HYPNOTIC SUSCEPTIBILITY, DISSOCIATION, AND MARIJUANA USE: A RELATIONSHIP BETWEEN HIGH HYPNOTIC SUSCEPTIBILITY, MARIJUANA USE, AND DISSOCIATIVE ABILITY

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ABSTRACT

Participants were 413 introductory psychology students from West Chester University. Participants completed the AnomalousExperiences Inventory (AEI) (Kumar, Pekala, & Gallagher, 1994) and the Dissociative Experiences Scale (DES) (Bernstein &Putnam, 1986). Participants then experienced the Harvard Group Scale of Hypnotic Susceptibility (Shor & Orne, 1962). Participants were divided into five groups of low to high susceptible participants (based on their responses to the Harvard) and ANOVA analyses were performed for the AEI drug items (use of alcohol, LSD, cocaine, heroin, and marijuana) as a function of hypnotizability and dissociative ability. A significant interaction between drug use and hypnotizability as a function of dissociative ability was found only for the use of marijuana. For participants who were highly hypnotizable (Harvard Scale scores of 10 to 12), endorsement of having used marijuana was associated with .significantly higher DES scores of about 1 SD in comparison to those participants who did not use marijuana. The interrelationships among dissociation, marijuana use, and hypnotizability are reviewed with reference to the above research findings. Pending replication, implications concerning the use of marijuana as a means for experimentally assessing dissociative processes are discussed.

This paper first reviews current theorizing on the interrelationships among dissociation, the limbic system, marijuana intoxification, and hypnotizability and then delineates a research protocol that fortuitously discovered an interesting relationship between marijuana use, high hypnotizability, and dissociation that, pending replication, may have relevance for understanding the dissociative disorders.

DISSOCIATION AND THE LIMBIC SYSTEM

Multiple memory systems have been postulated for some time now (Tulving, 1972). The term, "multiple memory system," refers "to the idea that two or more (memory) systems are characterized by fundamentally different rules of operation" (Sherry & Schacter, 1987, p. 440). Tulving (1987) has proposed a three-tiered system involving procedural memory, semantic memory, and episodic memory. Procedural memory is action-based knowledge that refers to "knowing how," while semantic (general knowledge) and episodic memory (personal experiences) refer to "knowing that."

Although controversial (Wilhite & Payne, 1992) , research by several investigators has suggested the functional dissociation of various memory systems (McDonald & White, 1993; Wilhite & Payne, 1992). Kihlstrom (1980) demonstrated a dissociation between semantic and episodic tasks as a function of hypnotic susceptibility level. Specifically, he found "the hypnotizability of the participants (being) strongly associated with performance on the episodic but not on the semantic task" (1980, p. 234). McDonald and White (1993) postulated a physiological basis for the separation of memory systems. They suggested that: a) "a normal hippocampus appears to be necessary for tasks that require the use of information about relationships among stimuli" (1993, p. 3), b) the amygdala "may mediate the rapid acquisition of behaviors based on biologically significant events with affective properties" (p. 3), and c) the dorsal striatum "may mediate the formation of reinforced stimulus-response associations" (p. 3).

MARIJUANA, MEMORY, AND THE LIMBIC SYSTEM

Cannabis intoxification has been implicated in the manifestation of dissociation. Marijuana has been found to affect short-term memory in clinical participants (Schwartz, 1991). Not only is there an immediate decrement in short-term memory, but this recent memory decrement can have more long-term effects. Its continuation is dependent on the amount of tetrahydrocannabinol (THC) in the limbic system. Essman (1984) made a distinction between the immediate decrements in short-term memory from acute marijuana intoxification and a "retroactive memory impairment apparently resulting from the disruption by marijuana or one of its constituents of memory-trace consolidation" (1984, p. 566). He suggested that this latter effect is dependent "upon delta-9-THC accumulation in the hippocampus" (p. 563).

