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The Role of Individual Differences in Learning Alcohol Expectancy Associations

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THE ROLE OF INDIVIDUAL DIFFERENCES IN LEARNING
ALCOHOL EXPECTANCY ASSOCIATIONS

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
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For Ari and Riley

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The Role of Individual Differences in Learning Alcohol Expectancy Associations

Howard R. Steinberg

ABSTRACT

Alcohol expectancy theory suggests that genetically influenced personality characteristics may lead to differential acquisition of expectancy information, and that this information then may serve as one mediational pathway for alcoholism risk. Research has already shown that expectancy information can predict and even mediate risk, but it has yet to be shown that personality traits can influence the acquisition of alcohol expectancy information. To that end, personality characteristics known to be risk factors for the development of excessive alcohol use were assessed in 83 male undergraduates. In addition, each participant studied, in a paired-associate learning/cued-recall test paradigm, a list of word pairs matching alcohol content words (keg, beer), positive/arousing alcohol expectancy words (happy, fun), and neutral words (backpack, desk). Their rate of learning the second word from each pair after being cued with the first word was then assessed across three trials of this task, and overall learning of the pairs was then assessed using free-recall. To determine whether learning rates for each type of word pair was a function of participants' status on the personality risk measures, hierarchical regression analyses were conducted for cued- and free-recall data.

Results indicated that higher sensation seeking, more drinking-related problems, and a lesser degree of a family history of alcohol problems were predictive of greater

recall for word pairs containing alcohol and expectancy information. Consistent with predictions, these risk indicators were also associated with a higher rate of learning for the alcohol and expectancy pairs.

These findings suggest that significant differences exist in the ability to learn alcohol to expectancy word associations, and lend support to recent theories that implicate individual difference factors as a predisposition for the development of problematic alcohol to expectancy associations in memory.

Introduction

Alcohol abuse and dependence are among the most prevalent and debilitating disorders experienced in society (NIAAA, 1997). The problems that occur as a consequence of alcohol misuse are not limited to the physical, social, and psychological difficulties faced by the individual drinker. The impact is felt by the individual's family, friends, and community, and is often the source of great expense and danger to society as well. Although there are a number of treatment approaches for alcohol problems, identifying the initiating and maintaining factors involved in the disorder is of utmost importance.

For a number of years, attempts have been made to ascertain the most significant risk factors for the development of alcohol problems (e.g. Schuckit, 1998; Sher, Walitzer, Wood, & Brent, 1991). Such risk indicators run the gamut from distal genetic and biological predisposition to more proximal environmental influences. Additionally, the wide array of these biological, psychological and sociological factors may interact to form variations of risk patterns. The multifaceted nature of this etiological process has made it increasingly important to focus upon mechanisms by which risk variables may lead to alcohol use and abuse.

One likely possibility for such an intervening factor is information that one holds in memory concerning the possible outcomes associated with drinking alcohol. Based upon the relationship between an individual's learning history and observable behavior,

alcohol expectancies provide information concerning “if-then” contingencies that help determine one’s drinking behavior in various contexts (Goldman, 1999; Goldman & Rather, 1993). Numerous investigations of the predictive capacity of alcohol expectancies in diverse populations, as well as studies demonstrating the manipulation of expectancies to reduce drinking, have supported the importance of this line of research (see Goldman, 1994; 1999).

Recent evidence has supported the role of alcohol expectancy as a mediator between a number of risk factors for alcohol misuse and drinking (Finn, Sharkansky, Brandt, & Turcotte, 2000; Henderson, Goldman, Coover, & Carnevala, 1994). Though individual differences on these measures of risk exist, the process by which such factors affect the development and maintenance of alcohol expectancies is largely unknown. It may be the case that some individuals come *prepared* (McCarthy, Kroll, & Smith, 2001) to develop specific types of alcohol to outcome expectancy associations due to predisposing factors. More specifically, certain characteristics may put an individual at risk for developing these types of associations in memory. Following a review of the alcohol expectancy literature, as well as the literature on risk for alcohol abuse, this paper will attempt to address some of these issues.

History of the Expectancy Concept

The expectancy concept has a considerable history predating the construct’s current status in the literature. In his writings amidst the predominantly behavioral atmosphere of his time, Tolman (1932) proposed the existence of expectancy as a mechanism which occurred between a stimulus and a response. He believed that such

cognitive variables, stored in memory over time, had the ability to provide an organism with the expectation of an outcome in the presence of similar stimuli. Attempting to address the lack of clarity present in the formulation of the expectancy concept by Tolman and other expectancy theorists, MacCorquodale and Meehl (1953) offered a set of postulates and quantitative derivations aimed at systematizing those previous theories. Rotter (1954) embraced the expectancy construct in his elucidation of social learning theory. Defining expectancies as probabilistic relationships between reinforcements and behaviors, he placed a greater emphasis on the subjective utility of the reinforcement that an individual would expect from performing a specific behavior.

Bolles (1972) proposed that expectancy may be understood to be the learning of a contingency (S-S*) between environmental stimuli (S) and certain biologically pertinent consequences or events (S*), or an expectancy of a response (R)-outcome (R-S*) contingency which is learned. He explicitly defined expectancies as new information gained about the environment, which is processed and stored in memory for future use by the organism. Later, Bandura (1977) outlined the importance of efficacy expectations as the belief that one can successfully perform a behavior to produce a given outcome.

Definition of Alcohol Expectancy

The application of the expectancy concept to the study of drinking behavior has not greatly altered its earlier conceptualization. In the most general sense, alcohol expectancies refer to the anticipated consequences of using alcohol. This relationship between alcohol and its expected effects is of an “if-then” variety (Goldman, 1999; Goldman, Brown, & Christiansen, 1987). For example, one might expect that *if* he or she

were to drink two beers, *then* he or she would feel tired. The anticipated consequence of feeling tired after drinking may prove vital in an individual's decision to drink. However, due to the variety of different experiences and learning histories people maintain, their expectancies of reinforcement from drinking may differ dramatically. This disparate expectancy information, assumed to be stored in memory, has been shown to play a mediating role in an individual's decision to drink. To take it one step further, those who expect more positive outcomes from drinking (measured through the assessment of these expectancies) will most likely drink more often to obtain those outcomes when compared to those who expect less positive outcomes. This description might suggest that we maintain control over these expectancies, as well as over our decisions to drink. However, research has suggested that such behaviors often become automatized, or appear to take place without any conscious thought or specific attention (Chenier & Goldman, 1992; Roehrich & Goldman, 1995).

Perhaps the most striking aspect of the "expectancy effect" and what helps define it as distinct from total pharmacological influence, are the numerous and varied outcomes that individuals anticipate will occur after the consumption of alcohol. Changes in aggressive behaviors, sexual arousal and disinhibition, tension reduction, as well as changes in overall sociability, have long been attributed to the drug effects of alcohol. Interestingly, alcohol's pharmacological effects work in direct opposition to a number of the drug's expected effects. During the past twenty-five years or so, a number of investigators have attempted to identify the true effects of alcohol on human behavior. Many of their studies have focused upon the importance of cognitive factors in the

display of post-alcohol use behavior. One of the most useful and controversial methodological strategies applied towards this goal has been the balanced placebo design.

The Balanced Placebo Design

Strongly rooted in the field of medicine for its use as both a treatment, as well as a control procedure for the evaluation of drug effects (Marlatt & Rohsenow, 1980), placebos have been widely utilized and adapted for numerous purposes. Researchers conducting studies examining the pharmacological effects of drugs administer placebos in order to control for the *nonspecific* factors that might cloud their findings of a true drug effect. The “placebo effect” itself, however, never gained attention as a variable of interest until recently. Using both the single- and double-blind methods, investigators were led to the conclusion that, although these methods allow for the control of drug effects, as well as experimenter bias (or expectancy in the latter case), they do not control for the effects of participants’ expectancies. Carpenter (1968) suggested that an “antiplacebo” procedure should be used in order to get at the true pharmacological effects of a drug while controlling for the subject’s expectancy for receiving the drug. His work, along with early applications of the design he proposed to amphetamine effects, set the stage for the application of what is now termed the balanced placebo design to studying the effects of alcohol (see Marlatt & Rohsenow, 1980).

The balanced placebo design entails adding two additional conditions to a traditional placebo design. This typically results in a 2 X 2 factorial design in which half of the participants receive an alcoholic beverage while the other half do not. Within each of these groups, half of the subjects are told that they will receive alcohol while the other

half are told that they will not be receiving alcohol. This design sets the alcohol administration conditions and the instructions of whether alcohol was given, to be completely crossed allowing for analyses of all conditions. Perhaps the most significant feature of the design is its ability to allow the researcher to observe the expected effects of alcohol independent of its pharmacological effects in the ‘received no alcohol but told alcohol’ cell.

In the early 1970’s, researchers studying the “loss of control drinking” phenomenon applied the balanced placebo design to alcohol for the first time (Engle & Williams, 1972; Marlatt, Demming, & Reid, 1973). Since these early studies, a number of investigators have utilized this design to attempt to identify the true effects of alcohol as well as the expected effects of its use. Aggression, tension-reduction, sexuality, as well as motor and cognitive performance have all been the subject of investigation using the balanced placebo design (see Hull & Bond, 1986; Goldman et al., 1987).

Although the balanced placebo design has aided researchers in clarifying the effects of alcohol and alcohol expectancies on a number of behavioral and cognitive variables, it is not without criticism. Many of the early problems addressed by investigators focused upon ensuring that the deception of participants in the appropriate conditions was believable. A number of procedures were proposed in order to help secure the subjects’ ignorance of the experimental manipulations (Rohsenow & Marlatt, 1981). One later investigation found that after careful manipulation checks, the expectancy effect was detected as being highly attributable to experimenter demands (Knight, Barbaree, & Boland, 1986), although some of the findings of this study remain questionable (Collins & Searles, 1988). Additional methodological problems with the

balanced placebo design involving the “dosage set” with which it may be used have also been investigated, and possible improvements in the design have been proposed as well (Martin & Sayette, 1993; Ross & Pihl, 1989). It is important to note, however, that such criticism has been directed at the balanced placebo methodology, and not at the reality of the placebo effect.

Assessment of Alcohol Expectancies

With evidence pointing towards the existence of true expectancy effects for alcohol use came the need to identify and quantify the range of these effects. Placebo based investigations demonstrated that, although not all behaviors could be affected by a placebo administration, many behaviors such as increased alcohol consumption and increased sexual arousal, often times were. The development of psychometric instruments designed to gauge the contribution of alcohol expectancies to a wide variety of behaviors has advanced our knowledge of these effects. Many scales have been designed exclusively for this purpose, and a recent meta-analysis of expectancy measurement demonstrated the utility of reliably measuring a broad range of expectancy content (McCarthy & Smith, 1996). Some alcohol expectancy measures include the Alcohol Effects Scale (AES; Southwick, Steele, Marlatt, & Lindell, 1981), the Effects of Drinking Alcohol Scale (EDA; Critchlow, 1987), and the Alcohol Expectancy Questionnaire (AEQ; Brown, Christiansen, & Goldman, 1987) which has been recognized as the most widely used expectancy questionnaire in the field (Leigh, 1989).

The AEQ is comprised of six factors that characterize the empirically derived domains of the positive effects of drinking alcohol. These factors have been identified as

alcohol; 1) being a global positive transforming agent, 2) enhancing sexual performance, 3) enhancing social and physical pleasure, 4) increasing social assertiveness, 5) providing relaxation/tension reduction, and 6) increasing power and aggression. A recent confirmatory factor analysis investigation of the AEQ found support for a hierarchical structure of alcohol expectancies (Goldman, Greenbaum, & Darkes, 1997). Importantly, both the common and unique variance associated with the factors of the AEQ predicted alcohol use at a one-year follow-up.

Although it does not contain the entirety of effects that individuals may expect from drinking alcohol (Brown, Goldman, Inn, & Anderson, 1980), the AEQ has demonstrated its utility in numerous studies. Specifically, higher scores on the AEQ have been related to higher levels of drinking, (Brown, Goldman, & Christiansen, 1985), have aided in the prediction of college drinking styles (Brown, 1985a), and were found to be related to treatment outcome at one year follow-up among male inpatient veterans (Brown, 1985b).

Following the creation of scales to assess alcohol expectancies in adults came the inevitable investigations of these same effects in adolescents and children. In an attempt to capture this information in adolescents, Christiansen, Goldman, and Inn (1982) developed the AEQ-Adolescent form (AEQ-A). The seven factors identified for the adolescent version were quite consistent with the adult version of the questionnaire. This was most likely due in part to the similarities in expectancies between these groups, as well as the similar methodologies used to identify the existing factors. Differing in perhaps a predictable manner is the addition of factors pertaining to the cognitive and

motor functioning of the adolescent, as well as the possibility of alcohol causing negative social change.

Miller, Smith, and Goldman (1990) attempted to identify the presence of alcohol expectancies in elementary school children as young as six years of age. Using puppets to help make the information from the AEQ-A comprehensible for the children in what they termed the CARE procedure (Children's Alcohol Related Expectancies), the authors were able to reach a number of important conclusions. Perhaps the most striking findings indicated that children's alcohol expectancies became increasingly more positive with age, and that this increase was the most dramatic in the third and fourth graders. These results converge with the findings of a recent study by Dunn and Goldman (1996) in which expectancies were measured in children using a more traditional, Likert-type scale. In addition to an increase in positive expectancies, Dunn and Goldman identified the formation of expectancies along an arousal dimension similar to the dimension found in adults (see Rather, Goldman, Roehrich, & Brannick, 1992). As in the study mentioned previously, these positive and arousing expectancies were also found to be most noticeable sometime between the third and fourth grades. This "critical period" in a child's life appears to be a necessary focus for primary prevention efforts aimed at stopping the initiation of drinking. Modifying these expectations at such an early age may prove to be the most significant contribution of this line of research.

