 'know' that you are thinking of the object") to 5 ("Perfectly clear and as vivid as normal vision"). All items are summed, yielding a range of scores from 16 to 80.

Factor analysis of the VVIQ has demonstrated a simple unitary factor [Dowling, 1973 (reported in White, Sheehan, & Ashton, 1977)]. Further, the inventory has been shown to possess good internal consistency; a split-half internal reliability coefficient of 0.85 was reported by Marks (1973) and an alpha coefficient of reliability of 0.94 was reported by Dowling (1973). Further, the test-retest reliability of the VVIQ has been reported to be 0.74 for an immediate test (Marks, 1973) and 0.67 for a three week interval (McKelvie & Gingras, 1974).

Sleep Questionnaire (Evans, 1977) (See Appendix E)

This 33-item inventory taps various sleep habits and behaviors. Subjects are asked to rate their responses on a 5-point scale that ranges from 1 ("Never") to 5 ("Always"), with a midpoint of 3 ("Sometimes").

Evans (1977) isolated 5 factors contained in the inventory based on independent samples of 92 and 180 undergraduate students. Only those items that loaded on at least one of these factors are included in the scoring. Based on the item-to-factor loadings, Evans (1977) has

suggested that the items be weighted as follows:

Voluntary Control of Sleep	Q9 + Q17 + Q26 + Q27 + Q29
Sleep Onset Difficulty	(6 - Q9) + 2(Q20) + Q21 + Q30
Difficulty Maintaining Sleep	2(Q5 + Q15) + Q28
Recall of Dreaming	2[Q1 + (6 - Q2)] + Q13
Cognitive Control of Sleep Mentation	2(Q24 + Q25) + Q7

Scores on each subscale range from 5 to 25. Although no reliability data have been reported, Evans (1982) has reported results of factor analyses that replicated the factorial structure found in the initial study.

Dream Questionnaire (Gibson, 1985) (See Appendix G)

This newly constructed inventory contains 17 questions concerning dream behavior and experience. It was designed specifically to investigate the potential relationship between these types of self-reports and hypnotizability; items were selected on an *a priori* basis based on theoretical speculation and empirical findings. Subjects are asked to indicate their answers on a 4-point scale of "Never", "Sometimes", "Often", and "Always".

Based on a sample of 105 students, Gibson (1985) reported three main clusters of responses to the inventory; he labelled them "Vividness and Satisfaction in Dreaming" (items 1, 2, 3, 4, 5, 6, 7, 12, 13, and 15), "Control of Dreaming" (items 8, 9, 10, 11, and 14), and "Sleep Walking and Talking" (items 16 and 17). The author has cautioned, however, against interpreting these clusters

until more data are available. A Principal Components Analysis of the the inventory with the present sample is presented in the Results section.

Gibson (1985) has suggested that the inventory be scored on a 2-point scale until more data can be accumulated on the finer distinctions of the 4-point format. This procedure was adopted for the present study. Responses of "Never" and "Sometimes" were scored as "0"; responses of "Often" and "Always" were scored as "1". The scoring for items 4 and 14 was reversed. All items were summed, yielding a range of possible scores from 0 to 17.

Self-Control Schedule (SCS) (Rosenbaum, 1980) (See Appendix H)

Subjects are asked to rate on a 6-point scale the degree to which each of 36 statements describes a particular behavior characteristic. The scale ranges from -3 ("very uncharacteristic of me, extremely nondescriptive") to +3 ("Very characteristic of me, very descriptive"); no provision is made for a "0" (neutral) response. All items are summed to yield a single score that can range from -108 to +108.

The various characteristics that are sampled include the use of cognitions to control emotional and physiological sensations (e.g., "When I am feeling depressed I try to think about pleasant events."), a tendency to employ problem-solving strategies (e.g., "When I try to get rid of a bad habit, I first try to find out all the factors

that maintain this habit."), perceived ability to delay gratification (e.g., "First of all I prefer to finish a job that I have to do and then start doing the things I really like."), and general expectations for self-efficacy (e.g., "Often by changing my way of thinking I am able to change my feelings about almost everything.").

All items in the inventory conformed to the following criteria on initial testing with 152 undergraduate students: (a) subjects endorsed all points on the scale; (b) the standard deviation of the item was at least one; and (3) the item contributed to the internal consistency of the inventory (i.e., the internal consistency alpha coefficient would be lowered by the removal of the item).

Kuder-Richardson Formula 20 internal consistency estimates of reliability ranged from 0.78 to 0.84 for five samples ranging in size from 111 to 179. Test-retest reliability after a four-week interval was found to be 0.86 (Pearson r) for a sample of 82 undergraduates.

Cognitive Failures Questionnaire (CFQ) (Broadbent, Cooper, Fitzgerald, & Parkes, 1982) (See Appendix I)

The CFQ is a 25-item inventory of self-reported failures in perception, memory, and motor function. Subjects are asked to rate the frequency during the last six months of each item on a five-point scale that ranges from 0 ("Never") to 4 ("Often") with a midpoint response of 2 ("Occasionally"). Representative items include, "Do you fail to notice signposts on the road?" (perception), "Do

you find that you forget why you went from one part of the house to the other?" (memory), and "Do you bump into people?" (motor). All items are summed; possible scores range from 0 to 100.

The inventory was designed to be sensitive to temporary disturbances in cognitive control. i.e., to be sensitive to a psychological "state". Test-retest reliability results indicated, however, that the CFQ was sensitive to a more stable, general tendency of individuals; Pearson correlations were found to be 0.82 (n = 57; average time elapsed = 21 weeks) and 0.80 (n = 32; average time elapsed = 65 weeks). A tau value of 0.62 was reported for an interval of one to two years (n = 114).

Alpha coefficients of internal consistency for earlier versions of the CFQ were found to be 0.79 (n = 98; six-point format) and 0.89 (n = 98; four-point format). The final five-point version was chosen in order to allow subjects the option of responding "Never". Further, subjects' responses on the inventory were not related to social desirability as measured by the Lie Scale of the Eysenck Personality Questionnaire.

Public and Private Self-Consciousness Scale (Fenigstein, Scheier, & Buss, 1975) (See Appendix J)

The inventory was designed to measure individual differences in self-focused attention. Three factors emerged consistently from Principal Components Analyses of items sampling the domain of self-consciousness with nine

samples (total sample size = 1821). These analyses with earlier versions of the inventory suggested that the construct of self-consciousness could be conceptualized in terms of thre subconstructs. Private self-consciousness refers to the extent to which individuals think about themselves (e.g., I'm always trying to figure myself out."). Public self-consciousness refers to individuals' awareness of themselves in social contexts (e.g., I'm concerned about the way that I present myself."). Social Anxiety, described as a reaction to self-consciousness, is defined by a discomfort in the presence of others (e.g., "I have trouble working when someone is watching me.").

The final version of the inventory contains 23 items which subjects are asked to rate on a 5-point scale from -2 ("extremely uncharacteristic") to +2 ("extremely characteristic") with a midpoint response of 0 (unlabelled). Items are summed, yielding a total score and three subscale scores. The total score can range from -46 to +46. The Private Self-Consciousness Subscale score (items 1, 3, 5, 7, 13, 15, 18, 20, and 22) can range from -20 to +20. Scores on the Public Self-Consciousness Subscale (items 2, 6, 11, 14, 17, 19, and 21) can range from -14 to +14. Finally, scores can range from -10 to +10 on the Social Anxiety Subscale (items 4, 8, 10, 12, 16, and 23). The scoring of items 3, 9, and 12 is reversed.

Fenigstein et al. (1975) presented male (n = 179) and female (n = 253) undergraduate student norms: Private Self-Consciousness Subscale [$\bar{x}$ = 25.9, S.D. = 5.0 (males);

$\bar{x}$ = 26.6; S.D. = 5.1 (females)]; Public Self-Consciousness Subscale [$\bar{x}$ = 18.9; S.D. = 4.0 (males); $\bar{x}$ = 19.3; S.D. = 4.0 (females)]; Social Anxiety [$\bar{x}$ = 12.5; S.D. = 4.1; (males); $\bar{x}$ = 12.8; S.D. = 4.5 (females); and Total Self-Consciousness [$\bar{x}$ = 57.3; S.D. = 9.2 (males); $\bar{x}$ = 58.7; S.D. = 8.9 (females)].

Factor analysis of the final version of the inventory with a sample of 152 undergraduates replicated the factor structure of the analyses performed with earlier versions of the scale. Further, the authors reported correlations among between the subscales for this sample and for another sample of 452 subjects. These values were, respectively: 0.21 and 0.26 (Private with Public), 0.21 and 0.20 (Public with Anxiety) and 0.11 and -.06 (Private with Anxiety). Test-retest reliability was examined with a sample of 84 subjects over a two-week period. These correlations were 0.79 (Private), 0.84 (Public), 0.73 (Anxiety), and 0.80 (Total).

Rey Complex Figure (Osterrieth, 1944) (See Appendix K)

Subjects were asked to study the Rey Complex Figure for two minutes. The task was designed to measure the ability to retain in memory a complex and abstract visual figure. The initial instructions for this task were as follows:

> You will be asked to study a drawing for two minutes. Study it carefully because in a half-hour you will be asked to draw it from memory. You can use any mental strategy that you think will help you to

recall it in a half-hour. Any questions?

Subjects were asked to draw from memory Rey's Complex Figure after a 30 minute interval, during which they completed other inventories. Although the standardized administration of this test requires that subjects copy the drawing in the initial stage and then redraw it from memory at later time, pilot testing in the present context indicated that this format produced a "ceiling" effect, i.e., performance was at a very high level for most subjects with very little variation in scores. The present format was thought to be difficult enough to produce individual differences in the present sample without being so difficult as to produce a "floor" effect. The variation across subjects' performances confirmed the utility of the present format.

The instructions for the recall task were as follows:

> Now I'd like you to draw the figure that you studied earlier. There is no time limit so take your time and draw the figure as accurately and as completely as you can. Any questions?

A scoring system is provided by Osterrieth (1944) in which each of 18 units in the design are allotted between 0.5 and 2 points (See also Lezak, 1983). Two points are allotted for a unit if it is correctly drawn and placed. One point is allotted if it is either drawn or placed correctly, providing that the unit is recognizable. A half-point is allotted if the unit is both placed and drawn incorrectly (but recognizable). Scores can range

from 0 to 36; more detailed scoring information is provided in Appendix K.

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

The Color and Word Test consists of three stimulus cards and was included as a measure of selective attention. Card A requires the subject to read 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) that are printed in different color-name-words. That is, for this latter card, subjects are asked to attend selectively to the color of the ink of each stimulus and to ignore the different printed word. Each card consists of 100 stimuli. The general instructions for the task and specific ones for each card were as follows:

> This task consists of three individual cards. I'm going to ask you to read out loud from left to right to the bottom of the page. Read as quickly as you can; I'll be timing the task. Also, if you make an error at any point, please correct it immediately. I'll be following with you and if you make a mistake that you haven't noticed, I'll say "No". Correct your mistake at that time. Any Questions?
>
> Card A: Please read these words from left to right as quickly as you can. Ready?
>
> Card B: Please read the color of the ink of each stimulus from left to right as quickly as you can. Ready?
>
> Card C: Please read the color of the ink of each stimulus from left to right

as quickly as you can but ignore the printed word. Ready?

Stroop (1935) reported mean first-administration response times of 41.0, 63.3, and 110.3 seconds, for Cards A, B, and C, respectively, for samples of 70 to 100 college students; these times have been replicated by Jensen (1965).

Saunders (1980), based on a review of the literature, has argued that Card A is an extraneous control. He has argued further that the logarithm 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. Further, the number of errors on Card C were recorded for each subject.

Block Design Subtest of the Weschler Adult Intelligence Scale-Revised (WAIS-R) (See Lezak, 1983)

This task contains nine printed square designs which subjects are asked to reproduce with three-dimensional blocks. Although standardly used as a partial measure of "intelligence", it was used in the present study solely as an objective measure of visual ability; this was communicated to the subjects.

Each block has two completely red sides, two completely white sides, and two red/white sides split on the diagonal. Subjects are asked to construct the designs as quickly as possible and are informed that their performance will be timed. The designs (with the exception of

the first one) were provided in printed form and were administered in order of increasing difficulty. Designs 1 to 5 are 2x2 configurations (4 blocks); Designs 6 to 9 are 3x3 configurations (9 blocks). Further, Designs 1, 2, 3, 4, and 6 contains "grid" information; i.e., they contain primarily full-colored blocks and any diagonals occur discretely and are easily identified. Designs 5, 7, 8, and 9, in contrast, contain few full-colored blocks and diagonals stretch across two and three-block spans, making their identification difficult. These latter designs require better visuo-spatial abilities since their construction is not readily amenable to verbal strategies (Lezak, 1983). The time limit for the 2x2 designs was 60 seconds; subjects were required to complete the 3x3 designs within 120 seconds.

The standardized administration procedure was adopted. Design 1 was constructed by the experimenter in the presence of each subject; subjects were asked to copy the design, using the block-model provided by the experimenter. Design 2 was demonstrated also, although the model provided to the subjects was the printed model from the Block Design booklet. Subjects attempted the remaining designs without aid from the experimenter.

The standardized scoring format was adopted. Subjects received two points for each of designs 1 and 2 if they passed on the first trial and one point if they passed on a second trial. They received four points for

correct assembly of each of the other designs within the time limit plus bonus points for fast times as described below. Total scores (including bonus points) could range from 0 to 47.

	Bonus Points			
Design	4	5	6	7
3	16-60"	11-15"	1-10"	---
4	16-60"	11-15"	1-10"	---
5	21-60"	16-20"	11-15"	1-10"
6	36-120"	26-35"	21-25"	1-20"
7	61-120"	46-60"	31-45"	1-30"
8	76-120"	56-75"	41-55"	1-40"
9	76-120"	56-75"	41-55"	1-40"

Consequences Test (Christensen, Merrifield, & Guilford, 1958) (See Appendix L)

For this task, subjects were asked to list as many consequences of two fictionalized and unlikely events as they could within a two minute period. Bowers and Bowers (1979) reported a positive relationship between HGSHS:A scores and a global measure of creativity for women but not for men (r = 0.41; $p < .05$ and r = 0.08; $p > .05$, respectively). The Consequences Test formed part of their test battery and was considered to be the best single measure of creativity (Bowers, P., personal communication, January 20, 1985).

Sheehan's (1967) shortened version of the Betts' Questionnaire Upon Mental Imagery (QMI) (See Appendix M)

The QMI has a total of 35 items, 5 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 7-point scale from 1 ("Perfectly clear and vivid as the actual experience") to 7 ("No image present at all, you only 'knowing' that you are thinking of the object"); 3 ("Moderately clear and vivid") represents the midpoint on the scale. Scores can range from 35 to 245; a low score corresponds to high vividness of imagery.

The test is internally consistent [Cronbach's alpha coefficient is reported to be in the 0.90's (Westcott & Rosenstock, 1976)] and test-retest reliability has been estimated to be 0.78 with a seven-month interval (Sheehan, 1967). Further, factor analyses have shown the existence of a general imagery factor that is common to all the subscales (Sheehan, 1967; White, Ashton, & Law, 1974).

Preference for an Imagic Cognitive Style Test (PICS) (Isaacs, 1982) (See Appendix N)

The PICS takes into account a number of the criticisms of self-report imagery scales (Nadon, 1983). Firstly, two thinking styles, verbal and imagic, are presented as being equally desirable, thus minimizing any tendency of subjects to present themselves as "good" imagers.

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 a 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 (1980; 1982). Finally, the test takes into account two other potentially important factors: degree of effort and absorption.

Subjects were asked to read the general instructions for the test and were given the accompanying questionnaire but were asked not to open it until asked to do so. During the course of testing, the experimenter described three scenarios. Subjects were asked to close their eyes, think about each scenario in turn, and to answer the appropriate questions in the inventory; a brief rest period was provided between each scenario.

After each scenario, subjects answered 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; a high score corresponds to a high degree of self-reported verbal content, imagery content, and absorptive involvement, respectively. The fourth subscale (Effort) 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; a high score corresponds 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.

Procedure

Following categorization for hypnotizability, all subjects completed the 12 paper-and-pencil inventories and the four experimental tasks. There was no hypnotic induction during this part of the experimental procedure. Subjects were paid $12 since its duration was approximately two hours over two one-hour sessions.

Subjects completed the Tellegen "Absorption" Scale (TAS) (Tellegen & Atkinson, 1974) and the Personal Experiences Questionnaire (PEQ) (Evans, 1982) after their participation in the HGSHS:A session. The 49 subjects who had been recruited from the research methods or from university advertisements did so immediately following HGSHS:A. The remaining 10 subjects from the Introduction to Psychology class did so just prior to their participation on SHSS:C.

The remaining inventories and tasks were administered in a different predetermined random order for each subject following participation on SHSS:C. Thirty-six of the subjects were tested in one two-hour session; the remaining 23 subjects were tested in two sessions of one hour

each.

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; they were asked to be as honest as possible in all self-reports and to try to do their best on the various tasks.

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

RESULTS

As indicated earlier, 59 subjects were divided into three groups of high, medium, and low hypnotic susceptibility on the basis of their SHSS:C scores. Subjects who scored from 0-4 were classified as low hypnotizable subjects; subjects who scored between 5-10 (without posthypnotic amnesia) were classified as medium hypnotizables; subjects who scored between 9-12 (with posthypnotic amnesia) were classified as high hypnotizables.

The primary aim of the present study was to estimate the best subset of variables that predicted subjects' hypnotic susceptibility levels; discriminant analysis was employed to this end. Although there were empirical and theoretical reasons for preferring some variables over others, an objective manner in which to reduce the variable pool in the present study further was needed for two reasons: spurious results can be introduced by a less informed selection process and reliability of the results requires that the number of subjects in the smallest group should substantially exceed the number of predictors. If this latter condition is not met, overfitting of the discriminant function can occur, and this in turn reduces reliability.

The first of two steps taken to reduce the variable pool was to examine the group means on each of the potential predictor variables. Accordingly, analyses of variance (ANOVA) were performed; those variables that demon-

strated a significant ANOVA were considered further. Univariate results from Nadon (1983) are presented also in order to allow for detailed comparisons between the two samples. Although this type of analysis provides the most meaningful basis for classification when variables are considered individually, results can be misleading to the extent that the predictors are redundant. Redunduncy becomes more likely the more potential predictors correlate with each other, as is the case with many of the variables in the present study. Hierarchical and stepwise discriminant analyses provide one way around this problem since redundancy among the predictors is taken into account.

Both stepwise and hierarchical discriminant techniques allow for predictor variables to be entered into the analysis in a step-by-step fashion. Redundancy among the predictors is taken into account in much the same manner as in analysis of covariance. In the "pure" stepwise case, the variable that is entered at the first step of the analysis is the one that can singly account for the most grouping variance, i.e., the variable with the highest univariate F value. At the second step of the analysis, it then acts like a covariate for the other variables; the variable that enters at the second step is the one with the highest F-to-enter once the effect of the first variable has been covaried out. The selection process continues in this manner until none of the remaining variables satisfies the required F-to-enter value.