A relationship between marijuana use, human memory, and dissociation was posited over two decades ago (Stillman, Weingartner, Wyatt, Gillin, & Eich,1974). Stillman et al. found that participants recalled material better when they were in the same marijuana drug state as when they learned the material than if they learned the material in a marijuana-intoxicated state and then tried to recall it in a sober state. They observed that state-dependent recall phenomenawith marijuana in toxification has been demonstrated as well with other drugs, including alcohol, stimulants, and barbiturates.

However, these investigators found that the state-dependency effects of marijuana were test-specific, with the picture arrangement test showing "especially clear state-dependent effects" (Stillman et al., 1974, p. 84). This test relies on participants having to remember the order or sequence of the pictures and is consistent with the results of Hill, Schwin, Powell, and Goodwin (1973), who also found state-specific effects for recall of *ordered objects,* but not for word associations or word recall. Thus, marijuana intoxification appears to affect a particular type of memory processing, that is, the temporal ordering of information.

Further evidence concerning disruption of temporal memorywas noted by Melges, Tinklenberg, Hollister, and Gillespie (1970). They measured temporal disintegration (defined as a confusion of past, present, and future while a person attempts to pursue goals) both subjectively and objectively. It was subjectively measured by a self-report scale and was objectively measured by a (cognitive) mental arithmetic task. In addition, they measured depersonalization by a 12-item self-report inventory. Melges et al. found that increasing THC concentrations induced significantly greater subjective and cognitive temporal disintegration. Additionally, temporal disintegration and depersonalization were highly correlated (r = .87), suggesting that "as each subject became more temporally disorganized, he simultaneously became more depersonalized" (p. 207). The temporal disintegration was due to "mistakes in serially coordinating and keeping track of information in immediate memory" (p. 209).

Miller and Branconnier (1983) suggested that cannabis acts selectively on the limbic system by "modulating the activity of cholinergic neurons in the septal-hippocampal pathway" (p. 441), leading to inconsistent retrieval of information from memoryand memory intrusions. According to Miller and Branconnier, cannabis probably effects two cholinergic limbic circuits:

> the temporoammonic circuit, which consists of interconnections between the hippocampus, mammillary bodies, anterior and dorsal medial nuclei of the thalamus, limbic, temporal, and entorhinal cortices (Meissner, 1968); and the inhibitory septal-hippocampal circuits to the reticular activating system.(Miller & Branconnier, 1983, p. 453)

The first circuit would involve memory decrements involving ineffective retrieval of information from long-term memory, while the second circuit would lead to failure to habituate to novel or irrelevant stimuli.

Thus, it seems reasonable to suggest that the same or similar cortical systems are involved in marijuana-induced temporal disintegration and psychological dissociation - the limbic system.

THE LIMBIC SYSTEM AND HYPNOTIZABILITY

Hypnotizability also seems to involve the limbic system in an important way. Hypnotizability is a trait that relates to issues of increased absorption and attention (Hilgard, 1977; Kumar & Pekala, 1988, 1989). Crawford (1994) concluded from her review of the literature that high hypnotizables, relative to lows: a) "demonstrate greater cognitive flexibility, the ability to shift cognitive strategies, and states of awareness, than do lows" (p. 223), and h) have a greater ability "to sustain focused attention on relevant activities and disattend to non-important stimuli in the environment" (p. 223). She further posited that the anterior fronto-limbic system is crucial to this ability. She cited EEG, evoked potential, cerebral blood flow, electrodermal, and neuropsychological studies in support of her conclusions.

De Benedittis and Sironi (1986, 1988) have examined the electrical activity of the hippocampus and amygdala of epileptic patients during hypnosis. They suggested that the hypnotic trance state "is associated with the hippocampal activity, concomitantwith a partial amygdaloid complex functional inhibition" (1988, p. 104), and that two relatively discrete aspects of the limbic system, the hippocampus and the amygdala, are probably "the possible neurodynamic core underlying at least some aspects of trance experience" (1988, p. 101).