Validity of the Expectancy Construct

Measurement of alcohol expectancies is useful only to the extent that predictions may be made concerning the relationship between expectancy information and other

variables of interest. Numerous investigations have provided empirical support for expectancy as a causal factor in drinking. A recent review of the alcohol expectancy literature (Goldman, Del Boca, & Darkes, 1999) identified six study design categories representing increasingly stringent criteria for providing evidence of a process or mediational role for expectancies (Goldman et al., 1999). These categories include: 1) expectancies correlated with drinking; 2) cross-sectional measurement of expectancies prior to drinking onset; 3) longitudinal designs; 4) the influences of expectancy and drinking on each other; 5) mediational models of covariation; and 6) experimental manipulation of expectancies.

Correlational evidence. A variety of alcohol expectancy measures have been found to correlate with drinking. This relationship has been documented in adults (Brown, 1985a, 1985b; Brown, Goldman, & Christiansen, 1985; Cooper, Russell, Skinner, & Windle, 1992), adolescents (Christiansen & Goldman, 1983; Christiansen, Smith, Roehling, & Goldman, 1989; Smith & Goldman, 1990; Sher, Walitzer, Wood, & Brent, 1991), and in children (Miller, Smith, & Goldman, 1990). Recently, a meta-analysis of 53 such studies found an effect size of .44 for expectancies predicting quantity/frequency of alcohol use and alcohol problems (McCarthy & Smith, 1996). Additionally, the variance accounted for in drinking varied quite a bit from study to study. The authors noted that when longer expectancy scales were used (covering more content), a greater relationship was found between expectancies and drinking. Significantly related to the present study, McCarthy & Smith (1996) urged investigators to cease conducting simple correlational research in favor of finding variables that may moderate this relationship.

Cross-sectional designs. Cross-sectional expectancy research has been conducted with children and adolescents in an effort to identify alcohol expectancies in populations that have not yet begun to drink alcohol (e.g., Dunn & Goldman, 1996). This line of research has demonstrated that expectancy information does not have to be learned from hands on experience with alcohol, but instead may be gathered in a vicarious manner. Though alcohol expectancy information gleaned from the youngest participants is typically negative, more positive expectations result over time (Dunn & Goldman, 1996). Such positive change in expectancy information as one nears typical drinking age strongly implicates the role of expectancy in an unfolding process.

Longitudinal designs. Longitudinal studies demonstrating how expectancies precede drinking behavior within participants have provided persuasive evidence for expectancy as an important mediator. In one study, alcohol expectancies of 7th and 8th graders were found to account for approximately 25% of the variance in predicting drinking one year later (Christiansen et al., 1989). Similar results were found by Stacy and his colleagues over a nine year span (Stacy, Newcomb, & Bentler, 1991). Additionally, expectancies in adolescence predicted adult drug use while also controlling for the individuals' drug use at the first time point.

Expectancy – drinking reciprocity. Demonstrating that changes or differences in expectancies can predict drinking, and that subsequent drinking levels can predict expectancies is strong evidence for the expectancy process (Goldman et al., 1999). This reciprocal effect was demonstrated in two notable studies in which a decrease (Sher, Wood, Wood, & Raskin, 1996), and an increase (Smith, Goldman, Greenbaum, &

Christiansen, 1995) in drinking and expectancies were noted over relatively long follow-up periods.

Expectancy mediating other risk factors. A number of biopsychosocial variables have been found to be associated with a greater risk for the development of alcohol problems. Recent investigations utilizing covariance structure modeling approaches have demonstrated alcohol expectancies to be partial mediators between such risk factors and alcohol use (Finn et al., 2000; Henderson et al., 1994; Sher et al., 1991; Webb, Baer, Francis, & Caid, 1993; Smith & Goldman, 1990; Smith, McCarthy, Kroll, & Miller, 1998). The importance of each of these risk factors, and their relationship with expectancies and drinking, will be discussed in detail later in this paper.

Experimental manipulation of expectancies. The knowledge that alcohol expectancy formation begins at an early age has led researchers to hypothesize the extent to which such information gathered in early life has an effect upon adult behavior. Assuming that this information is most likely stored as a semantic network in long-term memory (Goldman, Del Boca, & Darkes, 1999; Rather et al., 1992), attempts to alter these long standing and firmly held relationships would appear difficult. However, successful changes in drinking behavior following a manipulation of these expectations would provide strong evidence for the mediational role that alcohol expectancies play in the decision to drink (Goldman, 1999). A number of recent investigations have been directed towards establishing this mediational relationship in what have come to be called “expectancy challenge” studies. By experimentally manipulating the expectancy levels of certain participants and observing a change in drinking behavior, experimental

evidence for the mediational role of expectancies may be provided (Goldman et al., 1999; Darkes & Goldman, 1993).

Early studies using the challenge procedure demonstrated promising findings. Henderson and Goldman (1987) found that female participants' drinking decreased at two-week follow-up after participation in a simple challenge experiment. In this study, participants were administered a placebo beverage and then told of its contents after they displayed intoxicated like behavior. In a more extensive application of the paradigm, Massey and Goldman (1988) found similar results for an extended intervention over a follow-up period of four weeks. In addition, they found that moderate to heavy drinking females responded better to the challenge procedure than to a traditional program of intervention (see Goldman et al., 1991).

One of the more demanding tests of the mediational role of alcohol expectancies to date was a study conducted by Darkes and Goldman (1993) with moderate to heavy drinking male undergraduates. Using similar procedures to enact the challenge situation, the authors expanded upon the previous studies by addressing their limitations. For example, participants were male drinkers, which allowed for a better test of the effect of the manipulation (due to their greater variability in drinking compared with females), as well as added to the generalizability of the study. Also important was the use of a procedure that allowed for participants to undergo more than one expectancy challenge session. Consistent with findings from the earlier studies, participants in the expectancy challenge group demonstrated a decrease in drinking at follow-up, and maintained lower expectancies for social and sexual situations when compared with the traditional treatment group and the assessment only group. Once again, the effect of the challenge

procedure was the strongest for heavier drinkers. Interestingly, although the participants in the traditional educational group did show an increase in their knowledge about alcohol at post-assessment, this knowledge did not lead to a decrease in drinking. Darkes and Goldman (1998) conducted a replication of this study and attempted to alter drinking patterns in participants at an extended follow-up. By challenging the participants' arousing or social expectancies, significant changes in drinking were evidenced at post-treatment, as well as at a six-week follow-up assessment.

Expectancy manipulation occurring on a more implicit level has also produced interesting findings. In one telling experiment (Chenier, 1992), alcohol expectancies were implicitly primed using an alcohol laden context (bar setting). Implicit priming may be exemplified by the presentation of a prime in such a way such that participants are unaware or minimally aware of the stimulus and its connection to later testing for that material. Participants' performance in completion of neutral and expectancy word fragments in an alcohol related context (bar setting) and in a neutral context were compared. Results indicated that fragments for expectancy words were completed at a higher rate than neutral fragments when completed in the bar setting. A manipulation check attested to the fact that participants were unaware that the context within which they were placed for testing had anything to do with completing the word fragments. This 'unawareness' of the effects of alcohol relevant stimulation speaks to the possible automatic nature of drinking decisions in certain circumstances.

Roehrich and Goldman (1995) implicitly primed female participants' alcohol expectancies in order to observe a resulting increase in drinking behavior. Eighty females were asked to participate in a study of learning and memory in which they were

implicitly primed using a Stroop task with either expectancy or neutral words. In addition, they watched either a specific “Cheers” (bar cue) or “Newhart” (neutral cue) episode, and were told that they should try to remember it for a later recall test. This design yielded four context/stroop (priming) conditions: 1) Cheers-expectancy, 2) Cheers-neutral, 3) Newhart-expectancy, and 4) Newhart-neutral. Participants in each condition were told that while they waited to complete the final part of the study, they had an opportunity to participate in an unrelated taste-rating test of different beverages. In fact, all participants were administered beer (actually nonalcoholic) and the amount consumed during the taste test was recorded. The results of the study showed that participants who were implicitly primed with the greatest amount of alcohol and expectancy information (condition 1) drank more than the participants in any other group. In addition, the effects of the priming upon drinking were additive in that each group (1-4) drank more than the next. A manipulation check revealed that none of the participants made the connection between the memory experiment and the taste-rating task. Similar results were found in a more recent study in which the manipulation of expectancies was found to affect drinking over and above a manipulation of affect (Stein, Goldman, & Del Boca, 2000).

Taken as a whole, a good deal of empirical evidence highlights the importance of alcohol expectancies as part of the causal chain towards the onset and continuation of alcohol use. Though these findings shed light on the nature of the relationships shared by alcohol expectancies, drinking, and other variables, they do not elucidate the underlying nature of the expectancy process. More specifically, expectancy information must be

taken in, organized, stored, activated and outputted in order to exert influence in the manner described above.

Expectancy Structure in Memory

Alcohol expectancies have been proposed to exist in the form of a semantic network in long-term memory (Goldman et al., 1991; 1999; Rather et al., 1992). However, the nature of this network, as well as the extent to which it affects behavior is only beginning to be explored. Many recent investigations have clearly stood upon the shoulders of extensive and influential cognitive research. This has resulted in a number of clinical experiments and applications that have brought a renewed interest in previously existing cognitive theories and paradigms. Investigations founded in cognitive psychology appear to hold promise for developing a better understanding of how expectancies operate. The utility of general network theories of memory, like that of spreading activation (Collins & Loftus, 1975) in which activation from a node in a semantic network spreads through that network, has made further theorizing about the structure of alcohol expectancy in memory possible. Researchers have supported the notion that such network models are often useful for the development of more specific theories (Chang, 1986), and are preferred for their ability to offer a visual representation of semantic information as nodes in multidimensional space (Estes, 1991).

Rather and his colleagues (1992) named several characteristics of semantic network models which make them appropriate for initial investigations of the structure of alcohol expectancies. First, these models are parsimonious, in that expectancy information is readily transferable into the network structure. Second, the spreading

activation model emphasizes the process with which an outcome is generated, as opposed to using mathematical prediction. Next, the model fits relatively well with what is currently known about the operations of the nervous system. Fourth, semantic network models may fit well with other memory research, and may be readily applied to the study of expectancies. Finally, the comprehensiveness of this model allows for the integration of other useful theories and research areas.

While the utility of factor analytic techniques in determining the nature of alcohol expectancies has been apparent, the applicability of such measures in creating plausible associative network models is difficult. Following the lead of memory researchers who have opted to use category generation techniques followed up by multidimensional scaling (MDS; Davison, 1992) of the results, expectancy research was able to capture the “fuzzy” nature of expectancies in a visual format (Rather et al., 1992). In an initial attempt to map out the molecular level of alcohol expectancies, Rather and his colleagues had participants rate paired stimulus words, as well as category instances in order to determine the Euclidean distances needed to map the expectancy *nodes*. The expectancy elements plotted in multidimensional space fell along two dimensions; social/positive versus antisocial/negative and arousing versus sedating. Elements within the space are more likely to be coactivated if they are closer together (as in a semantic network). In the general drinking sample, elements such as jolly, energetic, and sociable fell close together indicating their likely co-occurrence. Other elements such as dangerous and vulgar fell in more remote areas of the multidimensional space, indicating a lesser chance of activation following prior node activation. Perhaps the most significant findings from this study were revealed by the PREFMAP procedure, which allows for the plotting of

preference vectors for selected groups upon the multidimensional space. In this case, four different drinking level groups were identified and their vectors mapped onto the MDS space. The results revealed that the vectors moved in an increasingly arousing direction as drinking level increased. For example, words most preferred by lighter drinkers tended to be more positive and sedating (woozy, mellow, sleepy), while heavy drinkers' expectancies fell within the positive and arousing quadrant of the multidimensional space (horny, courageous, funny) (Rather et al., 1992).

MDS procedures facilitated predictions concerning the probability of activation and accessibility of drinkers' expectancies within a semantic network memory model (see Goldman & Rather, 1993). Additionally, the new framework provided by such investigations facilitated further research incorporating this methodology as a visual tool for assessing memory organization (Dunn & Goldman, 1996). Recent investigations have applied clustering techniques to further identify the relatedness of elements within the expectancy network (Rather & Goldman, 1994). It is important to note that findings from other areas of psychology support the validity of this approach (Russell, 1980), and permit speculation as to the motivational capacity of the relevant nodes in the network (Bower & Cohen, 1982; Lang, 1985).

Individual Differences in Risk for Problematic Alcohol Use

As was mentioned earlier in this paper, a growing number of variables have been identified which place individuals at greater risk for the development of alcohol problems. These risk factors, most of which antedate drinking experience, help clarify the etiological pathway to alcohol use. It was not always the case that biopsychosocial

factors were thought to play a causal role in the development of alcohol problems. In fact, some researchers conceptualized the use of alcohol as a determinant of temperament or personality, while also downplaying the influence of genetic contribution (Vaillant & Milofsky, 1982). More recent investigations have provided a great deal of evidence to the contrary. Due to the wide range of variables which have been linked with alcohol use, only a brief review of those most salient and most germane to this paper will be presented.