Stepwise and hierarchical techniques differ in the amount of control that is exercised over the order of entry of the variables. The stepwise technique requires all variables to compete for entry according to a predetermined statistical criterion. With hierarchical analysis, the investigator specifies a priori the order in which the predictors are to be entered. Specifications can be given with both types of analyses concerning which variables are to remain in the analysis regardless of the level of statistical significance and whether some are to be removed if at any step they fail to meet certain statistical criteria. Further, the two techniques can be combined and the investigator can specify that some variables are to be entered a priori while others are allowed to compete for entry. Thus, a fair amount of flexibility is afforded by judicious use of the techniques.

Relying solely on statistical criteria, however, is not without hazard since trivial differences between predictor variables can cause one predictor to be chosen over another. If the chosen variable is a less reliable predictor, the resulting discriminant equation is less likely to replicate to another sample. For this reason, a second step was conducted in order to reduce the variable pool even further than the reduction afforded by the analyses of variance; each of the variables that demonstrated significant differences among the group means was given further consideration according to its reliability and theo-

retical validity. Finally, before presentation of the discriminant analyses of the present data, the extent to which the discriminant equation derived from Nadon (1983) replicated to the present sample is assessed. Each of these steps will be described in turn.

Finally, additional analyses are reported for the present variables at the end of the results section in order to further illustrate the main findings. The raw data for all the variables are presented in Appendix O; the correlation matrix for all the variables is presented in Appendix P.

Analyses of Variance

Since sex differences have been reported for some of the predictors of hypnotizability, two-way factorial analyses of variance (ANOVA) with two between-subjects variables (3 hypnotic susceptibility levels; 2 sex levels) were performed on all the predictor variables in the present study. Only two variables demonstrated significant interactions between sex and hypnotic susceptibility. These were the logarithm of the Stroop Ratio (log time to read card C / time to read Card B) (Stroop, 1935) and the total score on the Public and Private Self-Consciousness Scale (Fenigstein et al., 1975). Neither of these variables, however, demonstrated significant main effects for either sex or susceptibility. Although these results may be of interest for future studies, they did not appear to warrant separate discriminant analyses for male and female subjects since advantages gained by separate analyses are

outweighed by the greater reliability afforded by the larger combined sample. The source tables and the measures of central tendency for these two analyses are presented in Appendix Q).

Consequently, one-way analyses of variance were performed on the data with hypnotic susceptibility as the grouping variable. Table 2 presents the measures of central tendency for the variables that demonstrated significant differences among the group means in the present study and in Nadon (1983). The pairwise comparisons found to differ significantly by Tukey's Honestly Significant Difference Test (HSD) are presented also.[7] The reader is referred to Table 2 throughout this section. Table 3 presents the intercorrelation matrix for the variables that demonstrated significant ANOVAs in the present sample.

INSERT TABLES 2 AND 3 ABOUT HERE

The variables that demonstrated a significant one-way ANOVA are as follows:

Sheehan's (1967) shortened version of the Betts' Questionnaire Upon Mental Imagery [$F(2,56) = 3.49$; $p \leq .05$]; Marks' (1973) Vividness of Visual Imagery Questionnaire (VVIQ) [$F(2,56) = 3.69$; $p \leq .05$].

Tukey's posthoc pairwise comparison method revealed a significant difference between the high and low groups only on both the QMI [$HSD(3,56) = 20.15$; $p = .05$] and the VVIQ [$HSD(3,56) = 9.09$; $p = .05$]. High hypnotizable

TABLE 2

Measures of Central Tendency
for the Variables that Demonstrated
Significant Differences Among the Group Means[abc]

Variable Description	Susceptibility Group Low	Medium	High
Betts' Questionnaire Upon Mental Imagery (QMI)	93.75 (a) (36.43)	82.68 (17.85)	72.05 (a) (18.92)
(1983 Sample)	112.60 (a,b) (39.96)	81.45 (a) (22.92)	61.8 (b) (14.49)
Marks' Vividness of Visual Imagery Questionnaire (VVIQ)	54.30 (a) (15.09)	58.26 (8.50	64.30 (a) (10.42)
Preference for an Imagic Cognitive Style Test (PICS)	5.05 (a) (7.42)	8.68 (6.82)	12.95 (a) (5.40)
(1983 Sample)	7.75 (a) (7.08)	11.05 (b) (4.89)	15.60 (a,b) (3.52)
Tellegen Absorption Scale (TAS)	19.75 (a,b) (8.33)	25.42 (a) (4.79)	26.65 (b) (5.65)
(1983 Sample)	18.85 (a,b) (7.08)	23.80 (a) (4.72)	27.80 (b) (3.52)
Personal Experiences Questionnaire (PEQ)	11.70 (a) (4.41)	14.00 (3.04)	14.90 (a) (2.81)
(1983 Sample)	9.95 (a,b) (4.24)	12.70 (a) (2.92)	13.95 (b) (2.35)
PEQ "Controlled Absorption" Subscale (PEQ:C)	5.80 (a,b) (2.57)	7.58 (a) (1.61)	7.95 (b) (1.47)

PEQ "Automatic Absorption" Subscale (PEQ:A)	5.40 (a) (1.82)	6.42 (1.81)	6.95 (a) (1.54)
Taft Experience Questionnaire "Dissociated Experiences" Subscale	24.75 (a) (7.33)	28.21 (6.50)	30.60 (a) (6.37)
Taft Experience Questionnaire "Belief in the Supernatural Subscale	22.25 (a) (6.67)	24.42 (6.22)	28.95 (a) (6.21)
Taft Experience Questionnaire "Emotional Extraversion" Subscale	23.75 (a,b) (4.29)	27.84 (a) (3.47)	28.75 (b) (5.69)
Evans' Sleep Questionnaire "Cognitive Control of Sleep Mentation" Subscale	12.60 (3.30)	11.16 (a) (2.91)	14.65 (a) (4.41)
Gibson's Dream Questionnaire	4.40 (a) (1.88)	5.00 (1.33)	6.45 (a) (2.48)
Public and Private Self-Consciousness "Social Anxiety" Subscale	2.95 (a) (3.58)	0.63 (5.25)	-1.95 (a) (5.28)

[a]Group means are indicated first; standard deviations are indicated in parentheses.

[b]Across rows, Means with the same subscript, a or b, represent a significant difference at $p < .05$ level (2-tailed), at least.

[c]Where indicated, the measures of central tendency are from Nadon (1983).

TABLE 3

Intercorrelation Matrix
for SHSS:C and for Variables that
Demonstrated Significant ANOVAs
in the Present Sample[a,b]

	1 QMI	2 VVIQ	3 PICS	4 TAS	5 PEQ	6 PEQ:C	7 PEQ:A	8 TAFT DISS	9 TAFT SUPR
1	-	-81	-50	-61	-51	-55	-40	-34	-45
2	-	-	45	63	45	51	22	38	48
3	-	-	-	56	40	36	51	53	36
4	-	-	-	-	74	76	75	63	62
5	-	-	-	-	-	87	88	64	55
6	-	-	-	-	-	-	73	50	52
7	-	-	-	-	-	-	-	71	51
8	-	-	-	-	-	-	-	-	56

	10 TAFT EXTR	11 SLEEP COG	12 DREAM	13 SOC ANX	14 SHSS:C
1	-28	-12	-29	30	-32
2	18	24	29	-20	31
3	31	10	37	-32	46
4	36	35	40	-22	41
5	18	27	40	-12	34
6	19	31	35	-20	40
7	20	34	47	-17	32
8	23	32	38	-12	32
9	23	28	36	-15	37
10	-	-14	-02	-37	45
11	-	-	63	-11	15
12	-	-	-	-20	37
13	-	-	-	-	-37

[a]Values are to two decimal places.

[b]For values > 0.26, $p < .05$; for values > 0.33, $p < .01$.

subjects reported more vivid imagery than the lows; although the mediums scored in the midrange on both measures, they did not differ significantly from either the highs or the lows on either variable.

An additional analysis was performed in order to compare the present results on the QMI to those of Nadon (1983). A 3x2 treatments-by-levels ANOVA [with 3 treatments (susceptibility groups) and 2 levels (Nadon, 1983 / present study)] was performed on the data (See Bruning & Kintz, 1977). A significant main effect was found for susceptibility [F (2,113) = 19.26; $p < .001$] but not for sample level [F (1,113) = < 1.0; $p > .05$]. A significant interaction between susceptibility and sample, however, was found [F (2,113) = 3.22; $p < .05$). Tukey's pairwise comparisons revealed a significant difference between the two low hypnotizable groups [q (113) = 3.20; $p < .01$ (2-tailed)] but not between the two medium groups [q (113) = 0.21; $p > .05$] or between the two high groups [q (113) = 1.73; $p < .10$ (2-tailed)].[e]

Thus, the low hypnotizable subjects in the present study reported significantly more vivid imagery, as measured by the QMI, than those in Nadon (1983) and the highs showed the reverse pattern, although not significantly so. The variability of these results is consistent with results obtained over the last two decades (See Bowers, 1976; J. Hilgard, 1970/1979; Morgan & Lam, 1973; Perry, 1973; Sutcliffe, Perry, & Sheehan, 1970).

Preference for an Imagic Cognitive Style Test (PICS) (Isaacs, 1982) [$F(2,56) = 7.18$; $p \leq .002$].

Tukey's posthoc comparisons showed a significant difference between the highs and lows only [HSD (3,56) = 6.50; $p < .01$]. Highs reported a significantly greater preference for imagery than the lows; the mediums scored in the mid-range although they did not differ significantly from either of the other groups.

A 3x2 treatments-by-levels ANOVA was performed, comparing the present results with those of Nadon (1983). Significant main effects were found for sample level [$F(2,113) = 5.44$; $p < .05$] and for susceptibility grouping [$F(2,113) = 17.25$; $p < .01$) but not for the sample by susceptibility interaction [$F(2,113) = 0.71$; $p > .05$]. Subjects in the present study reported a significantly lower preference for imagery, although on average, this was equally true for subjects in all three susceptibility groups.

In order to shed more light on the PICS results, subjects' responses were examined in greater detail by calculating their scores on each of the 4 subscales: Verbal, Imagery, Absorption, and Effort. These data are presented in Table 4 for both the present study and for Nadon (1983). For the data of the present study, significant differences among the group means were found for the Imagery and Absorption subscales [$F(2,56) = 4.64$; $p < .02$; $F(2,56) = 3.73$; $p < .05$, respectively]. The highs

reported significantly greater imagery [HSD (3,56) = 1.91; p = .05] and absorption [HSD (3,56) = 1.65; p = .05] than the lows; no other differences were significant. Subjects' scores were not found to differ significantly on the Verbal and Effort subscales [F (2,56) = 2.56; p < .09; F (2,56) = 2.88; p < .07, respectively], although they were in the predicted direction of greater verbal content and greater effort for the lows. Thus, although these latter two scales did not significantly differentiate subjects of varying hypnotic susceptibility levels on an individual basis, they contributed to the overall score in the predicted direction, confirming the utility of considering the entire score rather than the subscales individually.

INSERT TABLE 4 ABOUT HERE

A 3x2 treatments-by-levels ANOVA was calculated for each subscale, comparing the present results to those of Nadon (1983); each analysis will be presented in turn.[7] The analysis of the Verbal subscale revealed a significant sample by susceptibility interaction [F (2,112) = 4.73; p < .02]. The sample and susceptibility main effects were not significant [F (1,112) = 2.25; p > .05; F (2,112) = 2.77; p > .05; respectively]. Posthoc comparisons showed that it was the higher verbal score of the medium subjects in the present study as compared to Nadon (1983) that accounted for the significant interaction [q (112) = 2.43;

TABLE 4

Measures of Central Tendency
for the PICS Subscales[a,b]

Subscale	Susceptibility Group: Low	Medium	High
Imagery	10.05 (a) (2.91)	11.16 (2.63)	12.45 (a) (1.82)
(1983 Sample)	10.37 (a) (2.19)	11.40 (b) (2.30)	13.75 (a,b) (1.12)
Absorption	10.40 (a) (2.39)	11.47 (1.65)	12.25 (a) (2.31)
(1983 Sample)	10.63 (a,b) (1.74)	12.00 (a) (1.65)	12.85 (b) (1.63)
Verbal	8.95 (3.89)	8.63 (3.15)	6.75 (2.81)
(1983 Sample)	7.89 (3.14)	6.95 (2.91)	6.95 (3.00)
Effort	6.45 (2.65)	5.32 (1.70)	5.00 (1.45)
(1983 Sample)	5.79 (a) (1.78)	5.00 (1.23)	4.10 (a) (1.29)

[a]Group means are indicated first; standard deviations are indicated in parentheses.

[b]Across rows, Means with the same subscript, a or b, represent a significant difference at $p < .05$ level (2-tailed), at least.

[c]Where indicated, the measures of central tendency are from Nadon (1983).

$p < .02$ (2-tailed)]. The Effort scores revealed significant main effects for sample and for susceptibility [F (1,112) = 4.06; $p < .05$; F (2,112) = 8.28; $p < .01$; respectively], but not for the interaction [F (2,112) < 1.0; $p > .05$]. The subjects in the present study reported significantly more effort, although this was equally true on average for subjects of all susceptibility levels. No differences were found between the two samples on the Imagery and Absorption subscales, although both variables demonstrated significant main effects for susceptibility. The F values for sample and susceptibility main effects, and interaction, respectively, were [F (1,112) = 2.45; $p > .05$; F (2,112) = 16.96; $p < .001$; F (2,112) < 1.0; $p > .05$; for Imagery] and [F (1,112) = 1.79; $p > .05$; F (2,112) = 11.16; $p < .001$; F (2,112) < 1.0; $p > .05$; for Absorption].

In summary, although the group scores on the Verbal and Effort scales fluctuated somewhat from one study to another, the Imagery and Absorption scores remained stable. Further, the lack of an interaction between the two samples on the total score indicates that the pattern of results from the earlier study replicated to the present sample.

Tellegen Absorption Scale (TAS) (Tellegen & Atkinson, 1974) [F (2,56) = 6.46; $p \leq .003$].

Both the highs and mediums reported significantly greater absorption than the lows but did not differ from

each other [HSD (3,56) = 6.37; p = .01]. Further, a 3x2 treatments-by-levels ANOVA did not demonstrate any significant differences between the present sample and that of Nadon (1983) [F (1,113) < 1.0; p > .05; F (2,113) = 19.66; p < .01; F (2,113) < 1.0; p > .05; sample, susceptibility, and interaction, respectively].

Personal Experiences Questionnaire (PEQ) (Evans, 1982) [F (2,58) = 4.41; p ≤ .02].

Low hypnotizable subjects reported significantly fewer of the types of experiences described in the PEQ than the highs [HSD (3,56) = 2.72; p < .05]. Further, Evans' (1982) hypothesis that absorption requiring aspects of voluntary control may discriminate subjects' susceptibility levels better than absorption that is more automatic was examined. Significant group differences were found for both the controlled [F (2,58) = 6.92; p < .003] and the automatic subscales [F (2,58) = 4.17; p < .05]. Tukey's posthoc comparisons provided some support for the hypothesis since the controlled absorption subscale discriminated both highs and mediums from the lows [HSD (3,56) = 1.92; p = .01; HSD (3,56) = 1.51; p =.05; respectively] whereas the automatic subscale differentiated the highs from the lows only [HSD (3,56) = 1.34; p = .05].

A 3x2 treatments-by-levels ANOVA on the total scores from Nadon (1983) and the present study showed significant main effects for sample and for susceptibility [F (1,113) = 5.15; p < .05; F (2,113) = 13.42; p < .01; respectively]

but not for the interaction [F (2,113) < 1.0; p > .05]. Subjects in the present study reported significantly more of the experiences sampled by the PEQ, although on average this was equally true for subjects in each group.

Three subscales of the Tafт Experience Questionnaire (Taft, 1969): Dissociated Experiences [F (2,56) = 3.80; $p \leq .05$]; Belief in the Supernatural [F (2,56) = 5.74; $p \leq .01$]; Emotional Extraversion [F (2,56) = 6.70; $p \leq .003$].

Highs reported significantly more dissociative-type experiences and a greater belief in the supernatural and related phenomena than did the lows [HSD (3,56) = 5.24; p = .05; HSD (3,56) = 6.28; p = .01; respectively], replicating Diamond and Taft (1975). Both highs and mediums reported significantly greater emotional extraversion than the lows [HSD (3,56) = 4.53; p = .01; HSD (3,56) = 3.56; p = .05; respectively]; this finding did not replicate Diamond and Taft (1975), who did not find a relationship between hypnotizability and this subscale. It should be noted that only two of the subscales from the Taft Experience Questionnaire yielded significant findings in both the present study and in Diamond and Taft (1975) (Dissociated Experiences and Belief in the Supernatural).

Cognitive Control of Sleep subscale of the Sleep Questionnaire (Evans, 1982) [F (2,56) = 4.63; $p \leq .02$] and the Dream Questionnaire (Gibson, 1985) [F 2,56) 5.76;

$p \leq .01$].

High hypnotizable subjects reported having significantly more cognitive control over their sleep patterns than did the medium subjects [HSD (3,56) = 2.80; p = .05]. The highs endorsed also significantly more of the statements on the Dream Questionnaire than the lows [HSD (3,56) = 1.93; p = .01]. Item-by-item responses on this latter scale are presented later in the results section.

Social Anxiety Subscale of the Public and Private Self-Consciousness Scale (Fenigstein et al., 1975) [F (2,56) = 4.16; $p \leq .03$].

Low hypnotizable subjects reported greater social anxiety than the highs [HSD (3,56) = 4.17; p = .05]. Although the author is unaware of any published data concerning the relationship between hypnotizability and this self-report measure of social anxiety, Balthazard (personal communication, August 16, 1985) indicated a similar finding with his subscale data. Further, it has been argued that anxiety in the hypnotic context may interfere with a person's responsiveness to hypnosis (e.g., Clarke & Jackson, 1983). This type of anxiety is generally seen in terms of transient negative preconceptions and expectations of hypnosis (Barber, 1964; Diamond, Gregory, Lenney, et al., 1974). J. Hilgard's (1970/1979) interview data, however, suggested that an, "apprehensiveness over any new and different experience" may be inimical to hypnosis (p. 270). The present find-

ings suggest further that such apprehensiveness may be more particular to new experiences in social contexts, such as hypnosis.

In summary, all variables that demonstrated a significant ANOVA were considered as candidates for discriminant analysis. The following section presents considerations for further reduction of the variable pool.