MARIJUANA, DISSOCIATION, HYPNOTIZABILITY, AND THE LIMBIC SYSTEM

The aforementioned review suggests that the hippocampal system and related limbic structures are involved in the changes in cognitive processes associated with dissociation, cannabis intoxification, and hypnotizability. Since marijuana affects the hippocampal system, specifically that part of the hippocampal system involved in the temporal ordering of information, studying the effects of marijuana on dissociative ability while controlling for hypnotizability may help to shed light on how dissociative ability and hypnotizability may be related.

The Present Investigation

When analyzing the data for another paper and focus (paranormal phenomena, dissociation, and hypnotizability) (Pekala, Kumar, & Marcano, in press), a significant interaction was found between hypnotizability, dissociation, and marijuana use. Given this significant finding, analyses were conducted to more fully determine and delineate the nature of this interaction, and if similar relationships might hold for the other items of the alcohol/drug subscale of the AEI. Because of the previously delineated relationships between the limbic system and dissociation, hypnotizability, and marijuana intoxification, it was hoped to determine if marijuana use might be significantly related to increased dissociative ability.

METHOD

Participants

Participants consisted of 413 individuals who took part in the study as part of a departmental course requirement. Participants were free to withdraw from the study at any time with impunity.

Materials

The Anomalous Experiences Inventory (AEI) (Kumar, Pekala, & Gallagher, 1994) was used to map unusual, paranormal, and anomalous experiences, abilities, and beliefs. The five subscales of the AEI include: anomalous/paranormal experiences, anomalous/ paranormal abilities, anomalous/paranormal beliefs, fear of the anomalous/paranormal, and use of drugs and alcohol. Of importance to the present paper is the use of drugs and alcohol subscale. It consists of seven items with a KR-20 value of .68. The seven items include: "I have tried mind-altering substances," "I have smoked marijuana," "I have taken LSD," "I drink alcohol," "I have used cocaine," "I have used heroin," "I have had a psychic experience under the influence of drugs or alcohol." The AEI subscales appear to have reasonably good reliability and convergent validity (Gallagher, Kumar, & Pekala, in press) . The Harvard Group Scale of Hypnotic Susceptibility (Shor & Orne, 1962) was used to assess hypnotizability level. It is the standard instrument used to measure hypnotic susceptibility when participants are seen in groups (Brown & Fromm, 1986). The Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986; Carlson & Putnam, 1992) was used to assess for degree of dissociative experiences. It is one of the standard scales for measuring dissociation (Ross, 1989).

Procedure

Participants first completed the AEI (Kumar, Pekala, & Gallagher, 1994) and the DES (Bernstein & Putnam, 1986; Carlson & Putman, 1992). Participants then experienced the induction procedure of the Harvard Group Scale of Hypnotic Susceptibility (Shor & Orne, 1962). After coming out of the induction, the participants completed the response items of the Harvard.

RESULTS

Preliminary Analyses

A score for the AEI "use of drugs/alcohol" subscale was computed for all participants. It was simply the average score per item. Scores were also obtained for the DES and the Harvard. The mean and standard deviation for the Harvard (all participants) was 6.14 (SD = 2.86) and that of the DES was 17.78 (SD = 10.76); these values are consistent with those reported in the literature (Carlson &Putnam, 1993; Hilgard, 1965) .

Participants were divided into those who scored between 0 and 2 (n = 43, M = 1.14) on the Harvard, and those between 10 and 12 (n = 56, M = 10.59). (This was done to parallel cutoff scores for the Harvard distribution from the previous study, [Pekala, Kumar, & Cummings, 1992.]). The remaining subjects were divided into three groups of low-medium (scores of 3 - 4, n = 78, M = 3.44), medium (scores of 5 - 7, n = 159, M = 6.11), and high-medium (scores of 8 - 9, n = 77, M = 8.47) susceptible participants for a total of 5 groups.