Family History

One of the most consistent findings concerning the risk for the development of alcohol problems is that alcoholism runs in families. Children or siblings of alcoholics are 2 – 7 times more likely to develop the disorder than individuals without a family history of such problems (NIAAA, 1997). Evidence for this genetic link has been demonstrated in a number of twin and adoption studies which take into account the contributions of both environmental and genetic factors (see McGue, 1994). Clearly, environmental factors (which may not be totally independent from genetic influence) are important, however the heritability of alcoholism is evident. While this familial link has appeared consistently in males, fewer investigations have supported this with females (Heath et al., 1997; Slutske et al., 1998). This is largely the explanation for why investigations of characteristics of children of alcoholics (COAs) predominantly focus upon the male offspring of individuals with the disorder.

Genetically Influenced Physiological Markers

Recent advances have been made in our knowledge of potentially important phenotypes of those more highly affected by alcohol or at greater risk. For example, findings in the field of molecular genetics have caused great debate over the existence of a gene for alcoholism. While evidence was offered for a relationship between the DRD₂ receptor gene and alcoholism (e.g. Blum et al., 1990), these findings have been difficult to establish on a consistent basis (Gejman et al., 1994). Similar, though more consistent variation has been found for the amount of the neurotransmitter serotonin and the enzyme monoamine oxidase (MAO) in individuals with alcohol problems (McGue, 1994). These findings are significant due to the relationship between the chemicals and impulsive and disruptive behaviors (Sher & Trull, 1994; Zubieta & Alessi, 1993).

Differences in physiological measures that are thought to measure attention and memory processes have been found in sons of alcoholics. A recent review of studies examining the P300 component of the event related potential (ERP) of the brain, has found moderate evidence for this wave component to be smaller in males with a positive family history of alcohol problems than in males without such history (Polich, Pollock, & Bloom, 1994). This research area continues to gain a great deal of attention.

A genetic variation in the capacity of the liver to metabolize alcohol has also been shown. Differences in various ethnic populations (found primarily in those of Asian descent) in metabolic response to alcohol (as evidenced by an unpleasant flushing response) may be attributed to such genetic variation in enzyme capabilities (Whitfield, 1997). Similarly, sensitivity to alcohol has been a heavily debated causal factor for alcohol problems. Research has suggested that lower sensitivity to alcohol's effects may

cause individuals to drink more to get such effects (e.g., Shuckit, 1998), while findings of heightened sensitivity have also been linked to risk (e.g., Finn & Pihl, 1988). An interesting theory that attempts to integrate these findings suggests that sons of alcoholics may be more sensitive to the positive effects of alcohol (found during the early stages of drinking) and less sensitive to the more negative and sedating effects (Newlin & Thomson, 1990). This theory fits in nicely with personality theories that suggest a greater reliance and attention to signs of reward and less response to those of punishment in heavier drinking individuals (Cloninger, 1987).

Personality Factors

It is likely that our natural instinct for categorization has helped stimulate the search for consistencies in behavior of individuals suffering from alcohol problems. Though a number of behaviors have been found to be correlated with heavier drinking, no specific personality type has been shown to solely describe the problem drinker (Nathan, 1988). Instead, dimensional approaches to personality that are capable of capturing the full range of behaviors, in all possible contexts, have been emphasized. The debate in the literature over the correct structure of such dimensions seems never ending (see Watson, Clark, & Harkness, 1994 for a review). And a variety of factor analytically derived questionnaires have been used to measure the dimensions. However, consistencies do exist at more basic levels allowing for the creation of three categories of personality traits that may be examined for their relation to substance abuse risk. These general sets of personality constructs include: neuroticism/negative

emotionality; extraversion/sociability; and finally impulsivity/disinhibition or behavioral undercontrol (Sher, 1997).

Neuroticism/negative emotionality. This class of behaviors includes traits such as anxiousness, depressed mood, feelings of guilt and low self-esteem (Eysenck & Eysenck, 1985). There is clear relationship of comorbidity of alcohol problems with affective disorders and anxiety disorders (APA, 1994). However, findings of differences between children of alcoholics (COAs) and non COAs on neuroticism have been mixed (Loukas, Krull, Chassin, & Carle, 2000; Sher et al., 1991).

Gray (1970) proposed that reward and punishment systems, deriving from specific brain processes and structure, should be taken into account when explaining neuroticism. He suggested that a behavioral inhibition system (BIS) is the causal basis for feelings of anxiety (Gray, 1982), and that the purpose of such a system is to suppress the performance of behaviors that may lead to punishment.

Extraversion/sociability. Sociability, activeness, and general positive emotionality typify this dimension of personality. Once again, there is no clear picture as to whether these traits predict or put one at greater risk for alcohol problems (Sher, 1997). This lack of conclusive evidence may be the result of findings indicating that extraversion does predict frequent intoxication and alcohol problems, while other evidence suggests that introversion may increase as more serious alcohol problems develop (Kammeier, Hoffman, & Loper, 1973).

Theoretically important to this paper is the notion of *conditionability*, or the greater likelihood that an individual may form connections between stimuli and responses at a higher rate than other individuals. The constructs of extraversion and introversion

proposed by Eysenck (1967) postulate that differences in cortical arousal result in variability in the capacity to form instrumentally conditioned associations. Experimental evidence using conditioned responses suggests that due to the chronic state of hypercortical arousal of the introverts, they form such associations with greater ease than extraverts (Levey & Martin, 1981). However, more recent work incorporating the construct of reward sensitivity (Gray, 1987) demonstrated that reward/punishment and impulsivity/anxiety tended to be more consistent predictors of acquisition of conditioned responses (Corr, Pickering, & Gray, 1994; Gorenstein & Newman, 1980; Zinbarg & Mohlman, 1998; Zinbarg & Revelle, 1989). Thus, the importance of individual differences in sensitivity to rewarding and punishing experiences appears to be a basic personality style that may strongly influence what is learned by an individual. Finding differences in conditionability may be a promising addition to the understanding of the etiological factors involved in alcohol use, and specifically, such differences may help to clarify how certain alcohol expectancy associations are formed.

Impulsivity/Disinhibition. The most consistent support for a relationship between personality and alcohol use has been found using measures of sensation seeking (Zuckerman, 1991) and disinhibition (Sher, 1999). Additionally, a number of studies examining the causal role of such behaviors in the etiology of alcohol problems have been conducted (Cloninger, Sigvardsson, & Bohman, 1988; Schuckit, 1998; Zucker & Gomberg, 1986). The tendency to poorly modulate responses to reward, as evidenced by a range of acting out behaviors, is clearly not specific to alcohol problems (Gorenstein & Newman, 1980), but may be descriptive of a whole host of behaviors. It is important to note however the possible complications that may occur when measures of these

personality types use impulsive type behavioral items as a measure of the construct (McCarthy, Kroll, & Smith, 2001). In other words, the ability to say that acting out items predict a different acting out behavior may not be that helpful in the long run.

Researchers attempting to remedy this situation have provided evidence against a unitary construct of disinhibition in favor of the independent factors of social deviance proneness and excitement seeking (Finn et al., 2000).

This tendency to actively seek out activities that may provide some form of positive reward has been hypothesized to exist as a physiological substrate for sensitivity to secondary appetitive stimuli (Corr et al., 1994). This behavioral approach (or activating) system (BAS) has been influential in the development of other theoretical constructs that have proven influential in the study of alcoholism risk (e.g., reward dependence, Cloninger, 1993). Additionally, Gray's model may be used to adequately characterize Eysenck's three dimensions of psychoticism, neuroticism, and extraversion (Derryberry & Reed, 1994).

Patterson and Newman (1993) proposed an attractive model for the incorporation of extraversion/sociability with neuroticism/negative emotionality in an effort to explain disinhibited behavior. The authors review empirical support for the conceptualization of neurotic extraverts as individuals who are more likely to pursue reward than avoid punishment when given the choice. Once again, the basic mechanisms of the proposed model are based upon the reward/punishment distinction in personality offered by Gray (1982). The model suggests a kind of biased processing in that these disinhibited individuals tend to be less likely to form associations that may lead to punishment in favor of more reward based associations (Patterson & Newman, 1993).

The applicability of such a general theory of disinhibited behavior makes it an attractive explanatory tool for the development of problematic alcohol use. According to the theory, those who tend to seek rewards more often are more likely to use alcohol, or participate in other behaviors that have a high potential for reward, as well as punishment. Once these behaviorally activated individuals are involved in a heavy drinking episode, they are more likely to encode the positive aspects of the experience while also paying less attention to the negative aspects (McCarthy, Kroll, & Smith, 2001). It is clear that the strength of this theoretical formulation of disinhibited behavior (especially as it applies to alcohol use) lies in the fact that it may be used to describe the process by which new behaviors are performed, and to what extent they are maintained in the face of possible negative implications. It is important to note that this process likely takes place in children and adolescents prior to drinking alcohol, and that biased encoding of alcohol-related information may be accomplished vicariously.

Expectancy Mediation of Risk Revisited

In a recent paper, Finn and his colleagues (2000) stated the importance of formulating cohesive theories that explain the mechanisms of how heightened biopsychosocial risk might lead to alcohol problems. As mentioned previously, strong empirical evidence supports the role of alcohol expectancies in this capacity (e.g., Henderson, Goldman, Covert, & Carnevalla, 1994). With this causal relationship firmly in place, studies have begun to explore possible variations in construct measurement within such models (Finn et al., 2000; McCarthy, Kroll, & Smith, 2001). In addition, mediational models for risk have been proposed for memory associations of alcohol use

(Stacy & Newcomb, 1998) as an alternative causal factor to alcohol expectancy, though such measures may be more similar to the concept of expectancy than they are different (Goldman et al., 1999).

Incorporation of influential and relevant personality theories to this mediational model may provide researchers the ability to examine the process by which trait-like factors affect how the reinforcing effects of a drinking situation are learned. Up until this point, the relationship between personality characteristics and the acquisition of expectancy information has received little attention. However, alcohol researchers have suggested that this type of relationship is highly likely (Finn et al., 2000; Henderson et al., 1994; Goldman et al., 1999).

McCarthy and his colleagues (2001) outlined a few possible tests of this relationship. First, they recommend that prospective studies examine the relationship between a reward-seeking personality style, alcohol expectancies, and drinking. Next they state that given a combination of reward and punishment for some action, reward seeking personality types would develop more reward-based expectancies for alcohol use. Subsequent expectancies would then be able to be measured for this positive content. Finally the authors suggest the likelihood of an interaction between personality and learning factors. Different levels of expectations for reward may develop as a function of inherited predisposition to seek out such experiences. Consequently, this may lead to participation in different activities and selection of environments that hold a greater likelihood for reward.

Based upon the earlier work of Patterson and Newman (1993) McCarthy and his colleagues (2001) suggest that disinhibited individuals (i.e., neurotic extraverts, high

BAS low BIS) are prone to form positive expectancies about behaviors, and more specifically about alcohol. They have named such proneness *acquired preparedness* to signify that such individuals are ready (due to personality risk) to learn or acquire positive alcohol-related information. In what appears to be evidence for this process, Kroll (1998) identified a full mediation of disinhibition on drinking through alcohol expectancies in a sample of men. Expanding upon this work, McCarthy (1998) examined gender effects and found this mediational relationship to hold more strongly in males than females. Additionally, experimental evidence indicated that neurotic extraverts made more errors of commission (in the hope of reward in the face of punishment) on a laboratory task measuring disinhibited errors. Once again, this effect was found to be stronger in males than in females (McCarthy, 1998).

Rationale for the Present Study

A good deal of evidence has been provided for the link between various personality constructs and risk for developing alcohol use problems (Sher & Trull, 1994; Sher, Walitzer, Wood, & Brent, 1991). Though the list of these different factors is long and sometimes contradictory, each has been placed in the role as a predisposing factor for difficulties with alcohol, much in the same way that a family history of alcohol problems implies a heightened vulnerability for similar difficulties (Chassin, Curran, Hussong, & Colder, 1996; Sigvardssen, Bohman, & Cloninger, 1996).

The learning that takes place during an individual's life which links alcohol use to numerous outcomes may be of a direct experiential or vicarious type (Goldman, Brown, Christiansen, & Smith, 1991). The ensuing expectations of alcohol use are presumably

stored in memory so as to provide guidance (not necessarily conscious) for future behavior in various contexts. When measured, an individual's alcohol expectancies may be used to predict future alcohol use (e.g., Brown, 1985; Christiansen & Goldman, 1983; Christiansen, Smith, Roehling, & Goldman, 1989; Stacy, Newcomb, & Bentler, 1991), and when expectancies are manipulated, a subsequent increase (Roehrich & Goldman, 1995; Stein, Goldman, & Del Boca, 2000) or decrease (Darkes & Goldman, 1993, 1998) in drinking may result.