Further Considerations for Reducing the Variable Pool

Due to inconsistency of results across studies concerning the relationship between hypnotizability and self-reported imagery, the QMI and the VVIQ were not included in the discriminant analyses. The reasons for this unreliability are hypothesized to be partially due to the decreasing test-retest reliability of the various self-report imagery scales over time. This observation led White, Sheehan, and Ashton (1977) to conclude that subjects do not only respond to the images evoked by the test items but respond also to potential confounds such as "halo" effects, demand characteristics, and question order and format (see also White, Ashton, & Law, 1978). Perhaps the most serious criticism of these scales, however, is that they convey, at least implicitly, the desirability of "good" imagery. Consideration of these criticisms and of the present results with the QMI that add to this picture, led to the decision that these inventories were not sufficiently reliable for the present purposes.

Similarly, the present results with the Emotional Extraversion subscale were thought to be equivocal since

experimental results concerning the relationship between hypnotizability and emotional extraversion, as measured by other inventories, has been unreliable (See Bowers, 1976). Further, in the original study, Diamond and Taft (1975) failed to find a relationship between the subscale and hypnotizability. With the large number of variables in the present study it was expected that some results would meet conventional levels of statistical significance by chance alone; the present finding with the Emotional Extraversion Subscale appears to be a likely candidate for this type of spurious result and was therefore not included in the discriminant analysis.

Since some support was found for Evans' (1982) hypothesis that the controlled absorption subscale of the PEQ may discriminate subjects' hypnotizability levels better than the automatic subscale, it was decided to enter them into the discriminant analyses separately. Since the Cognitive Control of Sleep subscale contains only three items and since the Dream Questionnaire is still being developed, it was felt that the most prudent approach was to add these two variables to yield a single new variable for purposes of the discriminant analysis. This new Sleep-Dream variable yielded significant differences among the susceptibility group means [$F_{(2,56)} = 5.42$; $p < .01$]; highs ($\bar{x} = 21.10$; S.D. = 6.47) differed significantly from the lows ($\bar{x} = 17.00$; S.D. = 4.40) and from the mediums ($\bar{x} = 16.16$; S.D. = 3.82) [HSD (3,56) =

3.92; p = .05]. Further both measures loaded uniquely on the same factor in a principal components analysis that will be presented in a later section. For these reasons, this approach appeared to offer the best chance of reliability for future studies.

Finally, selection of variables for discriminant analysis on the basis of univariate results can facilitate interpretation of discriminant results. It can be argued, however, that this strategy does not take full advantage of the complexity of the multivariate relationship between the predictors and the grouping variable. One way around this problem is to perform a Multivariate Analysis of Variance (MANOVA) stepdown procedure (Gabriel, 1979). Each variable is entered into the analysis in descending order of hypothesized importance; the analysis is equivalent to analysis of covariance, where differences among the group means are evaluated for each predictor under consideration with all previous variables covaried out. Thus, in the present case, the eight variables that had shown a significant ANOVA and were considered reliable were entered as a covariate block. The remaining variables were entered in a predetermined order; differences among the group means on the first variable were thus evaluated first; it was then added to the eight variable block which acted as a covariate for the second variable and so on. The overall strategy of order of variable entry was to give priority to variables that had demonstrated significant differences among the group means in

previous studies but not in the present one and/or appeared to be of particular interest theoretically. None of the variables, however, demonstrated significant differences in the analysis. Thus, only the original eight variables were retained for the discriminant analyses.[10]

Statistical Assumptions of Discriminant Analysis

The most important statistical assumption of discriminant analysis is that of univariate and multivariate normality of the scores on the predictor variables within the entire sample and within each group. In order to test for any outliers on the predictor variables, separate analyses were run for all predictors for each susceptibility group and for the total sample. None of the subjects in the present sample presented scores on any of the predictor variables so deviant as to cause them to score as univariate or as multivariate outliers on any of these analyses. Thus, no subject's data presented a threat to the statistical robustness of the results.

A further assumption of discriminant analysis is that the relationships between all predictors do not depart greatly from linearity. Violation of this assumption is less serious, however, since it simply leads to reduced power rather than increase in Type I error (Tabachnick & Fidell, 1983). Regression analyses were performed between all pairwise combinations of the predictors. Examination of the residual scatterplots of predicted values for each of these analyses indicated that this assumption had not

been violated.

A final assumption of homogeneity of variance-covariance matrices was not of particular concern for the present study since the n's for each group were approximately equal. Further, results of Box's M test and examination of the discriminant plots produced by the various discriminant analyses that will be presented later indicated that this assumption had not been violated. Thus, the present data set was deemed appropriate for discriminant analysis without any data transformation. Before presenting the discriminant results from the present study, however, the extent to which the discriminant equation from Nadon (1983) replicated to the present sample is presented.

Replication of Discriminant Results from Nadon (1983)

A major test of a discriminant analysis is the extent to which it replicates to another sample. Thus, the first step of the present study was to classify subjects in the present sample on the basis of the classification equations derived from Nadon (1983). The three variables that were found to significantly predict subjects' hypnotizability classifications in the earlier study were Sheehan's (1967) shortened version of the Betts' QMI, the PICS (Isaacs, 1982), and errors on the interference card (Card C) of the Stroop Color and Word Test (Stroop, 1935). Together, these three variables predicted 61.67% of the original sample correctly (60%, 50%, and 75% of the highs, mediums, and lows, respectively) (Binomial $p < .01$). Further, a single statistically significant discriminant

function, of a possible two, accounted for 50.41% of the grouping variance [χ^2 (4) = 39.16; $p < .0001$]. [11]

Table 5 presents the weighting coefficients of each predictor for the classification equations of the earlier study. Three classification scores for each subject in the present study were calculated by multiplying his/her score on each of the three predictors by its weighting coefficient and adding these values to the appropriate constant. Subjects were classified into the group that yielded the highest classification score. In this manner, 42.37% of the subjects in the present sample were classified correctly (40.0% of the highs, 36.84 % of the mediums, and 50.0% of the lows). This percentage of correct classification, however, did not exceed chance levels (Binomial $p > .05$).

INSERT TABLE 5 ABOUT HERE

Accordingly, the data from Nadon (1983) were reanalyzed. Based on the univariate results in the present study, it was thought that the failure to replicate the discriminant results was due partially to the fluctuation of the group scores on the QMI between samples. Further, the present study failed to replicate the marginal univariate results obtained with the Stroop error variable in the earlier study. Consequently, only the PICS was retained for reanalysis since sample variation was equally distributed among the groups and since the format of this

TABLE 5

Classification Function Coefficients
Derived from Nadon (1983)

	Susceptibility Group		
Variable	Low	Medium	High
QMI	.1939281	.1507970	.1279702
PICS	.4762570	.5478182	.6875684
Stroop	.6287440	.4420329	.2734382
Constant	-15.30837	-11.04007	-10.76092

measure avoids some of the major problems of other questionnaires that attempt to tap imagic processes.

On reanalysis, two variables were found to significantly predict subjects' classifications. These were the TAS and the PICS; the same correct classification rate was obtained with this analysis as had been obtained with the QMI, PICS, and the Stroop in the original analysis. Sixty-one.67 % of the original sample sample (85.0%, 45.0 %, and 55.0% of the highs, mediums, and lows, respectively) were classified correctly by these two variables (Binomial $p < .01$). Further, the single significant discriminant function [χ^2 (3) = 27.50; $p < .001$] generated by the variables accounted for 42.25% of the grouping variance.[18]

Three classification equations were derived also for this analysis in the manner that has already been described. The weighting coefficients and constants for each of the three equations are presented in Table 6. Using these equations, 49.15% of the present sample were predicted correctly (50% highs, 42.11% mediums, and 55% lows) (Binomial $p < .05$).

INSERT TABLE 6 ABOUT HERE

Thus, although the percentage of correct prediction lowered by 11% from the original sample to the replication sample, the equation generated by the earlier data was able to predict the new sample significantly above chance. This slight reduction in correct classification is not

TABLE 6

Classification Function Coefficients
Derived from Nadon (1983): Analysis 2

	Susceptibility Group		
Variable	Low	Medium	High
TAS	.6375086	.7960720	.9110326
PICS	.1476122	.2319823	.3680679
Constant	-7.679128	-11.85357	-16.63289

worrisome since some shrinkage is to be expected with a new sample, as would be expected with a multiple regression analysis. Further, when the two variables were allowed to generate their equation based on the present sample, a 49.15% correct classification was again achieved. This suggests that the shrinkage from one sample to the other was due not so much to the inexactness of the original equation as much as to chance variation from one sample to another. Similarly, the discriminant function generated by this analysis [χ^2 (3) = 15.37; $p < .01$] accounted for 24% of the grouping variance (canonical correlation = 0.49).

Discriminant Analyses of the Variables in the Present Sample

Analysis 1.

Based on the results of the one-way ANOVAs and considerations of reliability, eight variables were included in the initial discriminant analysis. These are presented in Table 7.

INSERT TABLE 7 ABOUT HERE

Since the discriminant equation with the TAS and the PICS from the earlier study replicated to the present sample, this first analysis involved "forcing" these two variables into the analysis first and second, respectively. That is, the program was instructed to enter these variables into the analysis before all others, regardless of their level of statistical significance, providing that

TABLE 7

Variables Entered into the Discriminant Analysis

Tellegen Absorption Scale (TAS)

Preference for an Imagic Cognitive Style Test (PICS)

Personal Experiences Questionnaire Controlled Absorption Subscale (PEQ:C)

Personal Experiences Questionnaire Automatic Absorption Subscale (PEQ:A)

Taft Belief in the Supernatural Subscale

Taft Dissociated Experiences Subscale

Sleep-Dream Score*

Social Anxiety Subscale

*This score was derived by adding the Cognitive Control of Sleep Mentation score to the Dream score.

they satisfied the F-to-enter criterion at their respective steps of the analysis. Further, the program was instructed to remove them if they served to reduce the discriminatory power once other variables had entered the analysis.[19]

The six other variables were allowed to compete for entry once the TAS and the PICS had entered. A stepwise method that maximized Rao's V was used to identify the best linear combinations (discriminant functions) of the predictor 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. Thus, at each step, the variable that is selected is the one that can account for the greatest proportion of variance that has not be accounted for by the variables already entered. In this manner, the analysis was designed to see if some combination of the remaining predictors could account for grouping variance that had not been explained by the TAS and the PICS.

Six predictors emerged from this analysis. Both the TAS and the PICS accounted for a significant proportion of the grouping variance at steps 1 and 2, respectively. Thus, the PICS was able to account for significant variance at step 2 that had not been accounted for by the TAS at step 1. Further, the Sleep-Dream and the Belief in the Supernatural variables each produced significant increases

in V at the third and fourth steps, respectively. Finally, the Social Anxiety and the Controlled Absorption variables each accounted for nonsignificant increases in V.

Two discriminant functions (of a possible two) were generated by the six predictor variables. The first [χ^2 (7) = 25.08; $p < .001$] and second [χ^2 (5) = 10.94; $p < .053$] functions accounted for 72.49% and 27.51% of the discriminatory power, respectively. Further, canonical correlation values of 0.61 and 0.43 were found for the functions, indicating that the first and second functions accounted for 37.21% and 18.49% of the grouping variance. The order of entry of the predictor variables, the corresponding F values, changes in V, and the overall percentage of correct classification for each step of the analysis are presented in Tables 8 and 9.

INSERT TABLES 8 AND 9 ABOUT HERE

Whereas canonical correlations provide a measure of the degree of association between the discriminant functions and the grouping variable, prediction of group membership provides a measure of the adequacy of the discriminant functions; this is determined by examination of the percentage of correctly classified cases (subjects). Table 9 illustrates that by step 6, 69.49% of the subjects were classified correctly, as opposed to 49.15% afforded by the TAS and the PICS at step 2, a statistically significant increase [McNemar's repeated-measures chi-square test for change: χ^2 (1) = 5.50; $p < .05$]. The contribu-

TABLE 8

Order of Entry of the Predictor Variables
Into the Discriminant Analysis
(TAS and PICS "Forced")

Step	Predictor
1	Tellegen Absorption Scale
2	Preference for an Imagic Cognitive Style Test
3	Sleep-Dream Score
4	Taft Belief in the Supernatural Subscale
5	Social Anxiety Subscale
6	Controlled Absorption Subscale of the PEQ

TABLE 9

Step-by-Step Percentage of Correct Classification for the Discriminant Analysis (TAS and PICS "Forced")

Step	F (2,56)	p <	Change in V	p =	Overall % of Correct Classification
1	6.46	.005	12.92	.002	50.85
2	4.64	.025	6.93	.031	49.15
3	4.68	.025	10.99	.004	54.24
4	4.33	.025	6.62	.037	62.71
5	3.83	.05	5.03	.081	61.02
6	3.40	.05	3.71	.157	69.49

tion of the total set of six variables must be interpreted cautiously, however, since neither the Social Anxiety nor the Controlled Absorption Subscales contributed significantly to the separation of the groups at its respective step. Accordingly, the remaining part of this section will address the first four predictor variables only.

The first four variables generated two discriminant functions. The first [χ^2 (5) = 21.32; $p < .001$] and second [χ^2 (3) = 9.49; $p < .025$] functions accounted for 71.58% and 28.42% of the discriminatory power, respectively. Further, canonical correlation values of 0.57 (32.49% of the variance) and 0.40 (16.00% of the variance) were found for the the first and second functions, respectively. At step 4, 62.71% of the subjects were classified correctly, a nonsignificant increase over the 49.15% at step 2 of the analysis [McNemar's test: χ^2 (1) = 3.06; $p < .10$].[14]

The Sleep-Dream (Step 3) and the Taft Belief in the Supernatural (Step 4) variables are nevertheless important since they significantly increased the separation among the discriminant function scores. Further, since Tellegen (1978/1979) has argued that the interaction between predictor variables should be considered when attempting to predict hypnotizability, an additional analysis was performed in which the various four, three and two-way interactions (cross-products) between the four predictors were allowed to compete for entry following the fourth step.

All of these newly formed variables produced F-to-Enter values of less than "1" at that step and thus were unable to account for new variance in the subject groupings. This indicates that the linear combination of the four predictors provides the maximum amount of information concerning subjects' susceptibility groupings in the present context.

Table 10 presents step-by-step subject classifications for each susceptibility group. Comparison of the subjects correctly classified at steps 2 and 4 of the analysis indicate that, as in Nadon (1983), the TAS and the PICS served primarily to classify correctly the low and high susceptible subjects. Fifty-five percent of both the low and the high hypnotizable subjects but only 36.8% of the medium subjects were classified correctly at step 2. The addition of the Sleep-Dream and Belief in the Supernatural variables in the present study served primarily to increase the correct prediction rate of the medium subjects over that afforded by the absorption and preferred thinking style inventories. At step 4 of the analysis, the percentage of correctly classified mediums increased to 73.70%; the major portion of this increase was due to the correct reclassification of medium subjects who, at Step 2, had been misclassified as highs. Further, the correct classification rate for the highs increased slightly to 65% and decreased slightly for the lows to 50%. The weighting coefficients of each predictor for the three classification equations are presented in Table 11.

INSERT TABLES 10 AND TABLE 11 ABOUT HERE

Group centroids (discriminant function mean scores) were established for each susceptibility group; each of these represents the average location of a case (subject) within his/her group in the discriminant function space. Comparison of the group centroids indicates how far apart the groups are along each of the discriminant dimensions (functions). Further, the group centroids are presented in standard form (z scores). The group centroids for the low, medium, and high susceptible groups, respectively, were -0.22888, -0.63488, and 0.83201 for the first function and -0.69607, 0.27431, and 0.43547 for the second function. Thus, the first discriminant function served primarily to separate the high hypnotizable subjects from the mediums and the lows and the second function served primarily to separate the lows from the mediums and the highs. Further, results of Box's M test revealed that the assumption of equality of group covariance matrices had not been violated ($p < .41$).

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 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 away from the group cen-

TABLE 10

Prediction of Group Membership for Each Step of the Discriminant Analysis (TAS and PICS "Forced")

	ACTUAL MEMBERSHIP*								
	Low			Medium			High		
Step	Predicted Membership			Predicted Membership			Predicted Membership		
	Low	Med	High	Low	Med	High	Low	Med	High
1	55	20	25	21	42	37	20	25	55
2	55	25	20	21	37	42	20	25	55
3	55	30	15	21	53	26	10	35	55
4	50	40	10	16	74	11	15	20	65
5	45	40	15	21	68	11	15	15	70
6	60	25	15	21	68	11	5	15	80

*Values are presented in percentages; percentages for the medium susceptible subjects are rounded to the nearest integer value.

TABLE 11

Classification Function Coefficients
Derived from the Present Sample
(TAS and PICS "Forced")

	Susceptibility Group		
Variable	Low	Medium	High
TAS	.1277050	.3107411	.1195978
PICS	-.0561428	-.0424533	.0980616
Sleep-Dream	.4981542	.3844701	.6133788
Taft/Super-Natural	.3967677	.3612903	.5118679
Constant	-10.86629	-12.38162	-17.20764

troid as the case being considered was calculated for each misclassified subject; the higher this probability, the more "typical" is the subject's score of the group into which he/she has been misclassified. These probabilities are presented in Table 12.

INSERT TABLE 12 ABOUT HERE

For the most part, the probabilities listed in Table 12 are relatively high, indicating that most of the misclassified subjects are not "borderline" cases. Indeed, two subjects (14 and 50) scored as protypical examples of the groups into which they had been misclassified; both presented probabilities of .99. Subject 14, a low susceptible, presented a pattern of scores on the four predictor variables that was protypical of the medium group and subject 50, a high susceptible, presented a pattern that was protypical of the low group. Thus, it does not appear that these misclassifications were due primarily to lack of measurement precision on the predictor variables. Further, the SHSS:C scores of the misclassified subjects did not differ from subjects in the same actual group who had been classified correctly [t (18) < 1.0; p > .05; t (17) = 1.90; p > .05; t (18) < 1.0; p > .05; lows, mediums, and highs, respectively]. Rather, these results suggest that other inventory and/or task measures of hypnotizability are required in order to explain the remaining variance.