Subjects were also divided into four groups of low (M = 4.69, range = 0 - 7, n = 51), low-medium (M = 11.60, range = 7 - 16, n = 158), high-medium (M = 20.77, range = 16 - 30, n = 51), and high (M = 38.34, range = 30 -71, n = 59) dissociative subjects (based on their score on the DES).

Correlations were computed between the Harvard, the DES, the drug subscale of the AEI, and the individual items of the drug subscale across all participants (n = 413). This was also done with only high hypnotizable and high dissociative subjects. Across all subjects, the Harvard and the DES were positively correlated (I= .23, p < .001). However, none of the correlations between the DES and the drug subscale of the AEI or its individual items, were significant at the Al level. (See Column 1 of Table 1 for the individual correlations.)

Table 1 also lists the correlations between the Harvard, the DES, the drug/alcohol subscale, and the individual items of that subscale for high hypnotizables and high dissociatives. None of the correlations between the individual items of the drug/alcohol subscale and the DES were significant except for a significant correlation between marijuana use and dissociation for highly hypnotizable subjects (r = .40. p <.001).

Main Analyses

A 5 (hypnotizability level) by 2 (drug use: "yes" versus

TABLE 1
Pearson Correlations Among Selected Variables for All Subjects and High Susceptibles/High Dissociatives [a]

Variables 1 - 10 are the same as vertically-listed variables on the left.

Variable	DES [b] Score	1. [c]	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. DES score			.29	.08	.10	.20	-.03	.06	-.02	-.11	
2. Harvard Score	.2'3	.34		.22	.15	.26	.11	-.11	.05	.32	
3. Drug/Alcohol Subscale	.09	.27	.09		.77	.69	.58	.34	.42	.58	
4. Mind-altering substances	.06	.20	.08	.81		.43	.31	.20	.19	.30	
5. Use of marijuana	.09	.40	.15	.77	.64		.20	.26	.01	.22	
6. Use of LSD	-.01	.05	-.03	.35	.02	.05		-.13	.62	A1	
7. Use of alcohol	.09	-.23	-.09	.26	.19	.03	-.28		-.35	-.15	
8. Use of cocaine	-.04	.16	-.02	.38	.21	.24	.17	-.15		.47	
9. Psychic experiences under drugs/alcohol	.10	.26	.16	.57	.34	.30	.13	-.06	.20		
10. Use of heroin [d]	.00										

'High susceptible subjects (n - 56) are below the diagonal; high dissociative subjects (n = 59) are above the diagonal.