To better understand the complexity of alcohol use and abuse, methods and theoretical approaches that integrate personality and learning theories are necessary. Expectancies have been shown to partially (and significantly) mediate the relationship between antecedent variables and alcohol use (Finn, Sharkansky, Brandt, & Turcotte, 2000; Henderson, Goldman, Covert, & Carnevalla, 1994; Sher et al., 1991). Additionally, theoretical models have recently addressed the process by which trait-based and learning-based (or cognitive) factors may contribute to the development of alcohol use problems (Goldman, Darkes, & Del Boca, 1999; McCarthy, Kroll, & Smith, 2001). While such formulations appear extremely promising, little evidence has been offered to support these models.

The purpose of the present investigation is to gain additional insight into the relationship between risk factors for alcohol use problems and alcohol expectancy information. More specifically, an attempt will be made to identify predisposing factors that may influence the process by which expectancy information is acquired, or is accommodated by existing memory structure for individuals with some of this information likely already in place. An attempt to ascertain whether certain individuals

are more or less prepared to learn associations, or to access preexisting associations between alcohol use and its possible outcomes than others will be made.

Eighty-three male undergraduate psychology students participated in a learning experiment in which they studied and were tested for their recollection of a large number of word pairs in a paired-associate learning task and a free recall task. Word pairs were constructed to represent associations between alcohol content and alcohol expectancy information, as well as to control for important experimental factors. A number of promising biopsychosocial risk factors for alcohol problems were selected based upon prior research and the relationship between such factors and performance on the paired-associate and free-recall tasks was examined.

It was hypothesized that:

1. Participants who scored higher on measures of risk would recall a greater proportion of word associations containing alcohol and expectancy content than those who scored lower on measures of risk.
2. Higher risk participants would learn word associations containing alcohol and expectancy content at a greater rate over successive trials than would lower risk participants.
3. Measures of risk would not differentiate individuals in their ability to recall non-alcohol and expectancy word pairs (control pairs).

Method

Participants

Eighty-three male undergraduate psychology students were contacted either through the undergraduate participant pool or through advertisements at the University of South Florida in Tampa ($n = 71$) and at Central Connecticut State University in New Britain, Connecticut ($n = 12$). Due to a desire for participants to represent a wide range of personality, expectancy, and drinking profiles, no pre-screening of participants took place. Participants were scheduled for one session lasting approximately one hour, and each participant was run through the study protocol individually. Identical study procedures were used at each study site. The use of males for the investigation was consistent with previous findings that have shown support for stronger personality and expectancy relationships in men than in women (McCarthy et al., in press).

Design

Each participant completed all three trials of a paired-associate learning task, as well as one free-recall task. Hierarchical regression analyses were conducted including each measure of risk described in detail later in this section, in order to predict performance on the tasks. The criterion measures of interest are the results of the cued-recall task for six sets of word pairs presented in the paired-associate learning task (described in detail below), and the results of the free-recall task.

Measures

Participant Information Form. This measure was administered in order to obtain demographic, as well as other important information. Included in the questionnaire were items regarding the participant's age, ethnicity, religiosity, academic performance, and SAT scores (used as a rough estimate of cognitive ability). In addition, the questionnaire had a number of alcohol related items including typical quantity and frequency of alcohol consumption (from Christiansen & Goldman, 1983), preferred alcoholic beverage, age of onset of alcohol use, and alcohol problems.

Family History Grid. This measure included items concerning alcohol use problems occurring in the parents, grandparents, uncles, and siblings of the participant. Responses to these items allow for the classification of participants into Family History positive (FH+) and Family History negative (FH-) categories (Andreasen, Endicott, Spitzer, & Winokur, 1977). Additionally, a multigenerational family history of alcohol abuse was obtained from such items such that the lineage of alcohol problems could be examined for each individual. Using this history, a measure of total number of individuals with a history of alcohol problems within a family was obtained for each participant.

Timeline Follow-Back Interview (TLFB). The timeline follow-back is a method of collecting drinking data from participants by using a set of calendars to reconstruct drinking episodes for the period of interest (Sobell, Sobell, Klajner, Pavan, & Basian, 1986). Historical reference points identified over a period of thirty days served to cue participants as to their drinking behavior during the specified period of time. Although

original TLFB procedures utilized a categorization format of administration to identify “types” of drinking days (e.g. none, heavy, light), participants in this investigation recorded exact amounts of alcohol consumed for each day specified on the calendars.

Zuckerman-Kuhlman Personality Questionnaire (ZKPQ). A 99-item true/false inventory measured five dimensions of personality: 1) Impulsive-Sensation Seeking (with separate subscales available for measuring Impulsivity and Sensation Seeking); 2) Neuroticism-Anxiety; 3) Aggression-Hostility; 4) Activity; 5) Sociability. The authors (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993) developed the questionnaire to measure the proposed “Alternative Five Factor” model of the basic dimensions of personality or temperament (Zuckerman, Kuhlman, & Kamac, 1988; Zuckerman, Kuhlman, Thornquist, & Kiers, 1991).

The ZKPQ scales representing the proposed five factors have been shown to have adequate reliability (ranging from .72-.86), and the correlations among the five scales ranged from -.02 to .28 (Zuckerman et al., 1993). Although the ZKPQ is a relatively new measure of personality, it has been utilized in a number of studies including the examination of the personality correlates of cocaine abusers (Ball, 1995; Ball & Schottenfeld, 1997), the parenting styles of parents in intact and stepparent families (Kraft & Zuckerman, 1999), and it has been recently used to examine the biopsychological bases and behavioral correlates of the sensation seeking construct (Brocke, Beauducel, & Tasche, 1999).

BIS/BAS Scales. These scales are composed of 20 items intended to measure two proposed motivational systems underlying behavior and affect: a behavioral inhibition system (BIS) and a behavioral activation system (BAS) (Gray, 1982). One BIS scale and

three BAS scales (Reward Responsiveness, Drive, Fun Seeking) assessed dispositional sensitivities to these two systems (Carver & White, 1994).

Reliabilities of the four scales ranged from .66 to .74, and intercorrelations between the scales range from -.08 (BIS with Fun Seeking) to .41 (Drive with Fun Seeking). The low correlation of the BIS with the BAS scales suggests, as does the theory, that they are relatively independent of each other. However, moderate correlations between each BAS scale is consistent with the shared nature of their origins, and a factor analysis of the BAS scales indicated one second-order factor (Carver & White, 1994).

Positive and Negative Affect Schedule (PANAS). In an effort to obtain a brief measure of each participant's mood at the time of the study, the 10-item PANAS (Watson, Clark, & Tellegen, 1988) was administered. The PANAS measured positive and negative affective states on two scales proposed by the authors to be independent of each other. Due to its brevity, as well as its demonstrated reliability and validity (Watson et al., 1988), the PANAS, rather than other, more extensive measures of affect (e.g. Profile of Mood States; POMS) was used. Though debate currently exists as to the true dimensional nature of affect (Larsen & Diener, 1992; Russell, 1980; Watson et al., 1988), it is likely that such variations in theory are complimentary to each other rather than incompatible.

Alcohol Expectancy Questionnaire (AEQ). The AEQ was administered in order to assess participants' expectations of the effects of drinking alcohol. This expectancy measure was chosen due to its ability to outperform other expectancy scales in the prediction of drinking (Goldman, Greenbaum, & Darkes, 1997), as well as its ability to

cover a broad content range. The AEQ is comprised of six factors of alcohol; 1) being a global positive transforming agent, 2) enhancing social and physical pleasure, 3) enhancing sexual performance and experience, 4) providing relaxation/tension reduction, 5) increasing social assertiveness, and 6) increasing power and aggression. Although it does not contain the entirety of effects that individuals may expect from drinking alcohol (Brown, Goldman, Inn, & Anderson, 1980), the AEQ has demonstrated its utility in numerous studies. Specifically, higher scores on the AEQ have been related to higher levels of drinking, (Brown, Goldman, & Christiansen, 1985), have aided in the prediction of college drinking styles (Brown, 1985a), and were found to be related to treatment outcome at one year follow-up among male inpatient veterans (Brown, 1985b).

Paired-associate Learning Task. Paired-associate learning has a considerable history in the experimental psychology literature. Relevant to this paper, investigations of paired-associate learning have examined the effects of strength of association (Martin, 1964; Wicklund, Palermo & Jenkins, 1964; Palermo & Jenkins, 1964), frequency (Martin, 1964), meaningfulness of words (Wimer, 1963), and elaborative processing (Schacter & Graf, 1986). Additionally, individual differences in the performance of paired-associate tasks have been conducted (e.g., Yang, 1983), and have specifically looked at the effects of alcohol on performance as well (Yohman & Parsons, 1985). The conceptualization for the use of the paired-associate learning paradigm comes from associative learning studies examining the age-related effects of arousal and anxiety (Fisk & Warr, 1996) and more intricate methodology specifically designed to examine contingency learning in children (Johnson, Posner, & Rothbart, 1991). These

investigations have provided sound examples of using this methodology and adapting it to examine simple learning in college undergraduates.

A computer-based associative learning task was used for this study. Participants were instructed that a number of word pairs would be presented on the computer monitor, and that they were to read each pair aloud and do their best to try and memorize each word pair for a test to be given later. Thirty-six word pairs were presented on a computer monitor at a rate of three seconds per pair. All words appeared in lowercase letters in black text on a white background. Pairs were presented in a random order for each participant and for each trial.

Next, the participant was administered a cued-recall task in which the first word of each pair that they had seen in the study list was presented on the computer screen, slightly left of center, with a blank line next to it (fun _____). Cues were presented in random order and participants had ten seconds to verbally provide the word that was paired with the cue in the study list, or to make their best guess as to the correct response in the time provided. The experimenter recorded each response given. This task sequence (study list then cued-recall) was completed three times in a row in order to assess performance or learning over multiple trials. Each response provided on the cued-recall task received a score of either one (correct) or zero (incorrect) based upon the exact match between the target and the response given. For example, if a participant gave the answer “brew” to the cue “alcohol _____” when the target was “brew” they would receive a score of one point for that item. Total number of points for each word pair type (described below) was used as the dependent measure.

Free-Recall Task. Following the final trial of the cued-recall portion of the paired-associate learning task, each participant was given a blank piece of paper and instructed to write down as many of the word pairs as possible from memory.

Word Stimuli

Perhaps the most vital part of the investigation was the choice of word stimuli used in the paired-associate learning task. Since the primary object of the study was the learning of the expectancy to alcohol / alcohol to expectancy word relationships, it was important to determine if and to what extent a connection existed between all word pairs prior to training and test. Additionally, a number of different conditions, or word pair types were included to determine whether or not the learning of specific word pairs was due to factors other than those of primary interest to this investigation.

To explore the relationships between each pair of words chosen for the study, a preliminary investigation was conducted to obtain first word associate normative data for the stimuli. In this preliminary study, word lists composed of alcohol expectancy words (from Rather et al., 1992) and other pre-selected adjectives and nouns, were created. Three different forms with one hundred words per form were used. At the top of each were the instructions below:

For each word below, please write the one word that comes to mind after reading each word in the space provided. Try to work as quickly as possible. Please be sure to provide only one word for each response.

Word lists were administered in undergraduate psychology classrooms and participants received course credit for completing one list. Each word list was administered to approximately 100 participants. The primary purpose of conducting this initial study was

to determine important attributes of the words that were used in the current investigation. Specifically, it was necessary to obtain information for each word (and its associates) concerning: 1) the list of associates; 2) cue set size; 3) cue-to-target strength; and 4) target-to-cue strength.

This information for many of the words selected was available from an established list of word norms (Nelson, McEvoy, & Schreiber, 1998). In fact, a preliminary list of word pairs could have been created for the study based upon this information. However, normative information for selected alcohol expectancy words and additional study words were unavailable, necessitating collection of normative data.

Two separate lists of six groups of six different word pairs were used in the investigation. Participants were randomly assigned to receive one of the two lists. Across each group of word pairs, words were matched as to associative set size, and the printed frequency of the word (Kucera & Francis, 1967). Additionally, and perhaps most importantly, cue-to-target and target-to-cue strength of every word pair in the study were zero. While this does not indicate that there was no connection between words in the pairs, it does signify that neither word in any pairs has the other as an associate according to established norms (Nelson, McEvoy, & Schreiber, 1998). It is clear, however, that individuals will often find a way to make connections between pairs of words no matter how unrelated the words may seem. Take for example the word pair ICE – TIRE. While each word is not an associate produced by the other according to established normative data, it is clear that many meaningful connections could be made between the words. However, differences in the tendency to make these types of connections were of interest in the current study.

Appendix A provides the two final lists of word pairs used in the present investigation. Two lists of pairs were created in order to address the possibility that effects found in the investigation were due to the specific list of word pairs chosen as opposed to the general categories that they represent. If the relationship between each of the two lists to the dependent variables of interest was equivalent, then they were viewed as comparable lists in terms of their value in representing the categories of interest. This comparability allowed for the combination of lists for ease of analysis and for greater statistical power. Three types of words served as either the first or second word of each word pair; alcohol words (ALC), college or school related words (SCH), and alcohol expectancy words (EXP). The six word pair conditions represented each possible combination of the three word types. Word types were placed in both the first and second position of the pair because the effects of word type position were unknown for this study and could then be investigated. Twenty-four words of each word type were used for each list in total to create the thirty-six unique word pairs. School words were chosen for the study to provide a familiar group of nouns which were used as a control for alcohol and expectancy words in the study. The inclusion of the SCH words provided a comparison to the primary pairs (ALC-EXP, EXP-ALC). In this manner, the effects of including an ALC word or an EXP word in a pair was examined more closely.