TABLE 12

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

Misclassified Subject No.	Actual Group Membership	Predicted Group Membership	p	SHSS:C
3	Low	Med	.92	0
7	Low	Med	.81	1
8	Low	Med	.74	4
9	Low	Med	.61	1
13	Low	High	.81	1
14	Low	Med	.99	2
17	Low	Med	.89	0
18	Low	Med	.23	1
19	Low	Med	.05	4
20	Low	High	.94	1
23	Med	High	.89	5
24	Med	Low	.53	5
26	Med	High	.68	7
33	Med	Low	.82	6
36	Med	Low	.38	7
45	High	Med	.62	10
50	High	Low	.99	10
51	High	Med	.54	12
54	High	Med	.85	9
55	High	Med	.85	9
59	High	Low	.90	10
60	High	Low	.25	12

Further interpretation of the discriminant functions can be derived by examination of the correlations (loadings) between the predictors and each of the functions. These are presented in Table 13. After varimax rotation of the discriminant functions, the Sleep-Dream score and the TAS loaded on the first and the second functions, respectively. This indicates that the first function, which served primarily to discriminate the high susceptible subjects from the lows and mediums, can most appropriately be labelled a "sleep" dimension. Similarly, the second function, which primarily separated the low susceptible subjects from the mediums and the highs, can be labelled an "absorption" dimension. Further, both functions were related to the PICS and to the Taft Belief in the Supernatural Subscale, indicating that subjects' preferred thinking style and beliefs concerning supernatural phenomena are related to both dimensions. These function loadings, however, do not represent a predictor's unique contribution to the functions' discriminatory power. That is, they are analogous to "raw" correlations rather than semi-partial correlations in multiple regression (Tabachnick & Fidell, 1983).[10]

INSERT TABLE 13 ABOUT HERE

One technique that has been recommended as a further check for interpretation of predictor variables' contributions to the discrimination of the groups is to perform

TABLE 13

Rotated Correlations Between Both Discriminant Functions and the Predictors (TAS and PICS "Forced")*

Predictor	Function 1	Function 2
Sleep-Dream Score	.66	--
Tellegen Absorption Scale	--	.92
Preference for an Imagic Cognitive Style Test	.36	.72
Taft Belief in the Supernatural Subscale	.43	.53

*Variable loadings below .30 are not presented.

additional discriminant analyses contrasting each group with all others (Tabachnick & Fidell, 1983). In this manner, inspection of univariate F-to-Enter values prior to the first step of the analyses provides information concerning the relative importance of each predictor individually in the discrimination of each group versus all the others. Conversely, F-to-Remove values at the last step of the analysis provide information of the relative importance of each predictor once the contribution of the other predictors has been partialled out. These values are presented in Table 14 for the three contrast discriminant analyses.

INSERT TABLE 14 ABOUT HERE

Relative to the other predictors, the TAS and the PICS were the most important variables in the discrimination between the lows and the two other groups both individually and once the other variables had entered the analysis. When the highs were contrasted with the lows and the mediums, three predictors were found to contribute approximately equally: Sleep-Dream, PICS, and Taft Belief in the Supernatural. Again, each of these variables was important to this discrimination on an individual basis and once the other variables had been entered.

In summary, the emerging picture is that for most subjects, relatively high absorption abilities and a preference for an imagic cognitive style are a necessary

TABLE 14

Discriminant Analyses Contrasting Each Group with Both of the Other Groups

LOWS VERSUS MEDIUMS AND HIGHS

Predictor	F-to-Enter (Step 0)	F-to-Remove (Step 4)
TAS	12.50	1.55
PICS	10.10	2.38
Sleep-Dream	1.38	0.00
Taft/Supernatural	6.40	0.42

MEDIUMS VERSUS LOWS AND HIGHS

TAS	1.52	8.03
PICS	0.03	1.35
Sleep-Dream	4.23	7.03
Taft/Supernatural	0.44	2.42

HIGHS VERSUS LOWS AND MEDIUMS

TAS	5.23	1.76
PICS	11.23	6.92
Sleep-Dream	10.61	6.00
Taft/Supernatural	10.25	4.40

condition for at least medium hypnotic susceptibility. High hypnotic susceptibility, in turn, appears to be differentiated from medium responsiveness primarily in terms of the sleep dimension, although a belief in supernatural and related phenomena and a somewhat more pronounced preference for an imagic cognitive style appear to be important also. (The Sleep Dimension is examined in greater detail in a later section).

Finally, although the present analysis circumvented some of the problems associated with stepwise techniques, it can be argued that forcing the TAS and the PICS imposed undue constraints on the analysis, especially since all variables were seen to be important predictors. Accordingly, all of the variables were allowed to compete for entry in a second analysis.

Analysis 2.

When all variables were allowed to compete for entry, the same six variables were found that had emerged from Analysis 1, although in a different order. Further, only three variables (as opposed to four variables in Analysis 1) produced significant increases in Rao's V; these were (in order of entry): PICS, Sleep-Dream, and the Controlled Absorption Subscale of the PEQ. The Social Anxiety Subscale, Taft Belief in the Supernatural Subscale, and the TAS entered at the fourth, fifth, and sixth steps, respectively.[14]

Since the six predictors are the same as the ones

that were found for Analysis 1, the resulting discriminant functions are identical to the first analysis and are not presented here. The entry of the variables into the analysis is presented in Tables 15 and 16, however, since it differs from Analysis 1. Step-by-step classification information for each susceptibility group is presented in Table 17.

INSERT TABLES 15, 16, AND 17 ABOUT HERE

The remaining part of this section will address the first three predictors only. These variables generated two discriminant functions. The first [χ^2 (4) = 19.59; $p < .001$] and second [χ^2 (2) = 7.89; $p < .02$] functions accounted for 73.51% and 26.49% of the discriminatory power, respectively. Canonical correlation values of 0.55 (30.25% of the variance) and 0.37 (13.69% of the variance) were found for the first and second functions, respectively. At step 3, 54.24% of the subjects were classified correctly (Binomial $p < .05$).[17]

The group centroids for the low, medium, and high susceptible subjects for the first and second discriminant functions, respectively, were -0.77937, 0.27647, 0.51673, and -0.19242, -.048295, 0.65122. Thus, the first discriminant function served primarily to separate the lows from the mediums and the highs; the second function separated the highs from the lows and the mediums. This differed from Analysis 1 where the reverse was found. The

TABLE 15

Order of Entry of the Predictor Variables
Into the Discriminant Analysis
(All Variables Compete)

Step	Predictor
1	Preference for an Imagic Cognitive Style Test
2	Sleep-Dream Score
3	Personal Experiences Questionnaire Controlled Absorption Subscale
4	Social Anxiety Subscale
5	Belief in the Supernatural Subscale
6	Tellegen Absorption Subscale

TABLE 16

Step-by-Step Percentage of Correct Classification for the Discriminant Analysis (All Variables Compete)

Step	F (2,56)	p <	Change in V	p =	Overall % of Correct Classification
1	7.18	.005	14.36	.001	50.85
2	5.50	.001	9.31	.010	52.54
3	5.11	.001	8.92	.012	54.24
4	4.24	.025	4.53	.104	54.24
5	3.64	.05	3.62	.164	61.02
6	3.40	.05	5.45	.066	69.49

TABLE 17

Prediction of Group Membership for Each Step of the Discriminant Analysis (All Variables Compete)

Step	ACTUAL MEMBERSHIP*								
	Low			Medium			High		
	Predicted Membership			Predicted Membership			Predicted Membership		
	Low	Med	High	Low	Med	High	Low	Med	High
1	60	15	25	42	16	42	5	20	75
2	55	25	20	37	37	26	5	30	65
3	50	30	20	26	47	26	15	20	65
4	60	25	15	26	42	32	20	20	60
5	60	20	20	26	53	21	15	15	70
6	60	25	15	21	68	11	5	15	80

*Values are presented in percentages; percentages for the medium susceptible subjects are rounded to the nearest integer value.

pattern of correlation between the predictors and the functions, however, remained the same. The PICS and the Controlled Absorption Subscale loaded most highly on the first function and thus contributed mostly to the separation of the lows from the other two groups. The Sleep-Dream predictor loaded most highly on the second function and thus contributed mostly to the separation of the highs from the two other groups, although the PICS contributed also. Further, Box's M test revealed that the assumption of equality of group covariance matrices had not been violated ($p < .08$). The rotated correlations between the predictors and the discriminant functions is presented in Table 18; the classification coefficients are presented in Table 19.

INSERT TABLES 18 AND 19 ABOUT HERE

In summary, results of Analysis 2 confirm the main findings of Analysis 1. The construct of "absorption" emerged from both analyses as being important in the statistical isolation of low hypnotizable subjects. Further, examination of the Controlled Absorption Subscale of the PEQ and the TAS suggests that the two scales measure essentially the same construct, both in terms of face validity and in statistical terms. The Sleep-Dream score was important in both analyses in the statistical isolation of the high hypnotizable subjects. Finally, the PICS contributed primarily to the separation of lows from

TABLE 18

Rotated Correlations Between Both Discriminant Functions and the Predictors (All Variables Compete)*

Predictor	Function 1	2
Controlled Absorption Subscale	.86	--
Preference for an Imagic Cognitive Style Test	.64	.43
Sleep-Dream Score	--	.85

*Variable loadings below .30 are not presented.

TABLE 19

Classification Function Coefficients
Derived from the Present Sample
(All Variables Compete)

	Susceptibility Group		
Variable	Low	Medium	High
PICS	.0109630	.0673607	.1617132
Sleep-Dream	.5331722	.4308241	.6318737
PEQ:C	1.076255	1.586697	1.446487
Constant	-8.779396	-10.88445	-14.56176

the mediums and the highs, although it contributed also to the separation of highs from the lows and the mediums.

Cluster Analysis

Cluster analysis involves classifying subjects into groups in which the members are more alike to each other, on the basis of various predetermined measures, than they are to members of the other groups, or clusters (Green, 1978). This is the obverse question to what is asked in discriminant analysis where subjects are already classified and the question to be answered is which variables will best fit the a priori classification.

The state-of-the-art in cluster analysis allows the technique to be used mostly for descriptive purposes. For various reasons described by Green (1978), tests of statistical significance of cluster analysis have not been adequately developed. Nevertheless, it can provide information in the present context concerning how subjects are grouped on the basis of the predictor variables without imposing the a priori susceptibility classification.

All subjects in the present sample were clustered on the basis of their scores on the four variables that emerged as significant predictors from Discriminant Analysis 1: TAS, PICS, Sleep-Dream, and Belief in the Supernatural. The data were analyzed by the K-Means Clustering Method (Engelman & Hartigan, 1981). All subjects were considered to belong to one cluster at the first step of the analysis. This cluster was broken down in successive

steps until the optimal number of clusters was found. In this manner, the analysis served to estimate how many groups of subjects would be expected to occur in the present sample on the basis of the four predictor variables.

Four main clusters of subjects emerged from the analysis; although one additional cluster was found, it will be given only minor consideration since it contained only two subjects (both highs). Nine of the 15 subjects in Cluster 1 were highly hypnotizable; two were medium hypnotizable subjects; three were low hypnotizable subjects. Further, two of the three lows and one of the two mediums in the cluster had been misclassified as highs by the discriminant analysis. Seven of the 11 subjects in Cluster 2 were of medium hypnotizability; four subjects were low hypnotizable subjects; no highs were grouped in this cluster. Further, two of the four lows in the cluster had been misclassified by the discriminant analysis as mediums. Eight of the 11 subjects in Cluster 4 were lows; the three other subjects (one medium and two highs) had been misclassified as lows by the discriminant analysis. Thus, Clusters 1, 2, and 4 are most typical of high, medium, and low hypnotizable subjects, respectively. Cluster 5 presented a mixed pattern (seven highs, eight mediums, and five lows). Fifteen of the 21 subjects in the cluster, however, had been classified as mediums by the discriminant analysis (two of the seven highs, seven

of the eight mediums, and all five lows). Finally, both highs in Cluster 3 had been classified correctly by the discriminant analysis. Table 20 presents the classification of subjects by susceptibility groups into the 5 clusters.

INSERT TABLE 20 ABOUT HERE

Table 20 illustrates also that the vast majority of the high hypnotizable subjects were classified into either Cluster 1 or Cluster 5. Similarly, most of the mediums were classified into either Cluster 2 or Cluster 5. In contrast, the low hypnotizable subjects were approximately evenly spread over Clusters 1, 2, 4, and 5. Examination of the mean scores on the predictor variables for each cluster can provide a "profile" of the cluster members; these values are presented in Table 21.

INSERT TABLE 21 ABOUT HERE

Cluster 1 (mostly high hypnotizable subjects) presents a pattern of high average scores on all four variables. Cluster 2 (mostly medium hypnotizable subjects) presents midrange scores on TAS and low relative scores on the other three variables. Cluster 5 (mostly highs and mediums) presents also a pattern of midrange scores on the TAS and low relative scores on the Sleep-Dream and on the Belief in the Supernatural variables but a high average score on the PICS. These results support the hypothesis

TABLE 20

Cluster Classification of
Subjects from Each Susceptibility Group
(Five Cluster Analysis)

Susceptibility Group	Cluster*				
	1	2	3	4	5
[illegible]	3	4	0	8	5
Medium	2	7	0	1	9
High	9	0	2	2	7

*Values presented represent number of subjects.

TABLE 21

Measures of Central Tendency
for the Four Predictor Variables
For Each Cluster*

	Variable			
Cluster	PICS	TAS	Taft/ Supernatural	Sleep-Dream
1	10.93 (5.65)	29.79 (3.10)	33.93 (3.90)	23.00 (4.39)
2	1.00 (4.53)	23.45 (3.39)	21.55 (4.64)	16.18 (3.79)
3	17.00 (5.00)	30.00 (4.00)	22.00 (2.00)	30.00 (3.00)
4	2.45 (4.29)	12.09 (3.85)	19.27 (5.85)	15.73 (4.73)
5	14.29 (3.06)	25.86 (3.43)	24.76 (3.68)	16.00 (3.06)

*Cluster Means are indicated first, under which their Standard Deviations are indicated in parentheses.

presented earlier that for most subjects, relatively high absorption abilities may be necessary for at least medium hypnotizability and that a somewhat more pronounced preference for an imagic cognitive style is characteristic of highs, as opposed to medium, hypnotizable subjects. Further, they indicate that the Sleep-Dream and the Belief in the Supernatural variables serve to distinguish some of the high hypnotizable subjects from the mediums. The lack of a clustering pattern for the low hypnotizable subjects suggests that a variety of reasons underly these subjects' low responsiveness to hypnotic procedures, at least in experimental contexts. That most of the subjects in Cluster 4 were lows, however, indicates also that low scores on all variables coincides with low hypnotizability for most subjects.

In summary, these results suggest that four patterns of self-reports (i.e., four groups) exist in the present sample. They suggest also, however, that hypnotizability classifications are a fair approximation of the four clusters. Further, they support J. Hilgard's (1970/1979) hypothesis of "multiple pathways" to hypnotizability. At least two patterns were found to typify high hypnotizable subjects. One of these patterns (Cluster 5), however, was also typical of some of the medium subjects. Thus the discriminant results that suggested the need for other variable(s) in order to more clearly differentiate subjects according to hypnotizability are supported by these

results.

Principal Components Analysis of the Variables that Demonstrated Significant ANOVAs

These data were analyzed in order to provide an empirical summary of the variables that demonstrated significant differences among the group means. Principal Components Analysis may be used profitably for this purpose, despite the relatively small sample size in the present study, providing that the number of subjects notably exceeds the number of factors. Further, since Principal Components Analysis may be thought of as analyzing variance among variables, as opposed to Factor Analysis which may be thought of as analyzing covariance, it was the analysis of choice (Tabachnick & Fidell, 1983). Four factors emerged from the analysis, accounting for 75.57% of the variance in subjects' scores. In order to facilitate interpretation, the factor solution was rotated by an oblique rotation method, allowing for the factors to be correlated. Further, the direct quartimin method was used in order to provide, "maximum flexibility and minimum ambiguity" of the factor solution (Tabachnick and Fidell, 1983; p. 402). Table 22 presents the rotated loadings between the variables and the factors and Table 23 presents the correlations between the rotated factors.

INSERT TABLES 22 AND 23 ABOUT HERE

Examination of Table 22 indicates that the TAS and the PEQ:C loaded on two factors; their loadings on Factor

TABLE 22

Rotated Factor Loadings
of the Variables that Demonstrated
Significant ANOVAS
(Principal Components Analysis)[a,b]

Variable	Factor 1	2	3	4
PEQ:A	.90	--	--	--
Taft/Dissociation	.89	--	--	--
TAS	.71	.30	--	--
PEQ:C	.62	.32	--	--
Taft/Supernatural	.60	--	--	--
Marks' VVIQ	--	.93	--	--
Betts' QMI	--	-.91	--	--
Evans' Cognitive Control of Sleep Mentation	--	--	.87	--
Gibson's Dream	--	--	.79	--
Social Anxiety	--	--	--	.89
Taft/Extraversion	.33	--	-.40	-.65
PICS	.42	--	--	-.37

[a]Columns appear in decreasing order of variance explained by the factors.

[b]Factor loadings below .30 are not presented.

TABLE 23

Factor Correlations for the Rotated Factors
(Principal Components Analysis)

	Factor			
Factor	1	2	3	4
1	1.00			
2	.47	1.00		
3	.25	.18	1.00	
4	-.25	-.24	.02	1.00

2 are low, however, and do not present an obstacle to interpretation. Indeed, interpretation of the factor solution is fairly straightforward since most of the loadings are either in the "very good" or "excellent" range (i.e., > 0.63 or > 0.71) (Comrey, 1973; cited in Tabachnick & Fidell, 1983). Thus, the factors can most appropriately be labelled "absorption" (Factor 1), "self-reported imagery" (Factor 2), "sleep-dream" (Factor 3), and "social anxiety" (Factor 4). This pattern lends support to the importance of the two dimensions (absorption and sleep-dream) that emerged from the discriminant analyses and to the potential importance of social anxiety as a separate dimension.

Table 23 indicates that Factor 1 ("absorption") correlated moderately with Factor 2 ("self-reported imagery") and weakly with the other two factors. This finding provides an additional reason (other than concerns of reliability) for the exclusion of the QMI and the VVIQ from the discriminant analyses since the absorption variables appear to be measuring to some extent similar processes. The variance that the absorption and the self-reported imagery factors share may reflect an ability to derive pleasure from sensory experiences since most items on the absorption scales attempt to tap these types of experiences and since the imagery self-reports attempt to tap this ability directly. Further, the variance that these two factors do not share may reflect the confounds

that have been associated with self-reported imagery such as demand characteristics and halo effects.

The two variables that demonstrated a complex pattern require comment. The Emotional Extraversion Subscale's loadings on the "absorption" and on the "sleep-dream" factors are difficult to interpret, although the loadings are relatively small. Further, it appears to be most related to "social anxiety". The complex pattern demonstrated by the subscale, however, suggests that it is tapping a number of constructs and lends support to the hypothesis that the significant differences among the group means observed on this variable are most probably spurious. Further, its loading on "social anxiety" does not necessarily suggest that the significant differences observed among the susceptibility groups on the Social Anxiety Subscale are spurious. Although empirical work has clearly demonstrated the lack of a relationship between emotional extraversion and hypnotizability (Bowers, 1976), more data are needed before firm conclusions can be drawn concerning the potential role that social anxiety may play in hypnotizability.