[b] *Correlations between DES scores and variables I - 10. (n = 413)*

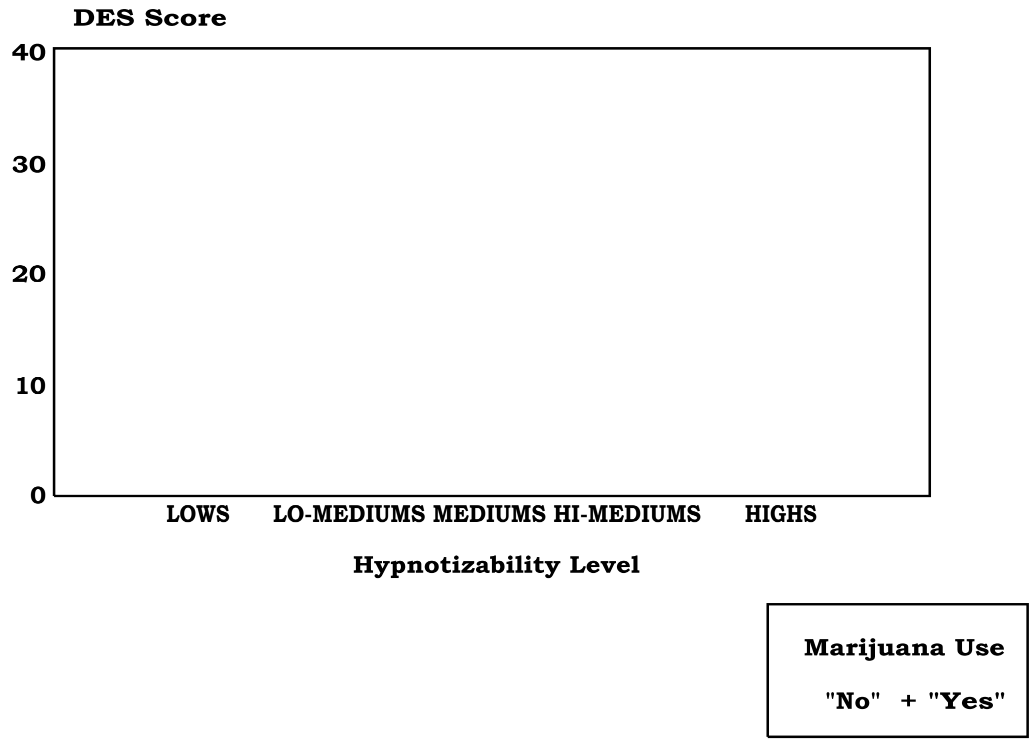
'Correlations greater than .25 are significant at the .05 level. Correlations greater than .33 are significant at the .01 level.

[d] *A correlation was not computed due to the very small number of "yes" responses for heroin use.*

"no") ANOVA was then computed for each of the five drug items (alcohol, LSD, cocaine, heroin, and marijuana) of the AEI subscale using the DES score as the dependent variable using SYSTAT (Wilkinson, 1988). Alpha was set at .01 using the Bonferroni correction procedure due to the five analyses being made (Kirk, 1968).

The main effect for drug use was not significant for any of the five analyses. There was a significant main effect for hypnotizability for two of the five analyses: LSD: $F(1, 403) = 4.95$, $p < .001$; and cocaine: $F(1, 403) = 5.14$, $p < .001$. With an increase in hypnotizability, there was a significant increase in dissociative ability across participants for the two drug

FIGURE 1
DES Score as a Function of Hypnotizability Level and Marijuana Use



items. The ANOVA could not be computed for the heroin item, due to the very small n for the "yes" cell.

Finally, there was a significant interaction, $F(4, 403) = 4.35$, $p < .003$, between marijuana use and hypnotizability. Figure 1 graphs the nature of this interaction. DES scores remain somewhat the same across all five hypnotizability groups if the participants responded "no" to the item: "I have smoked marijuana." However, if participants endorsed this item, then dissociative ability generally increased as hypnotizability did.

A post-hoc trend analysis using Scheffe's procedure was conducted assessing for trends separately for participants who answered "yes" and "no to marijuana use. (Sheffe's procedure was used so as to he conservative, [Kirk, 1968]). For the participants who smoked marijuana (the rising curve of Figure 1) , the linear trend, $F(1, 403) = 31.17$, $p < .01$) was significant. The quadratic, cubic, and quartic trends were not significant. For participants who did not smoke marijuana, none of the trends were significant.

Post-hoc analyses using Sh effe's procedure were also done to determine if mean DES scores differed for those participants who endorsed using marijuana versus those who did not for each of the five hypnotizability groups (see the far right group depicted in Figure 1). For the five comparisons, only the difference for the high susceptibility group was significant, $F(1,403) = 15.87$, $p < .05$. High susceptible participants who endorsed "yes" to the marijuana item ($n = 22$; $M = 28.90$; $SD = 15.1$) versus high susceptible participants who endorsed "no" ($n = 34$; $M = 17.85$; $SD = 10.9$) were about 1 SD apart (if the SD for high susceptibles who said "no" is used as the criterion).