For the first type of word pairs, alcohol content words were the first word of the pair. The second word of each pair was an alcohol expectancy word representing the positive and arousing quadrant of multidimensional space (e.g. horny, courageous, funny, etc.)(Rather & Goldman, 1992). Positive and arousing alcohol expectancy words were utilized in the investigation due to their use in previous studies in which moderate to

heavier drinkers demonstrated a “preference” for these outcomes of drinking (Rather et al., 1992). It is likely, however, that these outcomes exist in memory for all drinkers, and that this information may be organized differently in memory for those with diverse drinking patterns (Rather & Goldman, 1994). In the second type of word pairs, different alcohol expectancy words representing the same positive and arousing qualities served as the first word of the pair. The second word of the pair was a different alcohol content word. Taken together, these two sets were the word pairs of primary interest in the investigation. The other types of word pairs included the ALC-SCH pairs, the SCH-ALC pairs, the EXP-SCH pairs, and the SCH-EXP pairs.

Procedure

Participants were tested individually. Upon arrival at the research laboratory, the participant was given the informed consent form to read and sign, and was then provided with a brief outline as to what the study would entail (i.e. a computer task and some questionnaires). At this point, the participant was seated in front of a laptop computer and was administered the paired-associate learning task. Following completion of all three trials of this task and then the free recall task (approximate completion time was one half hour), the participant was given all questionnaires to complete in this order: PANAS, Participant Information Form, AEQ, BIS/BAS, ZKPQ. Upon completion of these measures, the participant was given the debriefing form followed by the designated extra-credit points for participation.

Results

Description of the Sample

Participants in the study identified themselves as White/Caucasian (69.9%), Black/African-American (10.8%), Hispanic/Latino (9.6%), Asian/Asian-American (6.0%), or “Other” (3.6%). Mean age of participants was 20.34 years (SD = 2.47) with a range of 18 to 31 years. Participants reported drinking alcohol on an average of 5.50 (SD = 6.19) days (range of 0 to 29 days) and an average of 30.82 (SD = 45.49) drinks of alcohol (range of 0 to 202 drinks) during the thirty days prior to their participation in the study. This amounts to approximately five and one half standard drinks of alcohol per drinking day. Following the completion of the study, participants who reported consuming high levels of alcohol during the thirty days prior to participating in the study were told that if they have concerns about their drinking or other problems that they may seek confidential assistance from the university Counseling Center. Independent samples *t*-tests were conducted to look for site differences for the demographic measures and for quantity and frequency of alcohol use. No reliable difference were found ($p > .05$).

Analysis of the Dependent Measures

Two separate lists of word pairs were used during the paired-associate learning task and the subsequent cued-recall task. To provide evidence that these two lists were essentially alternate forms of one another (or functionally equivalent for the purposes of

this investigation), total mean performance on each trial of the cued-recall task for each list was compared using independent samples t -tests. No significant differences were found ($p > .05$). Therefore, list type was combined into one list and not included as a factor in subsequent analyses. Additionally, t -tests revealed no differences between sites for total mean performance on the cued-recall task and the free-recall task across trials ($p > .05$).

Analysis of the Independent Measures

Due to the large number of potential independent variables included in this study, the primary focus of subsequent analyses was measures of those constructs that have received the greatest empirical and theoretical support as they relate to an increased risk for the development of alcohol problems. These include: the Impulsive-Sensation Seeking, Neuroticism-Anxiety, and Sociability scales from the ZKPQ; all four scales of the BIS/BAS; family history of alcohol problems as measured by the Family History Grid, and behavioral indicators such as self-reported alcohol use and drinking-related problems.

Zero-order correlations among each of these measures may be found in Table 1. As is evident from the table, a number of these measures were moderately correlated with one another as one might predict based upon the overlapping nature of the constructs being measured. While relationships among the measures exist, the sizes of the correlations indicate the possibility that each measure may offer unique information in subsequent analyses.

Before progressing further, it is important to identify the question raised by the correlational nature of this investigation: Was there a relationship between these independent measures of risk and performance on the recall task? The simplest and most

Table 1

Zero-Order Correlations between Selected Independent Variables

Measure	1	2	3	4	5	6	7	8	9
1. Imp/SS									
2. N/Anx	.05								
3. Soc	.16	-.12							
4. BIS	-.14	.48***	-.07						
5. BAS-R	-.04	.22*	.08	.36**					
6. BAS-F	.33**	.14	.20	-.01	.51***				
7. BAS-D	.35**	.04	.29**	-.08	.34**	.50***			
8. FamHx	.35**	.06	.15	-.13	-.03	.06	.28*		
9. Drink	.24*	.09	.22*	.02	.06	.37**	.14	.05	
10.Probs	.33**	.11	.13	.11	.12	.33**	.10	.13	.65***

Note. Imp/SS, N/Anx, Soc = ZKPQ; Impulsive-Sensation Seeking, Neurotic-Anxiety, Sociability, respectively; BAS-R = BAS Reward Responsiveness; BAS-F = BAS Fun Seeking; BAS-D = BAS Drive; FamHx = Family history of alcohol problems; Drink = Number of standard drinks over the past 30 days; Probs = Drinking-related problems. $p < .05$; ** $p < .01$; *** $p < .001$.

direct method of answering this question was to examine the correlations between the independent measures and task performance (more specifically, performance on the alcohol and expectancy word pairs, i.e., ALC-EXP and EXP-ALC). Table 2 provides this information for each measure of risk across the primary word pairs of interest.

Table 2

Zero-Order Correlations between Independent Variables and Performance on Cued-Recall Task for ALC-EXP, EXP-ALC Word Pairs Across Trials

Measure	ALC-EXP			EXP-ALC		
	Trial 1	Trial 2	Trial 3	Trial 1	Trial 2	Trial 3
Imp/SS	.01	.23*	.19	.17	.20	.04
N/Anx	-.06	-.16	-.07	-.09	-.10	-.06
Soc	.11	.08	-.09	.02	.01	.06
BIS	-.02	-.05	-.04	-.16	-.08	.06
BAS-R	.07	.13	.19	.00	.13	.10
BAS-F	.09	.21	.27*	.16	.15	.07
BAS-D	.11	.14	.17	.05	.17	.06
FamHx	-.01	-.09	-.15	.26*	.16	.14
Drink	.16	.28**	.15	.03	.04	.15
Probs	.22*	.41***	.29**	.14	.23*	.33**

Note. Imp/SS, N/Anx, Soc = ZKPQ; Impulsive-Sensation Seeking, Neurotic-Anxiety, Sociability, respectively; BAS-R = BAS Reward Responsiveness; BAS-F = BAS Fun Seeking; BAS-D = BAS Drive; FamHx = Family history of alcohol problems; Drink = Number of standard drinks over the past 30 days; Probs = Drinking-related problems.
* $p < .05$; ** $p < .01$; *** $p < .001$.

As is evident from the table, a number of independent variables chosen for investigation showed no clear relationship to performance on the cued-recall task. However, this was not true for other variables. Using a liberal alpha level of .05 to allow for the selection of factors warranting further investigation, the following measures were chosen and were included in subsequent analyses: Impulsive-Sensation Seeking, BAS Fun Seeking, Family History, alcohol use, and drinking-related problems. In order to address the possibility that the relatively few individuals at the extreme end of the drinking range caused a bias in the observed relationships, these participants ($n = 8$) were removed from the correlational analyses. A similar pattern of results was found.

In order to address potential site differences on scores across the independent variables, t -tests were conducted. No significant differences between sites ($n = 12$ and $n = 71$) were found across the measures ($p > .05$).

Analyses of the Relationship between the Independent Variables and Task Performance

To investigate the extent to which risk measures were predictive of performance on the cued-recall and free-recall tasks, hierarchical regression analyses were conducted. In each analysis, level of drinking as measured by the Timeline Follow Back was entered first, and all other predictors were entered together on the second step. This was done to control for the possible relationship between drinking and performance on the learning tasks. Recall for each of the six word pair types (ALC-EXP, EXP-ALC, ALC-SCH, SCH-ALC, EXP-SCH, SCH-EXP) for three trials per pair was predicted in 18 separate hierarchical regression analyses. A Bonferroni correction was used to control for the

probability of making a Type I error when examining the results of these analyses, and the resulting alpha level for each analysis was .0028.

Examination of the regression results for the first trial of the cued-recall task yielded no reliable findings across the six different word pairs. This suggests that, immediately following the first study trial, individual difference variables did not predict performance for any word pair type. So, differential learning following the first study and test trial was not observed.

Table 3

Hierarchical Regression Analysis for Risk Variables Predicting Performance on the Second Trial of the Cued-Recall Task for the ALC-EXP Word Pairs (N = 83)

Predictors	<i>B</i>	<i>SE B</i>	β
Step 1			
Drinking Quantity	.11	.04	.28*
Step 2			
Drinking Quantity	.00	.05	.01
Sensation Seeking	.13	.06	.24*
BAS-Fun Seeking	.00	.06	.04
Drinking Problems	.14	.06	.33*
Family History	-.15	.07	-.21*

Note: $R^2 = .08$ for Step 1; $\Delta R^2 = .16$ for Step 2 ($p < .01$)
 * $p < .05$.

Analysis of the second trial of the cued-recall task for the ALC-EXP word pairs, however, indicated that the model as a whole accounted for a significant proportion of the variance (24%), $R = .49$, $F(5, 82) = 4.73$, $p = .001$ (see Table 3). Sensation seeking ($\beta = .24$), drinking problems ($\beta = .33$), and family history ($\beta = -.21$) were found to be significant predictors of learning of these pairs, accounting for an additional 16% of the variance above and beyond that accounted for by drinking. Learning of the five other

Table 4

Hierarchical Regression Analysis for Risk Variables Predicting Performance on the Third Trial of the Cued-Recall Task for the ALC-EXP Word Pairs (N = 83)

Predictors	<i>B</i>	<i>SE B</i>	β
Step 1			
Drinking Quantity	.07	.05	.15
Step 2			
Drinking Quantity	-.06	.06	-.14
Sensation Seeking	.14	.08	.21
BAS-Fun Seeking	.11	.07	.18
Drinking Problems	.14	.07	.28
Family History	-.21	.09	-.25*

Note: $R^2 = .02$ for Step 1; $\Delta R^2 = .18$ for Step 2 ($p < .01$)
 * $p < .05$.

pair types on the second trial was not reliably predicted by the measures of interest. This finding is right in line with the first hypothesis of the study, essentially finding differences in learning of the ALC-EXP pairs and not other pairs by those with varying degrees of risk.

Examination of third trial performance for the ALC-EXP word pairs indicated that the proportion of variance (20%) accounted for by the total model was at significance level, $R = .45$, $F(5, 82) = 3.88$, $p = .003$, (see Table 4). A lesser family history of alcohol problems ($\beta = -.25$) was again a significant predictor of learning, while drinking problems ($\beta = .28$) approached significance ($p = .053$), accounting for variance above and beyond that accounted for by drinking. Findings across the other pair types were not reliable for this trial. Once again, the results from the third trial of learning support the hypothesis that individual differences in learning of the ALC-EXP pairs would exist.

For free-recall, separate hierarchical regression analyses were performed for each of the six word pair types, again controlling for drinking level. Findings indicated that only the analysis of the ALC-EXP pairs accounted for a significant proportion of the variance in free-recall score (18%) $R = .42.$, $F(5, 81) = 3.23$, $p = .01$. Significant effects for drinking-related problems ($\beta = .35$), and for a family history of such problems ($\beta = -.35$) were found even when controlling for level of drinking (see Table 5). Regression analyses including the other word pair types were not reliable. The free-recall data similarly support the study's hypothesis, and family history and drinking-related problems appear to be reliable predictors of learning of ALC-EXP information.

Table 5

Hierarchical Regression Analysis for Risk Variables Predicting Performance on the Free-Recall Task for the ALC-EXP Word Pairs (N = 83)

Predictors	<i>B</i>	<i>SE B</i>	β
Step 1			
Drinking Quantity	.00	.00	.00
Step 2			
Drinking Quantity	-.01	.00	-.25
Sensation Seeking	.01	.01	.13
BAS-Fun Seeking	.00	.01	.05
Drinking Problems	.01	.01	.35*
Family History	-.02	.01	-.35**

Note: $R^2 = .00$ for Step 1; $\Delta R^2 = .18$ for Step 2 ($p < .01$)

* $p < .05$; ** $p < .01$.

Taken together, the results of the cued-recall and free-recall findings support the hypothesis that individual differences exist in the capacity to learn word pairs containing alcohol and expectancy information, but not other types of pairs. More specifically, higher levels of sensation seeking, and drinking problems, and a lesser degree of familial alcohol problems is predictive of learning of this material.

A secondary hypothesis of the investigation was that certain individuals would not only learn more of the alcohol – expectancy information, but that they would also

acquire this information faster than other information. To test this hypothesis, hierarchical regression analyses were conducted examining the difference in learning across the three trials. Differences between the first and second trial, second and third trial, and total learning across trials (trial 3 – trial 1) for each of the six word pair types were calculated. This resulted in 18 separate criterion measures for use in individual multiple regression analyses. Once again, a Bonferroni correction was used to examine the results and level of drinking was entered into the regression equations on the first step.