The complexity demonstrated by the PICS variable is more easily interpreted. It loaded approximately equally on the "absorption" and on the "social anxiety" factors. Since the PICS contains an absorption subscale, its loading on Factor 1 is not surprising. That it also loaded on Factor 4, however, suggests that the format of the PICS may be partially tapping the extent to which individuals

are ill at ease in social contexts in addition to tapping a non-preference for an imagic cognitive style. Since subjects are asked to close their eyes and to think about various scenarios on three different occasions in the presence of the experimenter, the extent to which a person feels anxious in social situations may interfere with the ease with which he/she is able to think about the various scenarios. Interestingly, the PICS is the variable in the present study that is most similar in format to a hypnotic induction where subjects are also asked to close their eyes and to engage in imagination. Further, its failure to load on the "self-reported imagery" factor suggests strongly that the PICS is measuring an aspect of imagic processes that is different from that which is measured by the Betts' QMI and the Marks' VVIQ.

In summary, a non-statistical evaluation of a principal components analysis is the extent to which it "makes sense". By this criterion, the present results offer a potentially revealing summary of the data; they support many of the decisions that were made about inclusion and exclusion of specific variables into the discriminant analyses. Further, they proyide empirical data concerning three variables that have not been used extensively in hypnosis research to date (Dream, PICS, and the Social Anxiety Subscale); they suggest the utility of continuing research with them.

Analysis of the Dream Questionnaire

Various analyses were performed on the 17 items of the Dream Questionnaire (Gibson, 1985) in an attempt to clarify the nature of the present findings. The analyses were designed to evaluate which of the items of the questionnaire were primarily responsible for tapping into the Sleep-Dream dimension.

Firstly, a Principal Components Analysis was performed on the data. For this purpose, subjects' responses were recorded according to the 4-point format of the questionnaire. Within the limitations imposed by the relatively small sample size and by its rectangular distribution, the analysis suggested the presence of four main factors which accounted for 53.46% of the variance; a fifth factor contained four items (two of which were complex) and was difficult to interpret. The rotated loadings (by the direct quartim oblique method) between the items and the factors and the correlations among the factors are presented in Tables 24 and 25, respectively.

INSERT TABLES 24 AND 25 ABOUT HERE

With the exception of Items 4, 6, and 12, all items loaded only on one factor. Further, the low correlations among the factors suggest that, for the present sample at least, the factors acted independently of each other.

The item-to-factor loadings suggest the following labels for the factors (The reader is referred to Appendix G for description of the items): Factor 1 ("Creativity and

TABLE 24

Rotated Factor Loadings
of the Dream Questionnaire Items
(Principal Components Analysis)[a,b]

Item[c]	Factor 1	2	3	4	5
7	.80	--	--	--	--
15	.72	--	--	--	--
13	.62	--	--	--	--
5	.56	--	--	--	--
6	.52	--	-.36	--	.41
1	--	.82	--	--	--
2	--	.69	--	--	--
3	--	.67	--	--	--
4	--	.66	--	-.48	--
10	--	--	.80	--	--
9	--	--	.74	--	--
8	.32	--	.54	--	--
16	--	--	--	.80	--
17	--	--	--	.74	--
14	--	--	--	--	-.71
11	--	--	--	--	.67
12	--	--	--	.42	.38

[a]Columns appear in decreasing order of variance explained by the factors.

[b]Factor loadings below .30 are not presented.

[c]See Appendix G for item contents.

TABLE 25

Factor Correlations for the Rotated Factors:
Dream Questionnaire
(Principal Components Analysis)

	Factor				
Factor	1	2	3	4	5
1	1.00				
2	.23	1.00			
3	.12	.12	1.00		
4	.08	.13	.06	1.00	
5	.23	.12	.01	-.02	1.00

Dissociation": Items 5, 6, 7, 13, 15), Factor 2 ("Enjoyment of Dreaming": Items 1, 2, 3, 4), Factor 3 ("Cognitive Control of Dreaming": Items 8, 9, 10), and Factor 4 ("Sleepwalking and Talking": Items 12, 16, 17).

One-way ANOVAs were calculated (using the 2-point scoring format that was used in the discriminant analyses) in order to determine if any of the factors produced significant differences among the susceptibility groups. Significant differences were found for Factors 3 and 4 [F (2,56) = 3.19; $p < .05$; F (2,56) = 8.53; $p < .001$, respectively]. Highs scored higher on Factor 3 [HSD (3,56) = 0.69; $p = .05$] than did the mediums and higher on Factor 4 than both the lows and the mediums [HSD (3,56) = 0.54; $p = .01$]. The measures of central tendency for these two factors are presented in Table 26.

INSERT TABLE 26 ABOUT HERE

Further, group frequencies of "Infrequent" responses ("Never" and "Sometimes") and "Frequent" responses ("Often" and "Always") were calculated for each item. Since the total Sleep-Dream score served to primarily separate the highs from the lows and the mediums, Fisher's Exact Tests were calculated comparing the former subjects (High) to the latter considered as one group (Not High). Three questions yielded patterns which differed significantly from chance; they were Items 12 and 16 (Factor 4) and Item 14 (Factor 5). The patterns of responses suggest

TABLE 26

Measures of Central Tendency for Factor 3 ("Cognitive Control of Dreaming") and Factor 4 ("Sleep Walking and Talking") of the Dream Questionnaire[a,b]

	Susceptibility Group		
Factor	Low	Medium	High
3	1.00 (0.97)	0.58 (a) (0.84)	1.30 (a) (0.87)
4	0.05 (a) (0.22)	0.11 (b) (0.46)	0.70 (a,b) (0.80)

[a]Group means are indicated first; their standard deviations are indicated in parentheses.

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

that high hypnotizable subjects are more likely to report being able to control their dreams, talking in their sleep, and not dreaming more frequently when under stress. The data are presented in Tables 27 through 29.

INSERT TABLES 27, 28, AND 29 ABOUT HERE

In conclusion, the group differences on Factors 3 and 4 were based on relatively few items. Further, only one of the items (Item 12) demonstrated a significant deviation from chance with probability levels adjusted for multiple comparisons. Although this type of result requires cautious interpretation, the present results concerning high hypnotizable subjects' ability to control dreaming replicates correlational (Evans, 1982) and experimental (Belicki & P. Bowers, 1982) findings on this question and thus may be viewed with greater confidence than if they represented an isolated finding. Further, they suggest that this dimension accounts for variance in hypnotic susceptibility that is orthogonal to the contribution of other correlates of hypnotizability such as preference for an imagic cognitive style and absorption.

TABLE 27

Dream Questionnaire Item 12
"Can you dream on a topic voluntarily chosen the night before?"

	Frequency		
Susceptibility	Infrequent	Frequent	
Not High*	39	0	39
High	12	8	20
Total	51	8	59

Fisher's Exact $p < .0001$

*The "Not High" Group combines lows and mediums.

TABLE 28

Dream Questionnaire Item 16
"Do you (as an adult) talk in your sleep?"

	Frequency		
Susceptibility	Infrequent	Frequent	
Not High	37	2	39
High	15	5	20
Total	52	7	59

Fisher's Exact p = .03

TABLE 29

Dream Questionnaire Item 14
"Do you dream more often when you are under some period of stress (e.g., before an examination?)"

	Frequency		
Susceptibility	Infrequent	Frequent	
Not High	14	25	39
High	13	7	20
Total	27	32	59

Fisher's Exact $p = .02$

DISCUSSION

The primary aims of the present study were met. Two variables [the Sleep-Dream Score (which combined Evans' (1982) Cognitive Control of Sleep Mentation Subscale and Gibson's (1985) Dream Questionnaire), and Taft's (1969; 1970) Belief in the Supernatural Subscale] were found to account for significant increases in variance among hypnotic susceptibility groupings over that provided by the Tellegen "Absorption" Scale (TAS) (Tellegen and Atkinson, 1974) and the Preference for an Imagic Cognitive Style Test (PICS) (Isaacs, 1982). Further, the discriminant equation derived from the TAS and the PICS in Nadon (1983) replicated in the present sample. In addition, the results suggest that a tendency to feel anxious in social contexts may be inimical to hypnotic responsiveness. The main findings of the present study will be discussed in terms of hypnotic susceptibility and of the nature of hypnosis. Results will be discussed also in terms of their relevance to two applied contexts, athletics/sports and clinical.

Hypnotic Susceptibility and Hypnosis

As indicated in the introduction, one of the main questions concerning hypnotic susceptibility is the extent to which the various nonhypnotic predictors are redundant in statistical terms. The present results suggest that at least four constructs [namely, absorption, imagic cognitive style, sleep dimension (particularly the cognitive

control of sleep), and belief in the supernatural] can, independently of each other, account for variance in susceptibility groupings. Further, the cluster analysis suggests that patterns of responses on these four variables provide a fair approximation of the three hypnotic susceptibility groupings.

The discriminant equation with the TAS and the PICS (Step 2, Analysis 1) classified low and high hypnotizable subjects adequately (55% correct classification for each group) but classified medium subjects at chance levels (37%). The finding that 20% of low subjects were classified incorrectly as highs at Step 2 of the analysis and that 20% of the Highs showed the reverse pattern, however, indicates that the separation between low and high susceptible subjects on the basis of these measures is not perfect. A similar finding concerning the relationship between self-reported imagery and hypnotizability was reported by Perry (1973). He noted:

> Poor imagers are almost invariably insusceptible to hypnosis. Conversely, it is very difficult to predict hypnotic susceptibility from the knowledge that a person has vivid imagery, though there is a tendency among extreme scorers for medium- and high-susceptible subjects to have vivid imagery (p. 220).

Somewhat differently, Crawford (1982) found that high hypnotizable subjects scored consistently above the sample mean on the Vividness of Visual Imagery Questionnaire (VVIQ) (Marks, 1973) and on the TAS but that lows and mediums score both below and above the means on these

measures. Although these types of results may in part reflect the difficulties that have been associated with self-report imagery scales (Sheehan, 1979), they may also reflect the general greater difficulty of classifying medium, as opposed to low or high susceptible subjects, on the basis of nonhypnotic inventories.

Consideration of both Nadon (1983) and the present study suggests that this difficulty may stem partially from the finding that highs and mediums do not differ on absorption abilities [TAS and Personal Experiences Questionnaire (PEQ) (Evans, 1982)]. Indeed, the consistency of results with the TAS between Nadon (1983) and the present study is striking and supports the argument that the relationship between absorption and hypnotizability represents the strongest finding in the literature (see Kihlstrom, 1985). It suggests also, however, that although low scores on the TAS are predictive of low hypnotic responsiveness, highs scores are predictive of both medium and high hypnotic susceptibility.

Similar conclusions can be made concerning the PICS. Results of three studies (Isaacs, 1982; Nadon, 1983; present study) indicate that low preference for an imagic cognitive style is predictive of low hypnotic susceptibility whereas a relatively high imagery preference is predictive of both medium and high hypnotic susceptibility. Further, the relative consistency of results across these three studies suggests that it is a more reliable predictor of hypnotic susceptibility than the self-report

measures of imagery vividness.

Correct classification of the mediums improved in the present study by the addition of the Sleep-Dream score and the Belief in the Supernatural Subscale to the discriminant equation. This improvement was due primarily to the correct classification of medium hypnotizable subjects who had been misclassified as highs on the basis of the absorption and imagery preference measures. Examination of these results in terms of how subjects of different susceptibility levels respond to hypnotic procedures may provide heuristic speculation concerning the nature of hypnosis.

Tellegen (1978-1979), for example, has argued that hypnotic susceptibility scales may be tapping individual differences in two distinct dimensions: (1) an ability to experience the suggested events as real and (2) a tendency to comply overtly with the suggestions, regardless of one's subjective experience (see also Balthazard & Woody, 1985). He has argued further that the relative strength of the two factors could vary with the content of the suggestions, the ability factor being more related to some suggestions and the compliance factor being more related to other suggestions.

Compliance in this context does not refer to "faking" or deliberate deception. Rather, it refers to a willingness to "go along" with the hypnotic procedures. Indeed, the construct of motivation has been central to some

theoretical accounts of hypnosis (Barber, 1969; 1970; Sarbin & Coe, 1972). Spanos and his colleagues have continued along similar lines in a newly developed hypnotic susceptibility scale [Carleton University Responsiveness to Suggestion Scale (CURSS) (Spanos, Radtke, Hodgins, Bertrand, Stam, & Moretti, 1983; Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983). Unlike the Stanford Scales, which ask subjects to cooperate with the procedures but emphasize that people differ in their ability to respond to hypnotic suggestions, subjects are instructed on the CURSS that "Your ability to be hypnotized is a measure of your willingness to cooperate" (See Kihlstrom, 1985). This difference in wording has been offered as a potential explanation for the greater discordance between subjects' behaviors and experience on the CURSS as opposed to the SHSS:C (P. Bowers, Laurence, & Hart, 1986), lending support to Tellegen's (1978-1979) argument that hypnotic responsiveness can be conceptualized along an ability and a compliance dimension.

The present results concerning absorption and imagic style suggest that most low susceptible subjects do not readily engage in imaginative activities in their daily lives to the extent that medium and high susceptible subjects do. Accordingly, when confronted with the hypnotic context, they are either not inclined to engage in the imaginative processes that are intrinsic to hypnotic procedures and/or they do not possess the required skills to do so. Subjects who do not pass any of the hypnotic

suggestions, even a suggestion for heaviness of an outstretched arm that is aided by physiology, for example, may be conceptualized as unwilling to "go along" with the hypnotic suggestions. Other lows who respond to some of the relatively easy ideomotor items may be conceptualized as cooperating more readily with the hypnotic procedures; they may not, however, possess the skills necessary to experience the more difficult challenge and cognitive items. Thus, the items which contain suggestions of simple motor movements may, in Tellegen's (1978-1979) framework, be passed in terms of an ability and/or a compliance dimension.

In contrast, medium hypnotizable subjects may be conceptualized as not only willing to cooperate with the hypnotic procedures but as possessing also the absorption and the imagery skills which may be necessary for the experience of the more difficult challenge suggestions. Thus, although a willingness to go along with these suggestions is necessary also, they may tap more extensively the ability dimension than is the case with the ideomotor suggestions.

Medium hypnotizable subjects, however, do not appear to be able to control subjective alterations in consciousness to the same extent as their more highly hypnotizable counterparts (as indexed, for example, by the ability to control dreaming processes). This may in part explain the difficulty of classifying these subjects on the basis of

imagery and absorption measures. The hypnotic performance of at least some of these subjects, more so than for the lows or for the highs, may represent a complex interaction between the compliance and ability dimensions of hypnotic behavior. Indeed, medium susceptible subjects are more likely to report that they cooperated with the hypnotic procedures and that their behavior in hypnosis occurred voluntarily or contained a mixture of voluntariness and involuntariness; this contrasts the reports of high susceptible subjects who are more likely to report that their hypnotic behavior occurred involuntarily, even when given the opportunity to report otherwise (P. Bowers et al., 1986).

Theoretical controversy concerning posthypnotic amnesia further illustrates this issue. Some theorists have argued that target information is temporarily dissociated from conscious awareness in posthypnotic amnesia (e.g., Cooper, 1979; Hilgard, 1966; Kihlstrom & Evans, 1979; Orne, 1966). In contrast, other theorists have argued that "amnesic" subjects may best be conceptualized as attempting to meet the contextual demands of the hypnotic situation. Thus, Coe (1978; Sarbin & Coe, 1972) has argued that subjects who report an inability to recall target events, after receiving a suggestion for posthypnotic amnesia, may be witholding the information in accordance with how they perceive the contextual demands. Similarly, Spanos (1982a) has argued that amnesic subjects attempt to meet the demands of the amnesia testing situa-

tion by distracting their attention away from target information. In terms of the present discussion, both types of responses may need to be considered (Kihlstrom, 1982). Indeed, studies on the "breaching" of posthypnotic amnesia suggest two types of amnesia responses. Howard and Coe (1980) found that approximately half of amnesic subjects breached amnesia under various demand for honesty conditions. Further, the subjects who breached were those who had reported that they felt in control of their amnesia on previous testing whereas the remaining subjects reported previously that they did not feel in control of their amnesia. Accordingly, some medium susceptible subjects may possess sufficient absorption skills to deploy their attention away from the target information, and thus give an amnesic response. More highly hypnotizable subjects, on the basis of their dissociative abilities, may demonstrate similar amnesia but through different underlying cognitive mechanisms.

It should be noted that "linear-additive" models of nonhypnotic predictors of hypnotic susceptibility have been criticized on the grounds that they do not take into consideration the potentially complex interaction between context, motivation, and skills (Balthazard & Woody, 1985; Tellegen, 1978-1979). In the present study, however, the interaction among the four discriminant predictors could not account for variance in the subject groupings that had not already been accounted for by the their linear combi-

nation. Thus, a linear model may be appropriate when considering "skill" type predictors. To further our understanding of hypnotic responsiveness, however, consideration of the interaction between context, motivation, and hypnotic ability is also necessary. Since hypnotic susceptibility does not correlate with cumpliance as assessed by measures of social desirability (Bowers, 1976), researchers will need to look elsewhere for measures which tap Tellegen's (1978-1979) hypothesized compliance factor. Measures which tap this factor independently of the ability factor may be difficult to develop, although the present findings concerning the negative relationship between social anxiety and hypnotizability may represent a step in this direction; a tendency toward relatively high anxiety in social contexts may not allow a subject to cooperate fully with the hypnotic procedures, even if he/she wishes to do so. Consideration of this type of negative "predisposition" toward hypnotic procedures may be particularly instructive for the understanding of responsiveness in clinical contexts.

The present results point also to an interesting new direction. They extend previous results demonstrating the tendency for highly hypnotizable individuals to believe in supernatural and related phenomena. As mentioned in the introduction, similar findings have been found for highly hypnotizable children (Allen, 1985; Fanurik, Le Baron, & Zeltzer, 1985). Investigation of how these beliefs are related to absorptive and imagic preferences in children

may provide new data on the development of hypnotizability in children. It may also provide data on how these beliefs come to be long-lasting and persist into adulthood (Gray, 1985).

Finally, although the study of nonhypnotic predictors has yielded fruitful results in the study of individual differences among subjects of high, medium, and low hypnotic susceptibility, it has not by and large been extended to the study of individual differences among subjects of high hypnotizability. Extensive research has pointed to the heterogeneity of responses among these subjects to hypnotic suggestions of high item difficulty (Hilgard, 1965; Perry, 1977a). High hypnotizable subjects have been shown to respond differentially to difficult items such as a suggestion for a double hallucination (Orne, 1959), the posthypnotic persistence of an uncancelled posthypnotic suggestion (Perry, 1977b), hypnotic age regression (Perry & Walsh, 1978), hidden observer instructions (Hilgard, 1977 a; Laurence & Perry, 1981; Nogrady, McConkey, Laurence, & Perry, 1983), a suggestion for source amnesia (Evans & Thorn, 1966), the acceptance of a suggested pseudo-memory in hypnosis as having actually occurred (Laurence, Nadon, Nogrady, & Perry, 1986), and a cue to reverse posthypnotic amnesia (Nadon, D'Eon, McConkey, Laurence, & Perry, 1986). Extension of the present type of study to highly responsive subjects should lead to useful findings concerning the nature of hypnosis and to

the different ways that high hypnotizable subjects experience the subjective alterations in perception, mood, and memory (Orne, 1980) that are associated with high hypnotic responsiveness.