Additional Analyses

To determine if high hypnotizables may have been more likely to use marijuana than low (or medium) hypnotizables, Chi-square analyses were computed with hypnotizability (the five groups of hypnotizable subjects) as the independentvariable and a frequency count of marijuana use as the dependent variable. A significant difference was not found between groups (Chi-square = 6.00, $p < .20$) as a function of marijuana use.

To determine if high dissociatives may have been more likely to use marijuana than low (or medium) dissociatives, Chi-square analyses were then computed with dissociation (the four groups of dissociative subjects) as the independent variable and a frequency count of marijuana use as the dependent variable. A significant difference was not found between groups (Chi-square = 4.78, $p < .19$).

DISCUSSION

Dissociation, Hyjmotizability, and Marijuana Use

Asignificantinteraction between marijuana use and high hypnotizability as a function of dissociation was found in the present investigation. Those high susceptible participants who reported they smoked marijuana were more likely to be dissociative than those high susceptible participants who did not endorse that item. The significant linear trend for participants who smoked marijuana suggests that the relationship between hypnotizability and dissociation is a linear one, although differences between "yes" and "no" responders were only significant at the high susceptibility level. There was no significant trend for those participants who responded "no" to marijuana use.

The Chi-square analyses across the hypnotizability and dissociative ability groups suggests that there was *neither a* significant association between smoking marijuana and hypnotizability *nor* dissociation. Hence, it cannot be said that the results of the present study are due to increased marijuana use by high hypnotizable or high dissociative subjects vis-a-vis lows.

A very important question then becomes the direction of causality, that is, whether highly hypnotizable participants are more likely to become dissociative by smoking marijuana; or does high hypnotizability, in conjunction with high dissociative ability, lead to increased marijuana use? Because of the correlational nature of the present study, the question of causality cannot be answered here.

Corroborative Evidence

The question can also be asked if there is any other published data available to support the fortuitous finding of the present study concerning the relationship between marijuana use, hypnotizability, and dissociation. Although a literature search did not uncover any directly supporting evidence, a paper by Tart (1993) is suggestive. Tart, in an article on "Marijuana intoxification, psi, and spiritual experiences," reviewed results from three studies that he did with colleagues concerning marijuana use and psychic experiences. Whereas the first study found that experienced marijuana users reported a higher rate of psychic experiences than would be expected by chance, the second study found a "positive correlation between laboratory ESP scoring and frequency of marijuana use outside the laboratory in a student population" (p. 149). However, the third study failed to confirm these findings. In summarizing the results, Tart suggested that "marijuana, used under the proper psychological conditions, might facilitate the manifestation of psi" (p. 149) .

Since reported paranormal and anomalous experiences are correlated with high dissociative capacity (Braude, 1986; Pekala, Kumar, & Marcano, in press; Richards, 1991), and marijuana may augment psychic experiences (Tart, 1993), marijuana use may facilitate psi by way of increasing psychological dissociation, which manifests itself most notably (and significantly) with highly hypnotizable subjects.

Conclusions **and** *Limitations*

The research reviewed in the introduction suggests that the dissociation of memory involves the limbic system (McDonald & White, 1993). Marijuana appears to specifically affect the temporoammonic circuit which includes the hippocampus and the inhibitory septal-hippocampal circuits (Miller & Branconnier, 1983) and research by De Benedittis and Sironi (1986, 1988) also implicates the hippocampus and amygdala as mediating hypnotic ability. Thus, neurobiological research suggests that the hippocampal circuits are the common link between hypnotizability, dissociation, and marijuana intoxification.

Given the complicated nature of memory (Tulving, 1987) , it cannot be expected that the relationships among these variables would be easily understood. However, the finding of a relationship between marijuana use, dissociation, and high hypnotizability suggests that the THC in marijuana may be associated with a modification of the hippocampal circuits of highly hypnotizable participants leading to an increase in dissociative ability for these individuals. A replication study is needed.