Table 6

Hierarchical Regression Analysis for Risk Variables Predicting Difference Scores from the First to Second Trial of the Cued-Recall Task for the ALC-EXP Word Pairs (N = 83)

Predictors	<i>B</i>	<i>SE B</i>	β
Step 1			
Drinking Quantity	.08	.04	.24*
Step 2			
Drinking Quantity	.00	.05	.01
Sensation Seeking	.13	.06	.27*
BAS-Fun Seeking	.02	.05	.04
Drinking Problems	.10	.05	.26
Family History	-.13	.06	-.22*

Note: $R^2 = .06$ for Step 1; $\Delta R^2 = .15$ for Step 2 ($p < .01$)

* $p < .05$.

The regression examining mean recall differences for ALC-EXP pairs from the first to the second trial was at the significance level, $F(5, 82) = 4.03, p = .003$, and accounted for 21% of the variance (see Table 6). Sensation seeking ($\beta = .27$) and family history ($\beta = -.22$) significantly predicted learning this information across the two trials above and beyond the significant variance accounted for by level of drinking. As hypothesized, differences in the rate of learning were found for pairs containing alcohol and expectancy information and not for other pairs.

Table 7

Hierarchical Regression Analysis for Risk Variables Predicting Difference Scores from the First to Third Trial of the Cued-Recall Task for the ALC-EXP Word Pairs (N = 83)

Predictors	B	SE B	β
Step 1			
Drinking Quantity	.04	.05	.09
Step 2			
Drinking Quantity	-.06	.06	-.15
Sensation Seeking	.14	.07	.23
BAS-Fun Seeking	.11	.06	.19
Drinking Problems	.10	.07	.21
Family History	-.19	.08	-.26*

Note: $R^2 = .01$ for Step 1; $\Delta R^2 = .17$ for Step 2 ($p < .01$)

* $p < .05$.

The regression examining performance from the first to the third trial (or total learning) for the ALC-EXP pairs approached the conservative significance level, $F(5, 82) = 3.27, p = .01$, and accounted for 18% of the variance (see Table 7). Again, family history was a significant predictor ($\beta = -.26$), and sensation seeking approached significance ($\beta = .23, p = .058$). Findings across all other pair types were not reliable.

The results of the analyses examining rate of learning of pairs across trials suggest that individuals who scored higher on sensation seeking and had less of a family history of alcohol problems learned the ALC-EXP word pairs at a greater rate than other individuals. Importantly, this effect was specific to the word pairs of interest, though the findings were not seen for the EXP-ALC pairs. This supports the hypothesis outlined earlier, suggesting that specific risk factors would predict rate of learning of alcohol – expectancy information.

Discussion

The main hypothesis of the present investigation was that a relationship would be found between participants' scores on various measures of risk for alcohol problems and their ability to learn, or access previously learned alcohol and expectancy associations. More specifically, individuals who may be judged to be "high risk" as determined by their scores on proven measures of risk should learn more alcohol to alcohol expectancy associations and learn them faster than individuals judged to be "lower risk." Additionally, it was hypothesized that this result would not be found for control word pairs. A paired-associate learning and a free-recall task were used to measure the extent of learning of this information, and the results were largely supportive of the main hypotheses of the investigation.

Personality Factors

Analyses indicated that level of sensation seeking reliably predicted learning of alcohol-expectancy information on the cued-recall task, but not for the free-recall task. This finding was limited to the ALC-EXP pairs and not the EXP-ALC pairs. With regard to rate of learning of this information, a relationship was found between sensation seeking and the speed with which alcohol-expectancy pairs were learned as well. No relationship was found between sensation seeking and learning of control word pairs as was hypothesized.

The finding that sensation seeking scores predict learning of alcohol expectancy information is unique to this investigation. A good deal of prior research has demonstrated a relationship between sensation seeking (and similar constructs), alcohol expectancies, and drinking. No empirical evidence, however, has been provided to this point suggesting a link between this character trait and the development of specific alcohol to positive outcome expectancy associations.

As indicated earlier, sensation seeking is likely not a unitary construct but one which encompasses a whole host of behaviors and propensities (Finn, Sharkansky, Brandt, & Turcotte, 2000). Included in this array of behaviors are those which tend to be seen as possibly exciting or rewarding by such individuals, and using alcohol has been linked with such expectations in previous work (see Goldman, Darkes, & Del Boca, 1999).

The findings for the ALC-EXP pairs and not the EXP-ALC pairs suggest the importance of the effect of order for these types of learning tasks and for this type of information. It is possible that the general salience of word pairs containing an initial alcohol word may make such pairs leap out at these participants, essentially initiating a convergence of attentional resources due to the nature of the target. Additionally, it suggests an overriding *preference* for learning alcohol-related information on the part of higher sensation seekers. Importantly, however, these effects were not found for the ALC-SCH control pairs, highlighting the significance of the alcohol-expectancy association.

The results of the BAS Fun Seeking data indicated little support for the relationship between scores on this measure and learning of word pairs. This null

finding, however, does not rule out the possibility that a relationship does exist. It may be that the brevity of the scale (4 items) suggests questionable reliability as a measure of this construct. Additionally, though the BAS-Fun Seeking scale and the Sensation Seeking scale purportedly tap different constructs, examination of their overlapping content demonstrates a number of similarities. It may be that the BAS-Fun Seeking scale provides no additional benefit beyond measuring sensation seeking alone, and that sensation seeking may be a more useful measure when examining learning of this type of information.

Influence of Family History of Alcohol Problems

Having an extensive family history of alcohol problems has consistently been found to be a predictor of difficulties with alcohol in a variety of populations (McGue, 1994). Though, this relationship has not been reliably found in college student populations, likely due to the change in drinking pattern that accompanies many students, regardless of background, when they enter college (Gotham, Sher, & Wood, 1997). In the present investigation a consistent relationship was found between having a family history of alcohol problems and poorer performance on learning pairs containing alcohol and expectancy information. This relationship was found even when the extent of drinking was controlled for in the analyses. According to the hypothesis of the investigation, however, higher risk individuals would learn more alcohol – expectancy pairs than those with lower risk characteristics would, not less. What does this say about family history and this task? It is possible that those with a stronger lineage for such problems experienced some cognitive inhibition when it came to learning these specific

pairs (as this relationship was not seen for other pairs). Some research evidence has suggested that those with a family history of alcohol problems have greater difficulties on similar types of cognitive tasks. The design of the study, however, allows us to observe that family history did not predict recall for all other word pairs.

Perhaps the answer lies in the fact that having a family history of alcohol problems is not a simple measure of risk. Family history can mean different things to different people. It may be the case that an individual with such a background spends his or her time avoiding all situations involving drinking. Or, it may be just the opposite for other individuals. It is possible that such alcohol – expectancy associations hold special meaning for such individuals, but that accessibility to this information differs. Finally, it may be that when we measure family history, we are really capturing some other variable, or more likely, some combination of factors that account for these results. The findings of this investigation clearly suggest that, though complex, family history plays a role in how this information is learned, organized, or accessed from memory.

Drinking-Related Problems

Participants with more drinking-related problems reliably recalled (cued and freely) more alcohol and expectancy word pairs than those with fewer drinking-related problems. Importantly, this relationship was found even while controlling for the influence of drinking level. This would suggest that having drinking-related problems and recalling more of these “problematic” pairs is meaningful above and beyond the explanation provided for by just the amount one drinks. This finding is in line with the sensation seeking findings suggesting that this information means something special to

such disinhibited people. Unfortunately, such associations too often result in negative consequences, while sensation seeking and other similar constructs may take on either positive or negative connotations (Finn, Sharkansky, Brandt, & Turcotte, 2000).

An argument may be made against using prior risky behavior to determine risk status. Within the context of an investigation of individual differences, however, utilization of drinking-related problem data makes good sense. While the personality and other measures employed in the study provide information concerning background factors influencing one's performance on a task, behavioral data such as drinking-related problem information allows for examination of the relationship between prior actions or choices and acquisition of this material. This data is novel, and its value may be discerned independently of the other risk factors assessed.

Summary and Conclusions

A good deal of evidence from the alcohol expectancy measurement literature has pointed to a strong relationship between endorsement of positive and arousing expectancies for alcohol use by those who drink more. While the tasks in this study were designed to measure the extent to which alcohol and expectancy (and other) word pairs were learned, it was clear that such tasks may also be seen as alternative expectancy measures. Results from this investigation indicated that individuals' scores on proven measures of personality and genetic risk for alcohol problems predicted performance on recall for alcohol and expectancy information. Investigations of expectancy measurement have typically found that these same factors have been consistently related

to greater endorsement of positive and arousing alcohol expectancies (Goldman, Darkes, & Del Boca, 1999).

Not addressed sufficiently to this point is a large question of directionality of effect. More specifically, can we assume from the results of this investigation that such individual differences were the reason why alcohol and expectancy word pairs were recalled more often and faster than other pairs? Does this truly get at the notion of whether or not such individuals are predisposed or more *prepared* to acquire this type of information? Though it may seem attractive to subscribe to this theoretical stance, it is likely that such individuals already have these alcohol and expectancy pairings more firmly established or more highly organized (Rather & Goldman, 1994) in memory, and this is the reason for heightened performance. Some authors have suggested and have provided evidence for the fact that that this type of information may be more highly accessible for these individuals (Stacy, Leigh, & Weingardt, 1994). Alternatively, there is the possibility that these specific associations may be present but may only be tapped with the appropriate task. Though it was clear that the word pairs used in the study had not been subject to explicit association for the participants prior to the investigation, activation of similar semantic information in memory likely took place. This activation across the hypothesized semantic network described earlier, possibly occurred more dramatically for those individuals with a history of making these types of associations and acting upon them, even in the presence of initially neglected negative consequences (Patterson & Newman, 1993; McCarthy, Kroll, & Smith, 2001).

It would seem that the results from the present investigation lend support to the notion that individual differences exist in the ability to acquire or access alcohol to

alcohol expectancy relationships. While this study provides a unique look at a number of factors of interest, determination of conditionability or preparedness for these associations was not fully addressed by the study design. Valid tests of such theories within this type of learning framework would require the utilization of truly novel stimuli and associations, which is a highly challenging prospect. Causal investigations of individual differences and learning with respect to alcohol and alcohol expectancy information would have to be conducted prior to the development of such connections in memory. Studies of young children and the use of animal models would be valuable additions to this line of research. Additionally, broadening the scope of investigation to more heterogeneous populations is warranted.

Though considerable debate remains regarding expectancy measurement, recent attention has shifted from the question of ‘Does expectancy influence drinking?’ to ‘How does expectancy influence drinking?’ This interest in the process by which drinking behavior is affected has allowed for the rapid advancement of research in this area. Investigations aimed at examining the interaction between individual difference variables and cognitive factors will likely hold great promise in the prediction of the initiation and maintenance of alcohol use behavior.

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Appendices

Appendix A: Word pairs used in the investigation

Word List 1

Alcohol – Expectancy	Expectancy – Alcohol
Scotch – Funny	Fun – Bourbon
Pub – Wordy	Babble – Saloon
Beer – Cheerful	Happy – Wine
Booze – Horny	Erotic – Ale
Miller – Courageous	Energetic – Mug
Shot – Lively	Daring – Budweiser

Alcohol – School	School – Alcohol
Liquor – Textbook	Lecture – Whiskey
Tavern – Finals	Backpack – Bar
Vodka – Classroom	Graduation – Rum
Brew – Chalk	Paper – Alcohol
Cocktail – Parking	Campus – Tap
Keg – Tuition	Calculator – Drink

Expectancy – School	School – Expectancy
Talkative – Chapter	Computer – Exciting
Lustful – Exam	Essay – Brave
Hilarious – Desk	Professor – Active
Joyous – Notes	Pencil – Sexy
Confident – Library	Dormitory – Verbal
Exhilarated – Freshman	Homecoming – Jolly

Appendix A: (Continued)

Word List 2

Alcohol – Expectancy	Expectancy – Alcohol
Keg – Exhilarated	Jolly – Drink
Cocktail – Joyous	Verbal – Tap
Brew – Confident	Sexy – Bar
Vodka – Hilarious	Active – Rum
Tavern – Lustful	Brave – Alcohol
Liquor – Talkative	Exciting – Whiskey

Alcohol – School	School – Alcohol
Shot – Homecoming	Freshman – Budweiser
Miller – Dormitory	Library – Mug
Booze – Pencil	Notes – Ale
Beer – Professor	Desk – Wine
Pub – Essay	Exam – Saloon
Scotch – Computer	Chapter – Bourbon

Expectancy – School	School – Expectancy
Daring – Calculator	Tuition – Lively
Energetic – Campus	Chalk – Funny
Erotic – Paper	Parking – Cheerful
Happy – Backpack	Classroom – Horny
Babble – Graduation	Finals – Wordy
Fun – Lecture	Textbook – Courageous

Appendix B: Informed Consent

**Social Sciences/Behavioral
Adult Informed Consent**
University of South Florida

Information for People Who Take Part in Research Studies

The following information is being presented to help you decide whether or not you want to be a part of a minimal risk research study. Please read carefully. If you do not understand anything, ask the Person in Charge of the Study.

Title of Study:	<u>Individual Differences in Paired Associate Learning</u>
Principal Investigator:	<u>Mark S. Goldman, Ph.D.</u>
Person in Charge of the Study:	<u>Howard R. Steinberg, M.A.</u>
Study Location(s):	<u>Building PCD</u>

You are being asked to participate because this is an important study examining learning and memory in college students. Your participation may help advance the knowledge base in this area.