Hypnotic Susceptibility in Applied Contexts

There are two applied contexts in which the skills that are related to hypnotizability appear to be particularly relevant: athletics/sports and clinical. The study of hypnotizability in relation to both contexts has received increasing attention in recent years; each will be discussed in turn.

The use of hypnosis as a potential aid in improving athletic performance is more popular today than at any other time (Clarke & Jackson, 1983). Part of this enthusiasm appears to stem from historical claims that "normal" endurance can be transcended by hypnotic procedures (e.g., Reiger, 1889). The "human plank" feat, in which the hypnotist requests one or more persons to sit on a deeply hypnotized person who is stretched across two chairs, is an example of this type of folklore.

Despite the fact that these notions have been discredited (Barber, 1966; Collins, 1961; Hull, 1933), some sport investigators (e.g., Rathbone, 1969; Rosen, 1976) have warned that the use of hypnosis may cause athletes to transcend their physiological capacity to the point of serious injury or death. Most investigators, however, have asserted the safety of hypnotic procedures in the hands of competent health professionals (Clarke & Jackson,

1983; Johnson, 1961; Morgan, 1980; Ryde, 1983; Singer, 1977).

It is interesting to note from a "skills" perspective that many athletes have reported "peak experiences" during competition, when their repertoire of athletic skills appears to operate automatically; these resemble the reports of hypnotized subjects. Such athletes report experiences of involuntariness, dissociation, increased pain tolerance, narrowed attention, time distortion, and amnesia for the episodic components of the performance (Brown & Mahoney, 1984; Unestahl, 1983). Unestahl (1983) has labelled these types of hypnotic-like experiences the "ideal subjective state" or the "winning feeling" and has incorporated hypnosis into the training program of international level Swedish athletes.

Many anecdotal reports appear to point to the utility of using hypnosis in a variety of ways in order to improve athletic performance. Thus, Naruse (1965; 1975) has reported successful results with international level Japanese athletes in reducing competition anxiety (stage fright) through prior hypnosis training. Jackson (1985) has reported that hypnosis can be used to decrease or to increase arousal levels before competition, depending on the individual needs of the athlete. Structured (Garver, 1977) and unstructured (Johnson, 1961) cognitive rehearsal strategies in hypnosis have also proven to be successful. As with all anecdotal reports, however, such reports do

not allow for the separation of effects due to hypnosis from those due to general treatment factors.

Notwithstanding, results of one well controlled study suggest that hypnotic procedures may be effective in improving hypnotic performance for at least some athletes. Jackson, Gass, and Camp (1979) found that posthypnotic suggestions of well being and pain tolerance are able to improve endurance performance on a treadmill task for high, but not for low hypnotizable subjects. The results also showed a comparable improvement for medium susceptible subjects who had received waking task motivation instructions, thus further suggesting the importance of investigating both skill and compliance factors in hypnosis studies.

More is known about hypnosis and hypnotizability in the clinical context than is currently the case with athletics. This has been due primarily to the use of standardized susceptibility scales in the clinic. As was indicated in the introduction, however, there is much controversy surrounding their use in the clinic. Hilgard (1982) has summarized the current state of affairs. He stated:

> The lack of research to support the claims of some clinicians is shocking... Too often a clinician, by asking a question believes that the question has been answered. For example, the question may be asked: "Will not a low score on a test of hypnotizability discourage a patient, and hence interfere with therapy?" Instead of trying to find out, some clinicians believe the answer is obvious, and they

> report: That is why I do not use hypnotizability scales..." (p. 395).

Indeed, the growing body of evidence indicates that learning to use hypnosis in conjunction with therapy results in patients gaining a greater feeling of mastery over many types of physical and psychological symptoms (Frankel, 1982; Hilgard & Hilgard, 1975/1983; Pettinatti, 1985). Further, this appears to be true for most patients, regardless of their level of hypnotizability (J. Barber, 1980; 1982; Frankel, 1982).

Other evidence suggests that the alleviation of non-voluntary disorders (such as asthma, chronic pain, hemophelia, and migraines) through the therapeutic use of hypnotic procedures is related to one's level of hypnotizability. This relationship appears to be probabilistic; the more highly hypnotizable a person is, the more likely he/she will derive benefit from a treatment involving hypnosis. The alleviation of habit disorders (such as smoking, overeating, and alcoholism), however, appear to be more related to one's level of motivation (Bowers & Kelly, 1979; Hilgard & Hilgard, 1975/1983; Perry, Gelfand, & Marcovitch, 1979; McConkey, 1984; Wadden & Anderton, 1982). Further, it has been suggested that hypnotic susceptibility per se may be related to therapeutic outcome for non-voluntary disorders even when hypnosis is not used (Bowers & Kelly, 1979).

Paradoxically, the various imaginative and dissociative capacities that are associated with high hypnotic

responsiveness and which may allow patients to achieve therapeutic relief of their symptoms, may also predispose them to the development of maladaptive behavior patterns and/or psychosomatic symptoms. A body of clinical evidence suggest that hypnotic susceptibility is related in complex ways to the onset of phobic symptoms (Foenander, Burrows, Gerschman, & Horne, 1980; Frankel, 1974; Frankel & Orne, 1976; Gerschman, Burrows, Reade, & Foenander, 1979; John, Hollander, & Perry, 1983), bulimia and the "binge and purge" type of anorexia nervosa (Pettinatti, 1985), speed of therapeutic change for non-psychotic psychiatric patients (Nace, Warwick, Kelley, and Evans, 1978), severity of symptoms at admission to a psychiatric hospital (Horne, Evans, & Orne, 1982), skin disorders (Bowers & Kelly, 1979), and the occurrence of nightmares (Belicki & Belicki, 1984).

Some investigators have hypothesized that dissociative mechanisms underly the relationship between these various psychopathologies and hypnotic susceptibility (Frankel, 1974; Pettinatti, 1985). Frankel (1974), for example, noted that many phobic patients commented that some of their hypnotic experiences, during routine assessment of their hypnotic susceptibility, bore a striking resemblance to some of their experiences in daily life. Since the research with these patients has shown that most of them fall into either the medium or the high range of hypnotic susceptibility, however, other constructs may be needed to more adequately explain the findings. Bowers

and Kelly (1979) have hypothesized that both absorptive and dissociative aspects of responsiveness to suggestion may be implicated in psychologically produced stress reactions and in various psychological healing techniques, such as hypnosis.

As Frankel (1982) has argued, knowledge of an individual patient's hypnotizability level can aid in the determination of the most optimal treatment strategy for him/her. This is not to say that this knowledge will determine whether hypnosis is or is not to be used in treatment. A treatment that involves hypnosis can enhance nonhypnotic aspects of the therapeutic process (e.g., transference) and can act as a strong placebo for low hypnotizable subjects (McGlashen, Evans, & Orne, 1969). Hypnosis can act also as an effective contextual manipulation (The patient is relaxed, his/her eyes are closed, and the therapist changes the tone and manner of verbal communication). These latter effects can be put to advantage by the use of "ego-strengthening" and other psychological techniques that encourage patients to perceive their difficulties in a more positive light and to gain more mastery over their symptoms (Hartland, 1971). Accordingly, since hypnotic susceptibility appears to reflect different skills and different imaginative styles, more detailed knowledge of patients' capacities than that afforded by a hypnotizability classification would provide more information on which to base treatment strategy.

Administration of the types of inventories in the present study would serve this need and would also provide empirical evidence concerning the correlates of some forms of psychopathology. That is, although hypnotizability has been related to various psychopathologies, it remains unclear what aspect(s) of hypnotic susceptibility account for these relationships. As with the investigation of hypnotic susceptibility among the more general population, this approach need not neglect context. Rather, the isolation of cognitive factors and imaginative preferences would aid in the understanding of their potential adaptive and maladaptive influences on everyday living.

Although there may be objections that this type of investigation takes too much time and can present obstacles to clinical treatment, this need not be so. Many clinicians already utilize lengthy psychodiagnostic procedures such as the MMPI or the Rorschach on the grounds that the information obtained will be useful in determining the appropriate treatment strategy, which in turn, will ultimately save time. A similar case may need to be made more forcefully with the respect to the evaluation of hypnotizability and/or its correlates in the clinical context. Further, although experimental data can provide heuristic speculation concerning psychopathology, it is not a substitute for good clinical research. Frankel (1982) has argued cogently that there is more to be gained from standardized assessment of hypnotic susceptibility in clinical contexts than will be forfeited. Similarly, more

detailed assessment of nonhypnotic predictors of hypnotizability in clinical settings may further our understanding of the underlying dimensions of some forms of psychopathology.

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FOOTNOTES

[1] Johann Joseph Gassner (1727-1779), an Austrian priest, achieved therapeutic results similar to those of Mesmer with a different technique. Gassner, however, attributed his results to the freeing of his patients from the effects of demonic possession. Although the Roman Catholic Church accepted Gassner's practice, Mesmer's theory of physical fluid was more consistent with the "enlightened" trend in science of the period and Gassner's theory met with disfavor and ridicule by the scientific community (Ellenberger, 1970).

[2] Although Mesmer and his students recognized that the capacity for the therapeutic "convulsive crises" differed among individuals, they did not report any detailed figures. Further, de Puységur had already observed that only five to six percent of his patients were capable of somnambulistic crises.

[3] Research with children has shown that hypnotic susceptibility fluctuates during childhood and stabilizes around adolescence (K. Bowers, 1976; Gardner & Olness, 1981; Gordon, 1972).

[4] The modification consisted of replacing the anosmia to ammonia suggestion by the posthypnotic suggestion of the Stanford Hypnotic Susceptibility Scale, Form B (SHSS:B) of Weitzenhoffer and Hilgard (1959).

[5] Due to time constraints, only 9 medium susceptible male subjects were tested.

[6] In order to avoid unnecessary confusion, the variable "hypnotic susceptibility" will be referred to as the "grouping variable" and the various inventories and tasks will be referred to as the "predictor variables" or simply as the "variables" or as the "predictors".

[7] 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 differ significantly, the difference between them must exceed the HSD values reported in the text. Although this statistic is most often used to make comparisons between groups with equal n's, it can also be used when n's differ only slightly, as in the present study, providing that the harmonic n ($\tilde{n}$) is used in the calculations. $\tilde{N}$ is calculated by the formula:

$$\tilde{n} = \frac{\text{number of groups}}{[(1/n_1) + (1/n_2) + - - - + (1/n_j)]}$$

which for the present sample equals 19.66 (See Kirk, 1968, p. 88).

[8] Calculation of Tukey's pairwise comparisons for a two-way factorial ANOVA differs from that of one-way analyses. Accordingly, a q value (analogous to a t value) is reported here (See Kirk, 1968, p. 189).

[9] Subscale information for one low susceptible male subject from the earlier study was not available due to a misplaced protocol.

[10] The order of entry of the variables from first to last was as follows: Fantasy Questionnaire, Voluntary Control of Sleep, Intrinsic Arousal, Sleep Onset Difficulty, Difficulty Maintaining Sleep, Recall of Dreaming, Cognitive Failures Questionnaire, Self Control Schedule, Consequences Test, Rey Figure Score, Private Self-Consciousness, Public Self-Consciousness, Errors on Stroop Card C, Peak Experiences, Openness to Inner Experiences, Cognitive Regression, Block Design, Controlled Adaptability, and Intellectual Control.

[11] A canonical correlation value of 0.71 was found for this discriminant function. This value indicates how closely the discriminant function and the grouping variable (hypnotic susceptibility) are related; the proportion of variance in the grouping variable that is explained by the function is the canonical correlation squared.

[12] In the earlier study, the QMI and the TAS were the two best individual predictors of hypnotizability classifications, respectively. The QMI had been selected over the TAS in the stepwise analysis since it had a greater F-to-enter value at the first step of the analysis [F (2;57) = 18.70; $p < .0001$ versus F (2,57) = 14.21; $p < .0001$]. Further, because the two predictors shared overlapping

grouping variance, the TAS did not enter into the analysis at a later step.

13 The minimum F-to-enter value required for a variable to enter the analysis was set at "1" in order to allow for the greatest flexibility. It should be noted that a variable's univariate F at a particular step can be statistically nonsignificant and nevertheless produce a significant increase in V and vice versa.

14 A more conservative measure of correct classification is provided by a "jackknifed" procedure. This procedure classifies each subject on the basis of classification equations developed from all subjects except the case being classified. The jackknifed classification of subjects at step 4 of the analysis was as follows: For the lows, 45% were classified correctly; 40% were classified incorrectly as mediums and 15% as highs. For the mediums, 63% were classified correctly; 21% were classified incorrectly as lows and 16% as highs. For the highs, 60% were classified correctly; 15% were classified oncorrectly as lows and 25% as mediums.

15 The contribution of each predictor can be evaluated by other measures also: the unstandardized and standardized canonical discriminant function coefficients and the unrotated pooled-within groups correlations between the predictors and each of the discriminant functions. Preference is given here to the rotated correlation values since

the unstandardized function coefficients are affected by the variance in scores on each predictor; standardization solves this problem but the resulting coefficients are still influenced by any redundancies across the predictors, a particularly thorny problem in the present study due to the degree of intercorrelation among the predictors. Finally, the unrotated correlation coefficients provide problems of their own since they are derived in a manner similar to that in Principal Components Analysis; the first factor (or function) that is generated is a general factor and the second one is bipolar with opposite sign loadings, rendering interpretation difficult.

16

Examination of the F-to-Enter values at Step 3 of the analysis revealed that the difference between the TAS and the Controlled Absorption Subscale was small (3.30 versus 3.90) and that the F-to-Enter values of the other variables were all below 1.66. Clearly, an "absorption" variable could account for the greatest amount of unexplained variance at Step 3. That the Controlled Absorption subscale was selected does not necessarily indicate that it is a better index of absorption than the TAS. Indeed, the data were reanalyzed without the Controlled Absorption variable; the TAS replaced the Controlled Absorption subscale at the third step and the same four significant predictors were found as were found for Analysis 1.

17

The "jackknifed" classification of subjects at step 3 of the analysis was as follows: For the lows, 45% were classified correctly; 35% were classified incorrectly as mediums and 20% as highs. For the mediums, 47.4% were classified correctly; an equal percentage (26.32%) were classified incorrectly as lows or as highs. For the highs, 60% were classified correctly; an equal percentage (20%) were classified incorrectly as lows or as mediums.

APPENDIX A

Tellegen's Differential Personality Questionnaire

Scale Ab (DPQ:Ab)

(Tellegen and Atkinson, 1974)

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 <u>every statement</u>, 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 marking 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 the 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 B

Personal Experiences Questionnaire

(PEQ)

(Evans, 1982)

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 mescalin). 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?

2. Can you put yourself to sleep?

3. Have you almost fallen asleep while you were driving on a quiet, level stretch of road?

4. Have you ever been able to make a daydream seem real?

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?

6. Have you ever actively stared at something and had it slowly (or suddenly) become very strange before your eyes?

7. Have you ever had strange images--vivid and real as life--flow into your mind, seemingly out of nowhere?

8. Have you ever thought that you had said something when actually you had only thought about saying it?

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?

10. Have you ever been completely immersed in nature 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?

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?

12. Have you ever had the experience of seeming to watch yourself from a distance as if in a dream?

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?

14. Have you ever found yourself staring at something and for the moment forgotten where you were?

15. Have you ever been so lost in thought that you did not understand what people said to you even when you nodded token agreement?

16. Have you ever become so absorbed in listening to music that you became lost in imagination?

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?

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?

APPENDIX C

Fantasy Questionnaire

(Nadon, 1983)

Name : _____

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.

   ```
   ----------+----------
   0         50        100%
                       certain
   ```

   (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.

```
_____________+_____________
Extremely     Just          Extremely
 loose        Right         severe
```

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 being such as fairies, etc.? Yes____ No____

(d) Which of the two following descriptions <u>best</u> 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 <u>best</u> 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 orgasms <u>solely</u> through your imagination? Yes____ No____

APPENDIX D

Experience Questionnaire

(Taft, 1969)

EXPERIENCE QUESTIONNAIRE

Ronald Taft, Ph.D., Faculty of Education, Monash University, Clayton 3168, Victoria, Australia.

Score each item as follows:

0 Definitely untrue for me.

1 Probably untrue for me.

2 Can't decide (or not answered).

3 Probably true for me.

4 Definitely true for me.

Items	Name of scale
1 - 10	1. Peak Experiences
11 - 20	2. Dissociated Experiences
21 - 30	3. Openness to inner experiences (Automatic ideas, dreaming)
31 - 40	4. Belief in the supernatural
41 - 50	5. Emotional extraversion
51 - 60	6. Intrinsic arousal
61 - 70	7. Controlled adaptability
71 - 80	8. Intellectual control
81 - 88	9. Cognitive regression

Ego permissiveness Total (Scales 1,2,3,4,6,9)

EXPERIENCE QUESTIONNAIRE

Name _____

Sex _____ Age _____ Date _____

Read each statement or question below and decide whether it is true of you or not. Indicate your answers by putting a mark in the appropriate column after each item.

You will notice that some of the items are repeated but please don't look back on your previous answer. Just answer the item again. It is best not to analyze the words too carefully, just give your overall reaction.

1. Have you ever had the experience of some everyday thought, word or object suddenly becoming alive with deep meaning?
2. Have you ever had a strong feeling of being at one with the whole of creation?
3. Are you ever excited by the sheer joy of being alive?
4. Have you ever experienced a joyful emotion that was so strong that it seemed to blind you like a dazzling light?
5. Have you ever experienced a state of complete and utter serenity?
6. Have you ever had the experience of reading a novel (or watching a play) and while doing so, actually forgetting 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?
7. Have you ever found a sort of fulfillment of yourself in creating something, as in crafts, science, writing, art or music?

8. Have you ever been completely immersed in nature or in art (e.g. in the mountains, at the ocean, viewing sculpture, paintings, etc.) and had a feeling of awe, inspiration, and grandeur sweep over you so that you felt as if your whole state of consciousness was somehow temporarily altered?

9. 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?

10. Have you ever been so strongly in love with somebody that you somehow felt that your own self was fading and you felt at one with the beloved person?

11. Would you like to be hypnotized?

12. Have you several times in your life had extremely strong impressions or feelings that you could never really put into words, or describe properly to anyone else?

13. Have you ever carried on real conversation with another person while you were asleep? (e.g. wit someone who walked into your room)

14. Have you ever had the experience of doing some task in the middle of the night (e.g. jotting down a note, answering a phone call) with no memory the next morning of having done so?

15. Have you ever focussed at something so hard that you went into a king of benumbed state of consciousness, or a state of extraordinary calm and serenity?

16. Have you ever actively stared at something and had it slowly (or suddenly) become very strange before your eyes?

17. Have you ever had the impression that the walls or the ceiling were moving or changing size or state, even though you knew that this was impossible.