If replicated, these findings may help to supply a methodology whereby dissociation may be experimentally investigated, and hence may have relevance to understanding dissociation in clinical populations (Kluft. & Fine, 1993; Putnam, 1989; Ross, 1989).

However, even if the relationship holds between marijuana use and increased dissociative ability for high susceptibles it is unknown if this relationship would hold across clinical populations because the present study used only college students. Neither was a clinical population surveyed nor was data gathered as to whether the marijuana use was current and/or chronic. Hence, many questions remain to be further investigated.

Although drug (heroin, cocaine, LSD) and alcohol abuse was found to be associated about 40% of the time with a dissociative disorder in a study by Ross, Kronson, Koensgen, Barkman, Clark, and Rockman (1992), it is unknown if or how marihuana use figured into this relationship. It is also unknown at this time if the use of marijuana with high susceptible individuals has cumulative effects and/or if the use has to be current for the increase in dissociative ability to present itself. But the data, especially given the pharmacological and psychophysiological reactions of marijuana on the brain, suggest that the relationship between dissociation and marijuana use as a function of hypnotizability appears to be a plausible one, and one that needs to be more fully investigated. ■

REFERENCES

Bernstein, F. M., & Putnam, F. W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous and Mental Disease, 174, 727-735.*

Braude, S. E. (1988). Mediumship and multiple personality. *Journal for the Society for Psychical Research, 55,* 1.77-195.

Brown, D. P., & Fromm, E. (1986) . *Hypnotherapy and hypnoanalysis.* Hilldale, NJ: Lawrence Erlhaum Associates.

Carlson, E. B., & Putnam, E. W. (1992). *Manual for the Dissociative Experiences Scale.* Washington, DC: National Institutes of Men tal 1 lealth.

Carlson, E. B., & Putman, E. W. (1993). An update on the Dissociative Experiences Scale. *DISSOCIATION, 6,* 16-27.

Crawford, H. J. (1994). Brain dynamics and hypnosis: Attentional and disattentional processes. *International Journal of Clinical and Experimental Hypnosis,* 42, 204-231.

De Benedittis, G., & Sironi, V. A. (1986). Deep cerebral electrical activity in man during hypnosis. *International journal of Clinical and Experimental Hypnosis, 34, 63-70.*

De Benedittis, G., & Sironi, V. A. (1988). Arousal effects of electrical deep brain stimulation in hypnosis. *International Journal of Clinical and Experimental Hypnosis, 36,* 96-101.

Essman, E.J. (1984). Marijuana intoxification in rats: Interruption of recent memory and effect on brain concentration of delta 9-tetrahydrocannabinol. *Psychological Reports, 55, 563-567.*

Gallagher, C., Kumar, V. K., & Pekala, R. J. (in press). The Anomalous Experiences Inventory: Reliability and validity. *Journal of Parapsychology.*

Hilgard, E. R. (1965). *Hypnotic susceptibility.* New York: Harcourt Brace Jovanovich.

Hilgard, E. R. (1977) . *Divided consciousness: Multiple controls in human thought and action.* New York: Wiley.

Hill, S. Y., Schwin, R., Powell, B., & Goodwin, D. W. (1972). State-dependent effects of marijuana on human memory. *Nature, 243,* 241-242.

Kihlstrom, J. F. (1980). Posthypnotic amnesia for recently learned material: Interactions with "episodic" and "semantic" memory. *Cognitive Psychology, 12,* 227-251.

Kirk, R. E. (1968) . *Experimental design: Procedures for the behavioral sciences.* Belmont, CA: Brooks/Cole.

Kluft, R. P., & Fine, C. G. (Eds.). (1993). *Clinical perspective on multiple personality disorder.* Washington, DC: American Psychiatric Press.

Kumar, V. K., & Pekala, R.J. (1988). Hypnotizability, absorption, and individual differences in phenomenological experience. *International_ journal of Clinical and Experimental Hypnosis, 36,* 80-88.