General Information about the Research Study

The purpose of this research study is to examine learning and memory in a college student population. In addition, the relationship between some individual difference variables and learning of certain word pairs will be explored.

The number of people who might take part in this study is 150.

Plan of Study

- The major portion of this study is a memory task. On this task, you will be asked to view a list of word pairs on a computer screen and to try and remember as many of the word pairs as possible. Next, you will be asked to complete two memory tests for the information that was presented. Following completion of the memory tasks, you will be asked to complete questionnaires regarding some of your individual experiences. This study will take approximately 60 minutes to complete.

Benefits of Being a Part of this Research Study

- There are no direct benefits for being a participant in this study.

Risks of Being a Part of this Research Study

- There are no anticipated risks associated with this experiment.

Alternatives of Being Part of this Research Study

- You may choose not to participate in this study.

Confidentiality of Your Records

- Your privacy and research records will be kept confidential to the extent of the law. No identifying data will be collected during this investigation. Code numbers will be used to identify all data, and only the primary investigators will have access to this data. Data will be secured in a locked storage area. Authorized research investigators, agents of the Department of Health and Human Services and the USF Institutional Review Board may inspect your records from this research project.

The results of the study may be published in grouped form. In other words, the published results will not include your name or any other information that will identify you.

Payment for Participation

You will not be paid for your participation in this study. You will be given one experimental extra credit point for each half-hour of participation (up to a maximum of 3 points).

Volunteering to Be Part of this Research Study

- Your decision to participate in this research study is completely voluntary. You are free to participate in this research study or to withdraw at any time. If you choose not to participate, or if you withdraw, there will be no penalty or loss of benefits that you are entitled to receive.

Appendix B: (Continued)

Questions and Contacts

- If you have any questions about this research study, contact Howard Steinberg at (813) 974-6211.
- If you have questions about your rights as a person who is taking part in a research study, you may contact a member of the Division of Research Compliance Services of the University of South Florida at 813-974-5638.

Your Consent—By signing this form I agree that:

- I have fully read or have had read and explained to me in my native language this informed consent form describing a research project.
- I have had the opportunity to question one of the persons in charge of this research and have received satisfactory answers.
- I understand that I am being asked to participate in research. I understand the risks and benefits, and I freely give my consent to participate in the research project outlined in this form, under the conditions indicated in it.
- I have been given a signed copy of this informed consent form, which is mine to keep.

Signature of Participant

Printed Name of Participant

Date

Investigator Statement

I have carefully explained to the subject the nature of the above protocol. I hereby certify that to the best of my knowledge the subject signing this consent form understands the nature, demands, risks and benefits involved in participating in this study and that a medical problem or language or educational barrier has not precluded a clear understanding of the subject's involvement in this study.

Signature of Investigator

Printed Name of Investigator

Date

Institutional Approval of Study and Informed Consent

This research project/study and informed consent form were reviewed and approved by the University of South Florida Institutional Review Board for the protection of human subjects. This approval is valid until the date provided below. The board may be contacted at (813) 974-5638.

Approval Consent Form Expiration Date:

Revision Date: _____

Appendix C:

PANAS

THIS SCALE CONSISTS OF A NUMBER OF WORDS THAT DESCRIBE DIFFERENT FEELINGS AND EMOTIONS. READ EACH ITEM AND THEN MARK YOUR ANSWER IN THE APPROPRIATE SPACE ON THE COMPUTER SHEET. INDICATE TO WHAT EXTENT YOU FEEL THIS WAY **RIGHT NOW, THAT IS, AT THE PRESENT MOMENT**. USE THE FOLLOWING SCALE TO RECORD YOUR ANSWERS.

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

1 _____ interested

11 _____ irritable

2 _____ distressed

12 _____ alert

3 _____ excited

13 _____ ashamed

4 _____ upset

14 _____ inspired

5 _____ strong

15 _____ nervous

6 _____ guilty

16 _____ determined

7 _____ scared

17 _____ attentive

8 _____ hostile

18 _____ jittery

9 _____ enthusiastic

19 _____ active

10 _____ proud

20 _____ afraid

Appendix D:

Participant Information Form

Please provide the following information by filling in the appropriate bubbles on the scantron form.

21. Which of the following best describes you?
- (0) White/Caucasian
 - (1) Black/African American
 - (2) Hispanic/Latino
 - (3) Asian/Asian American
 - (4) Native American
 - (5) Other
22. What is your religious background?
- (0) Catholic
 - (1) Jewish
 - (2) Protestant
 - (3) Islamic
 - (4) Buddhist
 - (5) Hindu
 - (6) None
 - (6) Other
23. How important is religion to **you** in your daily life?
- (0) Not at all important
 - (1) Slightly important
 - (2) Important
 - (3) Very important
 - (4) Extremely important
24. Which of the following alcoholic beverages do you consume most often?
- (0) I don't drink
 - (1) Beer
 - (2) Wine
 - (3) Hard liquor or spirits, mixed drinks
25. Which of the following best describes you?
- (0) Never used alcohol
 - (1) Used to drink in the past, but now abstain from alcohol
 - (2) Recovering alcoholic
 - (3) Light drinker
 - (4) Social drinker
 - (5) Moderate drinker
 - (6) Regular drinker
 - (7) Heavy Drinker

Appendix D: (Continued)

26. Which of the following best describes how you usually drink alcohol?
- (0) I have never had a drink of alcohol.
 - (1) I do not drink alcohol anymore.
 - (2) I have had only 1,2,3, or 4 drinks of alcohol in my life.
 - (3) I drink alcohol 3 or 4 times a *year*.
 - (4) I drink alcohol about once a *month*.
 - (5) I drink alcohol 1 or 2 *days a week*.
 - (6) I drink alcohol 3 or 4 *days a week*.
 - (7) I drink alcohol 5 or 6 *days a week*.
 - (8) I drink alcohol every *day*.
27. Which of the following best describes how much alcohol you usually drink at one time? By a "drink" we mean a **can** or **bottle** of beer, a **glass of wine** or a **wine cooler**, a **shot of liquor**, or a **mixed drink with liquor in it**.
- (0) I don't drink alcohol at all.
 - (1) 1 drink.
 - (2) 2 drinks.
 - (3) 3 drinks.
 - (4) 4 drinks.
 - (5) 5 drinks.
 - (6) 6 to 8 drinks
 - (7) 9 to 12 drinks.
 - (8) 13 to 16 drinks.
 - (9) 17 or more drinks.
28. Have you ever failed to do what was expected of you because of your drinking?
- (0) Yes
 - (1) No
 - (2) I don't drink
29. Have you ever felt bad about yourself because of your drinking?
- (0) Yes
 - (1) No
 - (2) I don't drink
30. Have your family or friends ever worried or complained about your drinking?
- (0) Yes
 - (1) No
 - (2) I don't drink
31. Have you ever passed out as a result of drinking?
- (0) Yes
 - (1) No
 - (2) I don't drink
32. Have you ever gotten into a physical fight while drinking?
- (0) Yes
 - (1) No
 - (2) I don't drink

Appendix D: (Continued)

33. Have you ever done something while drinking that could get you into trouble with the law, like shoplifting or damaging property?
- (0) Yes
 - (1) No
 - (2) I don't drink
34. Have you ever gotten into trouble with the law for something that you did as a result of drinking?
- (0) Yes
 - (1) No
 - (2) I don't drink
35. Have there been occasions when you used larger amounts of alcohol than you had planned to use?
- (0) Yes
 - (1) No
 - (2) I don't drink
36. Have you ever stopped participating in a club, sports team, or other activity because it got in the way of using alcohol?
- (0) Yes
 - (1) No
 - (2) I don't drink
37. Do you think that your use of alcohol has ever caused your grades to drop, and do you still drink anyway?
- (0) Yes
 - (1) No
 - (2) I don't drink
38. Has your use of alcohol ever upset any of your friends to the point where they no longer speak to you or associate with you?
- (0) Yes
 - (1) No
 - (2) I don't drink
39. Do you find that you require much larger amounts of alcohol than you previously needed to get drunk or high?
- (0) Yes
 - (1) No
 - (2) I don't drink
40. Have you ever driven a car or motorcycle while drunk or high on alcohol?
- (0) Yes
 - (1) No
 - (2) I don't drink
41. Have you ever done anything else risky, while high on alcohol, that could have resulted in danger or physical harm to you or someone else?
- (0) Yes
 - (1) No
 - (2) I don't drink

Appendix E:

Alcohol Expectancy Questionnaire

This is a questionnaire about the effects of alcohol. Read each statement carefully and respond according to your own personal feelings, thoughts, and beliefs about alcohol **now**. We are interested in what **you** think about alcohol, regardless of what other people might think.

If you think that the statement is true, or mostly true, or true some of the time, then mark the number 0, for "AGREE", on your computer sheet. If you think the statement is false, or mostly false, then mark the number 1, for "DISAGREE" on your computer sheet. When the statements refer to drinking alcohol, you may think in terms of drinking any alcoholic beverage, such as beer, wine, whiskey, liquor, rum, scotch, vodka, gin, or various alcoholic mixed drinks. Whether or not you have had actual drinking experiences yourself **you are to answer in terms of your beliefs about alcohol**. It is important that you respond to **every question**.

**PLEASE BE HONEST. REMEMBER, YOUR ANSWERS ARE CONFIDENTIAL.
RESPOND TO THESE ITEMS ACCORDING TO WHAT YOU PERSONALLY
BELIEVE TO BE TRUE ABOUT ALCOHOL**

**PUT ALL RESPONSES ON YOUR
COMPUTER SHEET:**

0=AGREE 1=DISAGREE

42. Some alcohol has a pleasant, cleansing, tingly taste.
43. Drinking adds a certain warmth to social occasions.
44. When I'm drinking, it is easier to open up and express my feelings.
45. Time passes quickly when I'm drinking.
46. Drinking makes me feel flushed.
47. I feel powerful when I drink, as if I can really influence others to do what I want.
48. Drinking gives me more confidence in myself.
49. Drinking makes me feel good.
50. I feel more creative after I've been drinking.
51. Having a few drinks is a nice way to celebrate special occasions.
52. When I'm drinking I feel freer to be myself and do whatever I want.
53. Drinking makes it easier to concentrate on the good feelings I have at the time.
54. Alcohol allows me to be more assertive.
55. When I feel "high" from drinking, everything seems to feel better.
56. I find that conversing with members of the opposite sex is easier for me after I've had a few drinks.
57. Drinking is pleasurable because it's enjoyable to join in with people who are enjoying themselves.
58. I like the taste of some alcoholic beverages.

Appendix E: (Continued)

RESPOND TO THESE ITEMS ACCORDING TO WHAT YOU PERSONALLY

BELIEVE TO BE TRUE ABOUT

ALCOHOL

0=AGREE	1=DISAGREE
----------------	-------------------

**PUT ALL RESPONSES ON YOUR
COMPUTER SHEET:**

59. If I'm feeling restricted in any way, a few drinks make me feel better.
60. Men are friendlier when they drink.
61. After a few drinks, it is easier to pick a fight.
62. If I have a couple of drinks, it is easier to express my feelings.
63. Alcohol makes me need less attention from others than I usually do.
64. After a few drinks, I feel more self-reliant than usual.
65. After a few drinks, I don't worry as much about what other people think of me.
66. When drinking, I do not consider myself totally accountable or responsible for my behavior.
67. Alcohol enables me to have a better time at parties.
68. Drinking makes the future seem brighter.
69. I often feel sexier after I've had a couple of drinks.
70. I drink when I'm feeling mad.
71. Drinking alone or with one other person makes me feel calm and serene.
72. After a few drinks, I feel brave and more capable of fighting.
73. Drinking can make me more satisfied with myself.
74. My feelings of isolation and alienation decrease when I drink.
75. Alcohol helps me sleep better.
76. I'm a better lover after a few drinks.
77. Alcohol decreases muscular tension.
78. Alcohol makes me worry less.
79. A few drinks makes it easier to talk to people.
80. After a few drinks I am usually in a better mood.
81. Alcohol seems like magic.
82. Women can have orgasms more easily if they've been drinking.
83. Drinking helps get me out of a depressed mood.
84. After I've had a couple of drinks, I feel I'm more of a caring, sharing person.
85. Alcohol decreases my feelings of guilt about not working.
86. I feel more coordinated after I drink.

Appendix E: (Continued)

**RESPOND TO THESE ITEMS ACCORDING TO WHAT YOU PERSONALLY
BELIEVE TO BE TRUE ABOUT ALCOHOL**

**PUT ALL RESPONSES ON YOUR COMPUTER
SHEET:**

0=AGREE	1=DISAGREE
----------------	-------------------

87. Alcohol makes me more interesting.
88. A few drinks makes me feel less shy.
89. Alcohol enables me to fall asleep more easily.
90. If I'm feeling afraid, alcohol decreases my fears.
91. Alcohol can act as an anesthetic, that is, it can deaden pain.
92. I enjoy having sex more if I've had some alcohol.
93. I am more romantic when I drink.
94. I feel more masculine/feminine after a few drinks.
95. Alcohol makes me feel better physically.
96. Sometimes when I drink alone or with one other person it is easy to feel cozy and romantic.
97. I feel like more of a happy-go-lucky person when I drink.
98. Drinking makes get togethers more fun.
99. Alcohol makes it easier to forget bad feelings.
100. After a few drinks, I am more sexually responsive.
101. If I'm cold, having a few drinks will give me a sense of warmth.
102. It is easier to act on my feelings after I've had a few drinks.
103. I can discuss or argue a point more forcefully after I've had a drink or two.
104. A drink or two makes the humorous side of me come out.
105. Alcohol makes me more outspoken or opinionated.
106. Drinking increases female aggressiveness.
107. A couple of drinks makes me more aroused or physiologically excited.
108. At times, drinking is like permission to forget problems.
If I am tense or anxious, having a few drinks makes me feel better.