18. Have you ever felt your 'mind' or 'consciousness' going apart from your body? Or flowing out of your body? Or flowing into different parts of your body?

19. Have you ever had the feeling that a part of your body was not really part of you?

20. Have you ever had the experience of seeming to watch yourself from a distance as if in a dream?

21. Do you enjoy dreaming?

22. Do some of your most interesting thoughts come to you when you are half asleep or even fully asleep?

23. It can often be fun to imagine that one is a different person from what one really is.

24. When you have had an unpleasant experience you are not easily able to forget it.

25. As a child did you daydream very much?

26. Do you spend quite a bit of time in daydreaming?

27. When you doze off, do you sometimes wake up with a jerk?

28. When you go to bed do the day's events often come into your mind vividly even though you don't try to recall them?

29. Do some of the thoughts that pop into your head seem to have nothing to do with anything that you have previously experienced?

30. Do you often come up with 'wonderful ideas' while dreaming?

31. Would you rather rely on your intuition than try to think things out by logic?

32. Even though one may not come across it often, it is probable that mental telepathy (thought transference) exists.

33. The trouble with modern society is its lack of interest in mystical experiences.

34. Have you been in a state in which your emotions seemed to have a life of their own - when they seemed to be quite unconnected with what you yourself were experiencing or thinking?

35. Do you believe that by contemplation, a person can sometimes discover a world within himself that is more real than the world outside himself?

36. Do you believe, or at least half believe, in ghosts?

37. Very often the thoughts that come to a person when they are not thinking are more valuable than those which are the result of careful thinking.

38. Do you think there are events and things which cannot ultimately be explained logically?

39. People should not be worried about obscuring rational thought by beliefs in mystical experiences.

40. Have you ever felt an enormous sense of inner authority and illumination, full of revelation and significance with your own will in abeyance perhaps grasped and held by a superior power, with a higher control, a Presence or a surrender of self?

41. Would you like to express moods in a dance?

42. Do you enjoy stories that have surprising conclusions?

43. Would you like to compose jokes for MAD magazine?

44. Would you prefer hearing jokes to solving riddles?

45. Do you agree that there is a place for emotions when a scientist is trying to work out a new thing?

46. Do you enjoy 'wild' parties?

47. Do you think that you are regarded by others as a person with a strong sense of humor?

48. Have there been persons in your life outside your family whom you feel have influenced you a great deal or who have had a certain 'grip' on you?

49. Do you prefer to be close to most other people, rather than keeping a certain 'distance' from them.

50. Do you need other people around when you are feeling 'down in the dumps'?

51. Is it true that you don't like nonsense rhymes?

52. Have you had some experiences that were both strange and wonderful?

53. Is it true that you would not agree to take part in an experiment on a new drug that makes people have visions, but which, is not habit forming?

54. Are you good at remembering your dreams?

55. Is it true that you do not believe, or even half believe, in ghosts?

56. Have you ever had a telepathic communication with someone, that is, transfer of thoughts without the use of the ordinary senses such as hearing or seeing?

57. Have you experienced moments of inspiration and creativity when artistic expression, ideas or the solution to problems you have struggled with came to you with a special intensity and clarity?

58. Have you ever been able to do things with amazing ease, as if inspired, things that would usually be very hard for you (in work, social situations, hobbies, games, art)?

59. Do you seem to be more sympathetic than the average towards people who have physical handicaps?

60. Do you seem to feel things more intensely than do most people?

61. If you lived in a foreign country do you think that you could easily learn to speak and act like a native of that country?

62. When you have had an unpleasant experience, are you able to forget about it fairly easily?

63. If you are awakened suddenly from a deep sleep, do you usually know almost immediately what is happening?

64. If it were necessary for you to emigrate to another English-speaking country is it true that you would have no difficulty in adapting yourself?

65. Do you prefer solving riddles to hearing jokes?

66. When you go to bed, the day's events hardly ever come into your mind vividly without you trying to recall them.

67. You have seldom had strong impressions or feelings you couldn't put into words or describe properly to anyone else.

68. You do not think that you stay and feel pretty much the same regardless of what happens around you.

69. Are you able to concentrate on a task for long periods, even when there are other things going on around you?

70. You do not need other people around when you are feeling 'down in the dumps'.

71. When members of your group are looking for novel ideas they should consult you.

72. Would you rather try to think things out by logic than rely on your intuition?

73. Even though one may not come across it often, it is probable that mental telepathy exists.

74. When you have a problem on your mind does the solution sometimes seem to come to you suddenly, without your thinking about it?

75. It is good that modern society lacks an interest in mystical experiences.

76. Would you rather read a book about a person's life than a story?

77. When you drive a car (or if you were to drive a car) is it true that you would not feel tense if you had to back it up?

78. Do you find that you usually can see favourable qualities in people who are regarded by others as having no good qualities at all.

79. Is it true that you do not think that you stay and feel pretty much the same, regardless of what happens around you?

80. Are you able to concentrate on a task for long periods, even when there are other things going on around you?

81. A painting can be quite meaningless and yet be great art.

82. It can often be fun to imagine that one is a different person from what one really is.

83. Do you like trying to see shapes in the clouds?

84. Every adult should try to keep something of the childlike in his thinking and behaviour.

85. When you have a problem on your mind, does the solution sometimes seem to come to you suddenly, without your thinking about it?

86. It is fun to look through reversed binoculars so that everything looks small and far away.

87. When you doze off, do you often wake up with a jerk?

88. Do you think that in our culture there is too much emphasis on foresight and self-control, and too little emphasis on spontaneity, creativity, and impulsivity?

APPENDIX E

Vividness of Visual Imagery Questionnaire

(VVIQ)

(Marks, 1973)

Subject's Name _____

Marks Imagery Questionnaire

A set of 16 images is suggested below. In each case, you are then asked to rate the vividness of the image. Write the number corresponding to your experience next to each item. Use the following scale in determining which number to write.

1 = No image at all, you only "know" that you are thinking of the object

2 = Vague and dim

3 = Moderately clear and vivid

4 = Clear and reasonably vivid

5 = Perfectly clear and as vivid as normal vision

For items 1-4, think of some relative or friend whom you frequently see (but who is not with you at present) and consider carefully the picture that comes before your mind's eye.

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 colors worn is some familiar clothes.

Visualize a rising sun. Consider carefully the picture that comes before your mind's eye.

5. The sun is rising above the horizon into a hazy sky.

6. The sky clears and surrounds the sun with blueness.

7. Clouds. A storm blows up, with flashes of lightning.

8. A rainbow appears.

Think of the front of a shop which you often go to. Consider the picture that comes before your minds eye.

9. The overall appearance of the shop from the opposite side of the road.

10. A window display including colors, shapes and details of individual items for sale.

11. You are near the entrance. The color, shape and details of the door.

12. You enter the shop and go to the counter. The counter assistant serves you. Money changes hands.

Finally, think of a country scene which involves trees, mountains and a lake. Consider the picture that comes before your mind's eye.

13. The contours of the landscape.

14. The color and shape of the trees.

15. The color and shape of the lake.

16. A strong wind blows on the trees and on the lake causing waves.

APPENDIX F

Control of Sleep Questionnaire (CSQ 79)

(Evans, 1977)

Sleep Questionnaire

Name: _____Age:____Sex:_____Date:_____

Instructions:

People differ greatly in how they sleep and dream. We are interested in obtaining information on the frequency of occurrence of various patterns of sleeping and dreaming. We would greatly appreciate your cooperation in giving us information on how you sleep and dream by filling in this questionnaire.

Please answer each question by checking (X) the appropriate descriptive term.

___always ___usually ___sometimes ___rarely ___never

Please answer every question.

---

1. Do you dream at night?
2. Do you have nights of dreamless sleep?
3. Do you have periods during the night when you have thoughts running through your head but are not actually dreaming?
4. On awakening in the morning, are you unable to remember dreaming even though you are sure you did dream?
5. Do you wake up during the night?
6. Are you a deep sleeper?
7. Have you ever heard a sound in a dream that you found upon awakening was actually there?
8. Do you have nightmares at night?
9. Do you fall asleep easily?
10. Do you have to get up during the night?

11. Do you talk in your sleep?

12. Are you a light sleeper?

13. Do you dream about things that happened during the day?

14. Do you dream in color?

15. If you expect to hear a sound during the night while sleeping, would that sound be likely to awaken you even though it were not very loud? (For example, if you were expecting your roommate to come in late, and he did so even quietly while you were asleep.)

16. Are you able to sleep late on Sundays?

17. Do you take cat naps during the day?

18. Do you nap even when you do not feel very tired?

19. Do you find yourself oversleeping when you have an appointment you would rather avoid?

20. Do you have difficulty falling asleep?

21. Do you take sleeping medications?

22. Do you have trouble going to sleep in strange surroundings?

23. Do you like to sleep?

24. While you are dreaming, can you change the content of your dream at will?

25. Can you decide beforehand what you are going to dream about?

26. Do you ever go to sleep during a movie or theater performance, or during a concert?

27. Can you go to sleep at will on a long plane trip or car trip?

28. Can you set yourself to wake up at whatever time you choose in the morning?

29. Can you go to sleep at will?

30. Do you have trouble sleeping the night before exams or other important events?

31. What time do you usually go to bed each night?

32. How long do you usually take to fall asleep?

33. How long do you usually sleep each night?

34. How many times do you usually wake up during the night?

APPENDIX G

Dream Questionnaire

(Gibson, 1985)

DREAM QUESTIONNAIRE

This refers to your usual experience of dreaming. People vary a great deal in such experience, and research is establishing some of the more common differences. Please put a check mark (X) in one column at the right hand side to indicate what you consider to be your own experience.

Your help will be very much appreciated.

_____Never _____Sometimes _____Often _____Always

1. When you awaken in the mornings do you have the impression that you have been dreaming?
2. Do you remember the content of your dreams?
3. Are your dreams vivid and exciting?
4. On the whole, would you rather prefer that you did not dream?
5. Do you see colour in your dreams?
6. Do you awaken feeling that you have solved a problem?
7. Do your dreams give you interesting and creative ideas?
8. Do you have dreams in which you know that you are dreaming?
9. If you know that you are dreaming, can you to some extent control and direct the course of the dream?
10. If you know that you are dreaming, can you wake yourself up out of the dream if you wish to?
11. When having such dreams, do you think that you have awakened, but find that you are in yet another dream?
12. Can you dream on a topic voluntarily chosen the night before?

13. Do you experience the phenomenon of imagining that you have floated up and look down upon your sleeping self?

14. Do you dream more when you are under some period of stress (e.g., before an examination)?

15. Do future events seem to be foretold in your dreams?

16. Do you (as a adult) talk in your sleep?

17. Do you (as an adult) walk in your sleep?

NAME (BLOCK CAPITALS) _____

COURSE CODE _____DATE _____

AGE GROUP: UNDER 20 ( ); 20-25 ( ); OVER 25 ( )

M ( ) or F ( )

Please add any extra information about your sleep and dreaming that seems relevant to you. Your opinions will be appreciated.

_____

_____

_____

APPENDIX H

Self-Control Schedule

(SCS)

(Rosenbaum, 1980)

NAME: _____

MICHAEL ROSENBAUM SCALE

Directions: Indicate how characteristic or descriptive each of the following statements is to you by using the code given below. Please indicate your answer in the left margin.

+3 very characteristic of me, extremely descriptive

+2 rather characteristic of me, quite descriptive

+1 somewhat characteristic of me, slightly descriptive

-1 somewhat uncharacteristic of me, slightly undescriptive

-2 rather uncharacteristic of me, quite undescriptive

-3 very uncharacteristic of me, extremely nondescriptive

1. When I do a boring job, I think about the less boring parts of the job and the reward that I will receive once I am finished.

2. When I have to do something that is anxiety arousing for me, I try to visualize how I will overcome my anxieties while doing it.

3. Often by changing my way of thinking I am able to change my feelings about almost everything.

4. I often find it difficult to overcome my feelings of nervousness and tension without any outside help.

5. When I am feeling depressed I try to think about pleasant events.

6. I cannot avoid thinking about mistakes I have made in the past.

7. When I am faced with a difficult problem, I try to approach its solution in a systematic way.

8. I usually do my duties quicker when somebody is pressuring me.

9. When I am faced with a difficult decision, I prefer to postpone making a decision even if all the facts are at my disposal.

10. When I find that I have difficulties in concentrating on my reading, I look for ways to increase my concentration.

11. When I plan to work, I remove all the things that are not relevant to my work.

12. When I try to get rid of a bad habit, I first try to find out all the factors that maintain this habit.

13. When an unpleasant thought is bothering me, I try to think about something pleasant.

14. If I would smoke two packages of cigarettes a day, I probably would need outside help to stop smoking.

15. When I am in a low mood, I try to act cheerful so my mood will change.

16. If I had the pills with me, I would take a tranquilizer whenever I felt tense and nervous.

17. When I am depressed, I try to keep myself busy with things that I like.

18. I tend to postpone unpleasant duties even if I could perform them immediately.

19. I need outside help to get rid of some of my bad habits.

20. When I find it difficult to settle down and do a certain job, I look for ways to help me settle down.

21. Although it makes me feel bad, I cannot avoid thinking about all kinds of possible catastrophes in the future.

22. First of all I prefer to finish a job that I have to do and then start doing the things I really like.

23. When I feel pain in a certain part of my body, I try not to think about it.

24. My self-esteem increases once I am able to overcome a bad habit.

25. In order to overcome bad feelings that accompany failure, I often tell myself that it is not so catastrophic and that I can do something about it.

26. When I feel that I am too impulsive, I tell myself "stop and think before you do anything."

27. Even when I am terribly angry at somebody, I consider my actions very carefully.

28. Facing the need to make a decision, I usually find out all the possible alternatives instead of deciding quickly and spontaneously.

29. Usually I do first the things I really like to do even if there are more urgent things to do.

30. When I realize that I cannot help but be late for an important meeting, I tell myself to keep calm.

31. When I feel pain in my body, I try to divert my thoughts from it.

32. I usually plan my work when faced with a number of things to do.

33. When I am short of money, I decide to record all my expenses in order to plan more carefully for the future.

34. If I find it difficult to concentrate on a certain job, I divide the job into smaller segments.

35. Quite often I cannot overcome unpleasant thoughts that bother me.

36. Once I am hungry and unable to eat, I try to divert my thoughts away from my stomach or try to imagine that I am satisfied.

APPENDIX I

Cognitive Failures Questionnaire

(CFQ)

(Broadbent, Cooper, Fitzgerald, and Parkes, 1982)

NAME: _____

BROADBENT ET AL. SCALE

The following questions are about minor mistakes which everyone makes from time to time, but some of which happen more often than others. We want to know how often these things have happened to you in the last six months. Please indicate for each statement whether it has been true "Very often" (4), "Quite often" (3), "Occasionally" (2), "Very rarely" (1) or "Never" (0).

1. Do you read something and find that you haven't been thinking about it and must read it again?
2. Do you find you forget why you went from one part of the house to the other?
3. Do you fail to notice signposts on the road?
4. Do you find you confuse right and left when giving directions?
5. Do you bump into people?
6. Do you find you forget whether you've turned off a light or a fire or locked the door?
7. Do you fail to listen to people's names when you are meeting them?
8. Do you say something and realize afterwards that it might be taken as insulting?
9. Do you fail to hear people speaking to you when you are doing something else?
10. Do you lose your temper and regret it?
11. Do you leave important letters unanswered for days?
12. Do you find you forget which way to turn on a road you know well but rarely use?
13. Do you fail to see what you want in a supermarket (although it's there)?

14. Do you find yourself suddenly wondering whether you've used a word correctly?

15. Do you have trouble making up your mind?

16. Do you find you forget appointments?

17. Do you forget where you put something like a newspaper or a book?

18. Do you find you accidentally throw away the thing you want and keep what you meant to throw away - as in the example of throwing away the matchbox and putting the used match in your pocket?

19. Do you daydream when you ought to be listening to something?

20. Do you find you forget people's names?

21. Do you start doing one thing at home and get distracted into doing something else (unintentionally)?

22. Do you find you can't quite remember something although its 'on the tip of your tongue'?

23. Do you find you forget what you came to the shops to buy?

24. Do you drop things?

25. Do you find you can't think of anything to say?

APPENDIX J

Public and Private Self-Consciousness Scale

(Fenigstein, Scheirer, and Buss, 1975)

THE FENIGSTEIN, SCHEIRER, & BUSS SCALE

Name:_____

Student number: _____

The statements on the following pages concern statements one can make about oneself. No two statements are exactly alike, so consider each statement carefully before answering. You are asked to rate each item on a 5-point scale which relates to how characteristic the statement is of you. A rating of -2 indicates that the statement is extremely uncharacteristic of you, a rating of +2 indicates that the statement is extremely characteristic of you, a rating of 0 indicates that the statement is neither characteristic nor uncharacteristic of you.

It is important that you answer as frankly and as honestly as you can. Your answers will be kept in the strictest confidence.

```
          +------+------+------+------+
         -2     -1      0     +1     +2
extremely                              extremely
uncharacteristic                       characteristic
```

1. I'm always trying to figure myself out.
2. I'm concerned about my style of doing things.
3. Generally, I'm not very aware of myself.
4. It takes me time to overcome my shyness in new situations.
5. I reflect about myself a lot.

6. I'm concerned about the way I present myself.

7. I'm often the subject of my own fantasies.

8. I have trouble working when someone is watching me.

9. I never scrutinize myself.

10. I get embarassed very easily.

11. I'm self-conscious about the way I look.

12. I don't find it hard to talk to strangers.

13. I'm generally attentive to my own inner feelings.

14. I usually worry about making a good impression.

15. I'm constantly examining my motives.

16. I feel anxious when I speak in front of a group.

17. One of the last things I do before I leave my house is look in the mirror.

18. I sometimes have the feeling that I'm off somewhere watching myself.

19. I'm concerned about what other people think of me.

20. I'm alert to changes in my mood.

21. I'm usually aware of my appearance.

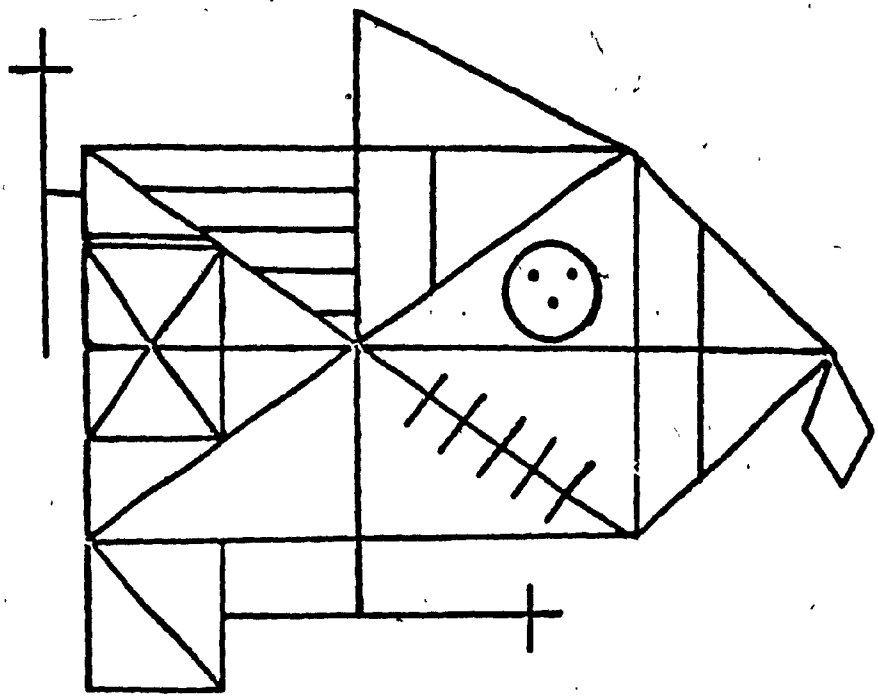
22. I'm aware of the way my mind works when I work through a problem.