Kumar, V. K., & Pekala, R. J. (1989). Variations in phenomenological experience as a function of hypnosis and hypnotic susceptibility: A replication. *British Journal ofExperimental and Clinical Hypnosis,* 6, 17-22.

Kumar, V. K., Pekala, R. J., & Gallagher, C. (1994). *The Anomalous Experience Inventory.* Unpublished psychological test: West Chester University.

McDonald, R. J., & White, N. M. (1993). A triple dissociation of memory systems: 14ippocampus, amygdala, and dorsal striatum. *Behavioral Neuroscience, 107, 3-22.*

Meissner, W. W. (1968). Learning and memory in the Korsakoff syndrome. *International Journal of Neuropsychiatry,* 4, 6-20.

Melges, F. T., Tinklenberg, J. R., Hollister, L. E., & Gillespie, H. K. (1970) . Temporal disintegration and depersonalization during marihuana intoxification. *Archives of General Psychiatry, 23,* 204-210.

Miller, L. L., & Branconnier, R. J. (1983). Cannabis: Effects on memory and the cholinergic limbic system. *Psychological Bulletin,* 93, 441-456.

Pekala, R.J., Kumar, V. K, & Cummings, J. (1992). Types of high hypnotically susceptible individuals and reported attitudes and experiences of the paranormal and the anomalous. *JournaloftheAmencan Society for Psychical Research, 86,* 135-150.

Pekala, R. J., Kumar, V. K, & Marcano, G. (in press). Abnormal personal experiences, hypnotic susceptibility, and dissociation. *Journal of the American Society of Psychical Research.*

Putnam, F. (1990). *Diagnosis and treatment of multiple personality disorder.* New York: Guilford.

Richards, D. G. (1991). A study of the correlations between subjective psychic experiences and dissociative experiences. *DISSOCIATION,* 4, 83-91.

Ross, C. (1989). *Multiple personality disorder: Diagnosis, clinical features, and treatment.* New York: John Wiley.

Ross, C. A., Anderson, G., Frazer, G. A., Reagor, P., Bjornson, L., & Miller, S. D. (1992). Differentiating multiple personality disorder and dissociative disorder not otherwise specified. *DISSOCIATION,* 5, 87-90.

Ross, C. A., Kronson, J., Koensgen, S., Barkman, K, Clark, P., & Rockman, G. (1992). Dissociative comorbidity in 100 chemically dependent patients. *Hospital and Community Psychiatry, 43,* 840-842.

Schwartz, R. H. (1991). Heavy marijuana use and recent memory impairment.. *Psychiatric Annals,* 21, 80-82.

Sherry, D. F., & Schacter, D. L. (1987) . The evaluation of multiple memory systems. *Psychological Review,* 94, 439-454.

Shor, R. E., & Orne, E. C. (1962). *The Harvard Group Scale of Hypnotic Susceptibility.* Palo Alto, CA: Consulting Psychologists Press.

Stillman, R. C., Weingartner, Wyatt, R. J., Gitlin, J. C., & Eich, J. (1974) . State-dependent (dissociative) effects of marihuana on human memory. *Archives of General Psychiatry,* 31, 81-85.

Tart, C. T. (1993) . Marijuana intoxiFication, psi, and spiritual experiences. *Journal of the American Society for Psychical Research, 87,* 149-170.

Tulving, E. (1972) . Episodic and semantic memory. In *Organization and Memory. In* E. Tulving & W. Donaldson (Eds.) . New York: Academic Press.

Tulving, F. (1987). Multiple memory systems and consciousness. *Human Neurobiology, 6,* 67-80.

Wilhite, S., & Payne, D. (1992). *Learning and memory: The basis of behavior.* Boston: Allyn & Bacon.

Wilkinson, L. (1988). *SYSTAT* Evanston, Illinois: SYSTAT.

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