Appendix F:

ZKPQ

DIRECTIONS: On the following pages you will find a series of statements that persons might use to describe themselves. Read each statement and decide whether or not it describes you. Then indicate your answer on the separate answer sheet provided.

If you agree with a statement or decide that it describes you, answer TRUE by blackening in the 0 on the answer sheet. If you disagree with a statement, or feel that it is not descriptive of you, answer FALSE by blackening in 1 on the answer sheet.

0 = TRUE	1 = FALSE
-----------------	------------------

In marking your answers on the answer sheet, be sure that the number of the statement you have just read is the same as the number you are marking on your answer sheet. **Answer every statement** either True (0) or False (1), even if you are not entirely sure of your answer.

1. I tend to begin a new job without much advance planning on how I will do it.
2. I do not worry about unimportant things.
3. I enjoy seeing someone I don't care for humiliated before other people.
4. I never met a person I didn't like.
5. I do not like to waste time just sitting around and relaxing.
6. I usually think about what I am about to do before doing it.
7. I am not very confident about myself or my abilities.
8. When I get mad, I say ugly things.
9. I tend to start conversations at parties.
10. I have always told the truth.
11. It's natural for me to curse when I am mad.
12. I do not mind going out alone and usually prefer it to being out in a large group.
13. I lead a busier life than most people.
14. I often do things on impulse.
15. I often feel restless for no apparent reason.
16. I almost never litter the streets with wrappers.
17. I would not mind being alone in a place for some days without any human contacts.
18. I like complicated jobs that require a lot of effort and concentration.
19. I very seldom spend much time on the details of planning ahead.
20. I sometimes feel edgy and tense.
21. I almost never feel like I would like to punch or slap someone.
22. I spend as much time with my friends as I can.
23. I do not have a great deal of energy for life's more demanding tasks.
24. I like to have new and exciting experiences and sensations even if they are a little frightening.

Appendix F: (Continued)

25. My body often feels all tightened up for no apparent reason.
26. I always win at games.
27. I often find myself being “the life of the party.”
28. I like a challenging task much more than a routine one.
29. Before I begin a complicated job, I make careful plans.
30. I frequently get emotionally upset.
31. If someone offends me, I just try not to think about it.
32. I have never been bored.
33. I like to be doing things all of the time.
34. I would like to take off on a trip with no preplanned or defined routes or timetables.
35. I tend to be oversensitive and easily hurt by thoughtless remarks and actions of others.
36. In many stores you just cannot get served unless you push yourself in front of other people.
37. I do not need a large number of casual friends.
38. I can enjoy myself just lying around and not doing anything active.
39. I enjoy getting into new situations where you can't predict how things will turn out.
40. I never get lost, even in unfamiliar places.
41. I am easily frightened.
42. If people annoy me I do not hesitate to tell them so.
43. I tend to be uncomfortable at big parties.
44. I do not feel the need to be doing things all of the time.
45. I like doing things just for the thrill of it.
46. I sometimes feel panicky.
47. When I am angry with people I do not try to hide it from them.
48. At parties, I enjoy mingling with many people whether I already know them or not.
49. I would like a job that provided a maximum of leisure time.
50. I tend to change interests frequently.
51. I often think people I meet are better than I am.
52. I never get annoyed when people cut ahead of me in line.
53. I tend to start my social weekends on Thursday evenings.
54. I usually seem to be in a hurry.
55. I sometimes like to do things that are a little frightening.
56. Sometimes when emotionally upset, I suddenly feel as if my legs are unsteady.
57. I generally do not use strong curse words even when I am angry.
58. I would rather “hang out” with friends than work on something by myself.
59. When on vacation I like to engage in active sports rather than just lie around.
60. I'll try anything once.

Appendix F: (Continued)

61. I often feel unsure of myself.
62. I can easily forgive people who have insulted me or hurt my feelings.
63. I would not mind being socially isolated in some place for some period of time.
64. I like to wear myself out with hard work or exercise.
65. I would like the kind of life where one is on the move and traveling a lot, with lots of change and excitement.
66. I often worry about things that other people think are unimportant.
67. When people disagree with me I cannot help getting into an argument with them.
68. Generally, I like to be alone so I can do things I want to do without social distractions.
69. I never have any trouble understanding anything I read the first time I read it.
70. I sometimes do "crazy" things just for fun.
71. I often have trouble trying to make choices.
72. I have a very strong temper.
73. I have never lost anything.
74. I like to be active as soon as I wake up in the morning.
75. I like to explore a strange city or section of town by myself, even if it means getting lost.
76. My muscles are so tense that I feel tired much of the time.
77. I can't help being a little rude to people I do not like.
78. I am a very sociable person.
79. I prefer friends who are excitingly unpredictable.
80. I often feel like crying sometimes without a reason.
81. No matter how hot or cold it gets, I am always quite comfortable.
82. I need to feel that I am a vital part of a group.
83. I like to keep busy all the time.
84. I often get so carried away by new and exciting things and ideas that I never think of the possible complications.
85. I don't let a lot of trivial things irritate me.
86. I am always patient with others even when they are irritating.
87. I usually prefer to do things alone.
88. I can enjoy routine activities that do not require much concentration or effort.
89. I am an impulsive person.
90. I often feel uncomfortable and ill at ease for no real reason.
91. I often quarrel with others.
92. I probably spend more time than I should socializing with friends.
93. It doesn't bother me if someone takes advantage of me.
94. When I do things, I do them with lots of energy.

Appendix F: (Continued)

- 95. I like "wild" uninhibited parties.
- 96. After buying something I often worry about having made the wrong choice.
- 97. When people shout at me, I shout back.
- 98. I have more friends than most people do.
- 99. Other people often urge me to "take it easy."

Appendix G:

BIS/BAS

Each item of this questionnaire is a statement that a person may either agree with or disagree with. For each item, indicate how much you agree or disagree with what the item says. Please respond to all the items; do not leave any blank. Choose only one response to each statement. Please be as accurate and honest as you can be. Respond to each item as if it were the only item. That is, don't worry about being "consistent" in your responses. Choose from the following four response options:

1 = very true for me

2 = somewhat true for me

3 = somewhat false for me

4 = very false for me

Put all responses on your computer sheet.

100. Even if something bad is about to happen to me, I rarely experience fear or nervousness.
101. I go out of my way to get things I want.
102. When I'm doing well at something I love to keep at it.
103. I'm always willing to try something new if I think it will be fun.
104. When I get something I want, I feel excited and energized.
105. Criticism or scolding hurts me quite a bit.
106. When I want something I usually go all-out to get it.
107. I will often do things for no other reason than that they might be fun.
108. If I see a chance to get something I want I move on it right away.
109. I feel pretty worried or upset when I think or know somebody is angry at me.
110. When I see an opportunity for something I like I get excited right away.
111. I often act on the spur of the moment.
112. If I think something unpleasant is going to happen I usually get pretty "worked up."
113. When good things happen to me, it affects me strongly.
114. I feel worried when I think I have done poorly at something important.
115. I crave excitement and new sensations.
116. When I go after something I use a "no holds barred" approach.
117. I have very few fears compared to my friends.
118. It would excite me to win a contest.
119. I worry about making mistakes.

Appendix H:

SRE Form

On this form, please tell us about your ACTUAL experiences drinking alcohol. Please answer each question as accurately as possible. Give only one answer for each question. Please do not give ranges (i.e.: don't list 4-6 drinks; write 5).

To fill out this form:

- One drink of alcohol=12 ounce beer, 4 ounce glass of wine, or a single shot of hard alcohol alone or in a mixed drink.
- If a question does not apply to you, write N/A in the space provided and move on to the questions that relate to you.

1. Begin with column A: How many drinks did it actually take “for you to begin to feel any different” the first 5 times (or so) you ever drank alcohol? DO NOT count sips taken as a child. Place your answer in column A, just to the right of Question 1.
2. How many drinks did it actually take “for you to feel a bit dizzy, or to begin to slur your speech” the first 5 times you ever drank? Place your answer in Column A, next to Question 2.
3. Now, complete column A for Questions 3 and 4, filling in the number of drinks it actually took for you to feel the effect listed on the left side of the table.
4. Next, fill in the same information for Column B for your most recent period of drinking at least once a month for 3 consecutive months.
5. Finally, fill in Column C: How many drinks did it actually take to feel the effects listed at the left during your period of heaviest drinking?

Effect of drinking alcohol (answer only those which apply to your actual drinking experiences)	A	B	C
	First 5 times you ever drank	3 months drinking at least once a month	Period of heaviest drinking
1) How many drinks did it take for you to begin to feel different? (where you could feel an effect)			
2) How many drinks did it take for you to feel a bit dizzy, or to begin to slur your speech?			
3) How many drinks did it take you to begin stumbling, or walking in an uncoordinated manner?			
4) How many drinks did it take you to pass out, or fall asleep when you did not want to?			

Appendix I:

Time-Line Follow Back Interview-Instructions

What I would like you to do is to recall your drinking for the past 30 days. I want to get an idea of how much alcohol you consumed on each day during this time. This is not a difficult task, especially when you use a calendar like this one (show calendar). What the calendar does is give you a visual picture of the dates and patterns of your drinking. What we have found is that calendars are very useful in helping people recall their drinking. The idea is to record the number of drinks you consumed each day. On days when you did not drink any alcohol, you would write "0". For days when you had something to drink, you would write in the number of drinks you consumed. The important thing is to make sure something is written in for each day on the calendar. Please use standard drinks to record your numbers (show standard drink chart). Standard holidays are marked on the calendar to help you to recall what you were doing during this time. You can also write in personal events and celebrations like birthdays, vacations, sporting events or other things which may help you to remember what your drinking was like during this time period. Do you have any questions?

Appendix J:

Family History Grid

This questionnaire concerns your family and experiences that family members have had with alcohol. Please begin by describing your family by indicating in **Column A** the total number of biological (i.e., related by blood) relatives (both living and dead) that you have in each category on each side of your family. For example, although you have only one biological grandmother on your mother’s side (as shown in Column A), you may have several aunts (your mother’s biological sisters) or none at all. If you have no relatives in a particular category, put the letter “N” (for “None”) in Column A in the space next to the category. If you don’t know how many relatives you have in a category, put “DK” (for “Don’t Know”) in the space.

Next, please indicate in **Column B** the number of biological relatives (both living and dead) in each category that had in the past, or currently have, what you would call a significant drinking problem, one that did, or should have, led to treatment. Some signs that drinking may be a problem include legal problems (e.g., drunk driving violations), health problems (e.g., cirrhosis of the liver, alcohol withdrawal symptoms), relationship problems (e.g., arguments about alcohol with family members), or work/school problems (e.g., poor performance, absenteeism resulting from alcohol use), or actual treatment (e.g., detox or rehab, AA meeting attendance). If you have no relatives with alcohol problems in a particular category, put the letter “N” (for “None”) in Column A in the space next to the category. If you don’t know how many relatives you have in a category, put “DK” (for “Don’t Know”) in the space.

Biological Relative	A	B
Mother’s Side	Number of biological relatives	Number of relatives with alcohol problems
Grandmother	1	
Grandfather	1	
Mother	1	
Aunt(s)		
Uncle(s)		
Father’s Side		
Grandmother	1	
Grandfather	1	
Mother	1	
Aunt(s)		
Uncle(s)		
Siblings		
Brother(s)		
Sisters(s)		

Appendix K:

Participant Debriefing Form

The study that you have just participated in will examine how college students' learning and memory for certain types of word associations (e.g., words concerning alcohol content and non-alcohol content) may be related to different characteristics that an individual may possess. Some of these characteristics include drinking patterns and personality variables. Currently, little is known about the connection between individual differences like drinking behavior and the ability to learn certain types of word associations.

If you have any questions or concerns regarding this study, please feel free to speak with the experimenter, or call Howard Steinberg at 974-6211. Thank you for your participation.

PLEASE DO NOT DISCUSS THIS EXPERIMENT WITH OTHERS! THANK YOU.

About the Author

Howard Steinberg received his B.A. in Psychology from the University at Albany, SUNY in 1992. Following two years involved with clinical research at the National Center for PTSD and the Substance Abuse Treatment Program at that Boston VA Medical Center, he entered the Ph.D. program in Clinical Psychology at the University of South Florida in 1994. While there, Mr. Steinberg co-authored a number of paper presentations for national conferences, he received a Student Travel Award from the American Psychological Association, and he received an APA Dissertation Research Award in 2001.

Mr. Steinberg has completed an internship in Clinical Psychology at the Greater Hartford Consortium, and is currently working as a Research Associate for the Yale University School of Medicine / VA Connecticut Healthcare System.

Mr. Steinberg currently lives in Connecticut with his wife and their 15 month-old daughter.