23. Large groups make me nervous.

APPENDIX K

Rey Complex Figure

(Osterrieth, 1944)



Scoring System for the Rey Complex Figure

Units

1. Cross upper left corner, outside of rectangle
2. Large rectangle
3. Diagonal cross
4. Horizontal midline of 2
5. Vertical midline
6. Small rectangle, within 2 to the left
7. Small segment above 6
8. Four parallel lines within 2, upper left
9. Triangle above 2 upper right
10. Small vertical line within 2; below 9
11. Circle with three dots within 2
12. Five parallel lines within 2 crossing 3, lower right
13. Sides of triangle attached to 2 on right
14. Diamond attached to 13
15. Vertical line within triangle 13 parallel to right vertical of 2
16. Horizontal line within 13, continuing 4 to right
17. Cross attached to 5 below 2
18. Square attached to 2, lower left

Scoring

Consider each of the 18 units separately. Appraise accuracy of each unit and relative position within the whole of the design. For each unit count as follows:

Correct	placed properly	2 points
	placed poorly	1 point
Distorted or incomplete but recognizable	placed properly	1 point
	placed poorly	1/2 point
Absent or not		0 point
Maximum		36 points

(From E. M. Taylor, 1959, adapted from Osterrieth, 1944)

APPENDIX L

Consequences Test

(Christensen, Merrifield and Guilford, 1958)

Consequences

Name _____

Date _____

This is a test of your ability to think of a large number of ideas in connection with a new and unusual situation.

Look at a sample item:

What would be the results if people no longer needed or wanted sleep?

Sample results:

1. Get more work done
2. Alarm clocks not necessary
3. No need for lullaby song books
4. Sleeping pills no longer used.
5.
6.

Of course, there are many more possible results that could have been written.

There will be 2 different situations somewhat like the one above, each one on a separate page. Four examples will be included for each item. You will be given two minutes on each page to write down other possible results. Write as many different consequences or possible results of the change as you can. Your answers need not be complete sentences. Your score will be the total number of <u>different</u> consequences that you write in the time given you.

List as many different consequences as you can.

What would be the results if everyone suddenly lost the sense of balance and were unable to stay in the upright position for more than a moment?

a. People would fall down
b. Could not walk
c. Many accidents
d. Confusion

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

1 = High ease. Responses just popped into mind; no effort exerted to develop consequence.

2 = Most consequences needed very little effort.

3 = Some items popped into head; others needed strong effort of thought. About half and half.

4 = Most needed some effort.

5 = High difficulty. Constantly made effort to develop next consequence.

List as many different consequences as you can.

What would be the results if none of us needed food any more in order to live?

a. No need for farmers
b. No plates, knives, and forks
c. No grocers
d. Save time

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

1 = High ease. Responses just popped into mind; no effort exerted to develop a consequence.

2 = Most consequences needed very little effort.

3 = Some items popped into head; others needed strong effort of thought. About half and half.

4 = Most needed some effort.

5 = High difficulty. Constantly made effort to develop the next consequence.

APPENDIX M

Shortened Version of the Bett's Questionnaire Upon Mental Imagery

(QMI)

(Sheehan, 1967)

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 after 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 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:

Item		Rating
5.	A red apple	(3)

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

Item	Rating
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 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 by 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.

Item	Rating
6. The whistle of a locomotive	( )
7. The honk of an automobile	( )
8. The mewing 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 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 "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.

Item	Rating
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.

Item		Rating
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 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 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.

Item	Rating
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 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 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.

Item		Rating
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 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 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.

Item		Rating
31.	Fatigue	( )
32.	Hunger	( )
33.	A sore throat	( )
34.	Drowsiness	( )
35.	Repletion as from a very full meal	( )

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 resent at all, you only "knowing" that you are thinking of the object	....Rating 7

APPENDIX N

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. Some people do not experience either pictures or words and describe their thoughts 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.

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 <<

Now 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 has 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 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.

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 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 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.

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 <u>verbal thinking</u> (V); the second, <u>imagery</u> (I); the third, <u>absorption</u> (A); and the fourth, <u>effort</u> (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 = PICS Score

APPENDIX O

Variable List

and

Raw Data

The raw data are presented for each group separately. Each subject has four lines of data, two on the first page and two on the second page.

Page 1, Line 1

Column	Description
1-2	Subject Identification Number
6	Sex; female:4, male:5
7-8	Age
9	Susceptibility; low:1, medium:2, high:3
10-11	Harvard Group Scale of Hypnotic Susceptibility, Form A
13-14	Stanford Hypnotic Susceptibility Scale, Form C
16-18	Betts Questionnaire upon Mental Imagery
20-22	Preference for an Imagic Cognitive Style
24-25	Stroop Test: Errors on Card C
27-28	Personal Experiences Questionnaire
29	PEQ Controlled Absorption
30	PEQ Automatic Absorption
32-33	Tellegen Absorption Scale
35-36	Fantasy Questionnaire
38-39	Marks Vividness of Visual Imagery Questionnaire

Page 1, Line 2

Column	Description
6-7	Evans Voluntary Control of Sleep
8-9	Evans Sleep Onset Difficulty
10-11	Evans Difficulty Maintaining Sleep
12-13	Evans Recall of Dreaming
14-15	Evans Cognitive Control of Sleep Mentation
17-19	Stroop Test: log C/B (three decimal places)
21-23	Stroop Test: Ratio C/B (three decimal places)
25-27	Fenigstein et al. Private Self-Consciousness
28-30	Fenigstein et al. Public Self-Consciousness
31-33	Fenigstein et al. Social Anxiety
35-37	Fenigstein et al. Total Score
39-40	Christensen et al. Consequences Test
41-43	Christensen et al. Difficulty Ratings (one decimal place)

Page 2, Line 1

Column	Description
6-7	Broadbent et al. Cognitive Failures Questionnaire
9-11	Rosenbaum Self Control Schedule
13-14	Taft Peak Experiences
15-16	Taft Dissociated Experiences
17-18	Taft Openness to Inner Experiences
19-20	Taft Belief in the Supernatural
21-22	Taft Emotional Extraversion
23-24	Taft Intrinsic Arousal
25-26	Taft Ego Strength
27-28	Taft Intellectual Control
29-30	Taft Cognitive Regression
32-33	Block Design

Page 2, Line 2

Column	Description
6-7	Rey Complex Figure
9-10	Gibson Dream Questionnaire

LOWS

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     1510172012 273 187 008013002 023 11035
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03   429101 00 077 017 01 1165 20 09 61
     1508162109 173 149 003-03002 002 20020
04   420101 02 173 001 06 0422 05 04 19
     1615191618 179 151 -02001-06 -07 20015
05   420105 02 090 001 02 1945 13 10 56
     1613131807 171 148 003006010 019 08045
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     0714201411 179 151 016012010 038 11025
08   423103 04 066 009 04 1798 32 19 66
     1414201617 215 164 013007004 024 10020
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     1514142013 260 182 017013006 026 15035
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     0917141511 208 162 016013010 039 09025
12   523100 00 105 -08 05 1183 12 04 58
     1020231715 176 150 007-06004 005 14025
13   520102 01 053 011 05 1587 29 18 65
     1309202417 102 126 015000001 016 19020
14   519102 02 088 013 02 1266 24 13 64
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     1407091305 097 125 -03005-07 -05 02100
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17   520100 00 053 010 03 1587 28 07 76
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18   521101 01 050 003 02 1697 30 17 66
     1014131915 155 143 001009004 014 19025
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LOWS

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	30	05		
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	32	04		
04	34	026	272219152427241715	41
	34	05		
05	42	035	242829262432162726	47
	31	04		
06	52	023	302733232120172221	24
	31	01		
07	50	042	403135242432213319	47
	29	03		
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	34	05		
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18	45	017	282728162822152628	22
	35	04		
19	60	011	381530152726222419	51
	33	05		
20	34	011	363629342033152027	42
	36	06		

MEDIUMS

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    1117151811 226 168 004001009 014 04045
25  422211 08 105 006 02 1495 26 07 56
    1310112307 101 126 009012001 022 12020
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	33	06		
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	36	07		
25	50	013	272121202618262326	50
	26	03		
26	43	043	363337402536112527	28
	40	07		
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	42	07		
28	53	022	363631272523252419	24
	32	03		
29	66	022	283237232824132026	43
	34	06		
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	31	04		
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	32	05		
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	35	06		
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	33	04		
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	34	05		
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	38	05		
36	19	028	251418142822182618	27
	35	05		
37	52	018	342931313126162026	40
	30	04		
38	49	025	282130253027212416	36
	27	03		
39	37	025	403532253125182122	19
	39	06		

HIGHS

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HIGHS

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34 13
56 54 026 323234282926172525 21
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40 01
58 29 035 404036374027283628 49
53 05
59 57 -19 292528242922161824 28
26 02
60 37 007 291836182523202626 35
41 03

APPENDIX P

Variable List

and

Correlation Matrix

Variable List

1 Harvard Group Scale of Hypnotic Susceptibility, Form A

2 Stanford Hypnotic Susceptibility Scale, Form C

3 Betts Questionnaire upon Mental Imagery

4 Preference for an Imagic Cognitive Style

5 Error on Card C of the Stroop Color and Word Test

6 Personal Experiences Questionnaire

7 PEQ Control Absorption Subscale

8 PEQ Automatic Absorption Subscale

9 Tellegen Absorption Scale

10 Fantasy Questionnaire

11 Marks Vividness of Visual Imagery Questionnaire

12 Broadbent et al. Cognitive Failures Questionnaire

13 Rosenbaum Self Control Schedule

14 Taft Peak Experiences Subscale

15 Taft Dissociated Experiences Subscale

16 Taft Openness to Inner Experiences Subscale

17 Taft Belief in the Supernatural Subscale

18 Taft Emotional Extraversion Subscale

19 Taft Intrinsic Arousal Subscale

20 Taft Ego Strength Subscale

21 Taft Intellectual Control Subscale

22 Taft Cognitive Regression Subscale

23 Block Design

24 Evans Voluntary Control of Sleep Subscale

25 Evans Sleep Onset Difficulty Subscale

26 Evans Difficulty Maintaining Sleep Subscale

27 Evans Recall of Dreaming Subscale

28 Evans Cognitive Control of Sleep Mentation Subscale

29 Stroóp: log of Card C over B (log C/B)

30 Fenigstein et al. Private Self-Consciousness Subscale

31 Fenigstein et al. Public Self-Consciousness Subscale

32 Fenigstein et al. Social Anxiety Subscale

33 Fenigstein et al. Total Score

34 Christensen et al. Consequences Test

35 Rey Complex Figure

36 Gibson Dream Questionnaire

Variable Number	1	2	3	4	5	6	7
1	-						
2	.81	-					
3	-.26	-.31	-				
4	.38	.47	-.51	-			
5	-.02	.00	.12	-.21	-		
6	.40	.36	.53	.37	.06	-	
7	.41	.42	-.57	.33	.12	.85	-
8	.38	.34	-.42	.48	.06	.86	.70
9	.40	.42	-.63	.54	-.03	.72	.74
10	.39	.34	-.51	.39	.07	.56	.55
11	.23	.31	-.82	.44	-.14	.45	.51
12	.23	.14	.09	-.10	.22	.12	.12
13	-.01	.07	-.25	.35	-.10	.27	.20
14	.26	.20	-.43	.33	-.04	.60	.65
15	.35	.34	-.35	.50	.14	.61	.46
16	.32	.29	-.30	.23	.18	.47	.43
17	.41	.38	-.45	.33	.09	.52	.49
18	.36	.44	-.27	.31	-.15	.20	.20
19	.21	.16	-.40	.43	-.03	.30	.19
20	.10	.08	-.06	.31	-.06	.00	.05
21	.21	.19	-.28	.32	-.09	.28	.16
22	.25	.28	-.30	.32	.04	.55	.48
23	-.06	-.14	.17	-.09	-.10	-.02	-.07
24	.25	.25	-.22	.22	.06	.28	.21
25	-.38	-.30	.43	-.36	.04	-.21	-.21

Variable Number	1	2	3	4	5	6	7
26	.10	.10	-.18	.21	-.01	.27	.28
27	.15	.05	-.06	.08	.00	.22	.21
28	.03	.14	-.11	.09	.22	.27	.31
29	-.09	-.15	.29	-.21	.38	.04	-.01
30	.10	.02	-.19	.15	-.05	.20	.23
31	-.03	-.07	.00	-.07	-.08	-.10	-.12
32	-.27	-.36	.29	-.33	.10	-.15	-.22
33	-.07	-.17	.02	-.09	.00	.00	-.03
34	.12	.05	-.23	.18	.05	.22	.33
35	-.08	-.07	.18	-.02	-.05	-.09	-.16
36	.37	.36	-.28	.37	.04	.41	.35

Variable Number	8	9	10	11	12	13	14
8	-						
9	.73	-					
10	.55	.06	-				
11	.34	.59	.36	-			
12	.13	.02	.31	-.10	-		
13	.26	.36	.28	.12	-.18	-	
14	.59	.66	.48	.41	.01	.27	-
15	.68	.60	.51	.37	.00	.26	.54
16	.46	.43	.53	.37	.33	.05	.56
17	.47	.60	.36	.47	-.09	.18	.44
18	.22	.38	.31	.18	-.13	.05	.13
19	.24	.31	.36	.24	-.15	.33	.34
20	.01	.35	.18	.00	-.32	.17	.13
21	.32	.25	.24	.10	-.08	.14	.27
22	.48	.52	.45	.33	.00	.10	.32
23	-.08	.72	.62	.51	.04	-.01	.10
24	.23	.32	.23	.23	-.20	.25	.27
25	-.22	-.39	-.30	-.32	.02	-.36	-.11

Variable Number	8	9	10	11	12	13	14
26	.28	.08	.05	.09	-.14	-.12	.34
27	.20	.26	.01	.14	-.10	.01	.32
28	.35	.35	.19	.24	-.04	.26	.41
29	.14	-.09	-.09	-.30	.02	.02	.08
30	.23	.20	.26	.32	-.04	.14	.33
31	.10	-.04	.07	.00	-.03	.04	-.23
32	-.20	-.24	-.02	-.20	.28	-.17	-.12
33	-.01	-.02	.16	.06	.10	.01	.00
34	.17	.19	.24	.24	-.05	.10	.40
35	-.04	-.18	-.13	-.05	-.13	.04	.00
36	.48	.40	.35	.29	-.05	.22	.40

Variable Number	15	16	17	18	19	20	21
15	-						
16	.54	-					
17	.53	.41	-				
18	.25	.00	.23	-			
19	.43	.19	.42	.17	-		
20	.03	-.10	-.19	.09	-.05	-	
21	.23	.26	.21	.10	.33	.26	-
22	.49	.37	.49	.24	.17	-.06	.08
23	-.03	-.06	-.11	.00	-.05	.26	.08
24	.29	.07	.26	.39	.34	.08	.08
25	-.20	.12	-.33	-.30	-.35	-.03	-.19
26	.22	.23	.14	-.08	.11	.30	.21
27	.16	.19	.08	.06	.02	-.06	.01
28	.32	.34	.27	-.13	.08	.00	.11
29	.08	.06	-.02	-.20	-.14	-.17	.00
30	.23	.49	.21	.01	.05	.17	.09
31	-.13	-.06	-.06	.02	-.13	-.05	-.09
32	-.14	.17	-.17	-.36	-.18	-.17	-.03
33	.00	.29	.00	-.15	-.11	.01	.00
34	.20	.21	.18	-.03	.22	.12	.01
35	-.20	-.06	-.19	.06	.02	.20	-.05
36	.38	.40	.36	-.01	.24	.10	.38

Variable Number	22	23	24	25	26	27	28
22	-						
23	.02	-					
24	.16	.12	-				
25	-.16	-.04	-.55	-			
26	.11	.04	-.04	.19	-		
27	.04	-.12	.22	.00	.08	-	
28	.16	-.06	.29	-.03	.22	.22	-
29	.05	.06	-.02	.21	.00	.00	.06
30	.19	.21	.00	.06	.06	.04	.06
31	.00	.00	-.09	-.02	-.29	-.05	-.25
32	-.01	.18	-.39	.40	-.27	-.19	-.11
33	.08	.19	-.23	.20	-.22	-.10	-.13
34	.09	.11	.22	-.17	.27	.17	.30
35	-.07	.36	.19	-.11	-.07	-.05	-.09
36	.26	-.04	.44	-.30	.33	.33	.63

Variable Number	29	30	31	32	33	34	35
29	-						
30	.05	-					
31	.04	.31	-				
32	.14	.11	.31	-			
33	.09	.69	.74	.66	-		
34	-.21	.18	-.25	-.37	-.20	-	
35	.07	.12	-.18	-.21	-.12	.20	-
36	-.10	.13	-.22	-.20	-.11	.32	-.12

APPENDIX Q

Source Tables

for Stroop log C/B

and

Private Self-Consciousness Subscale

STROOP LOG C/B

Low		Medium		High	
Female	Male	Female	Male	Female	Male
.231 (.064)	.158 (.038)	.160 (.041)	.197 (.038)	.190 (.042)	.169 (.063)

Source	Sum of Squares	DF	Mean Square	F	p
Sex	.0053	1	.0053	2.03	.16
Suscept.	.0031	2	.0016	.60	.55
Interaction	.0297	2	.0149	5.66	.01
Error	.1391	53	.0026		

PRIVATE SELF-CONSCIOUSNESS

Low		Medium		High	
Female	Male	Female	Male	Female	Male
8.40 (6.89)	9.10 (6.61)	10.00 (4.81)	5.33 (6.36)	5.00 (6.16)	11.80 (5.65)

Source	Sum of Squares	DF	Mean Square	F	p
Sex	13.14	1	13.14	.35	.56
Suscept.	11.83	2	5.92	.16	.85
Interaction	320.73	2	160.36	4.29	.02
Error	1982.90	53	37.41		