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# Automatic Attention to Aggression Cues and Alcohol Cues Using a Dichotic Listening Task and a Parafoveal Visual Task

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# Automatic Attention to Aggression Cues and Alcohol Cues Using a Dichotic Listening Task and a Parafoveal Visual Task

by

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# Dedication

This thesis is dedicated primarily to my sweetie, James B. LeVasseur. His dedication to walking my path with me was as valuable as his unshakeable faith in my ability to succeed and his keen perspective. These qualities in him made it possible for me to pursue a dream while retaining vital connections with my family and closest friends, while continuing my personal growth, and while keeping my wits about me. This thesis is also dedicated to my children, Aaron Edington and Cristofer Edington, who sometimes had to go without in my pursuit of higher education. I hope that in the final analysis they will be inspired by my tenacity to also reach beyond the simple or the known. Finally, I dedicate this thesis to my faithful champion, Andrea Edington Shank, who has always understood me, and loved me just the same!

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ABSTRACT

Ongoing investigations of drunken aggression tend to focus on 1) situational cues, and 2) individual variables such as personality traits. This study investigated the hypothesis that an undergraduate's attention would be pulled toward a nonconscious presentation of aggression stimuli, especially in the presence of alcohol cues, and especially if he or she was high on trait anger [as measured using the State Trait Anger Expression Inventory (STAXI); Spielberger, 1988] and had high expectancies for behaving aggressively while drinking alcohol [as measured using the Expectancy Questionnaire for Alcohol and Aggression – Lo Dose (EQAAL); Epps, Hunter, LeVasseur, Steinberg, & Hancock, unpublished manuscript].

Seventy-nine of the participants who completed questionnaires also completed one of the two computer tasks (adapted from John Bargh and associates) weeks later in either the Barroom or the Cleanroom. Attention to HiAggression words (as measured by reaction time or error rate difference scores) was significantly higher than attention to NonAggression words using the parafoveal visual task, with observed power at 1. No significant differences were found using the dichotic listening task. Additionally, there was a significant three-way interaction (Word Type X Setting X Angry Temperament) when participants where blocked according to high vs. low angry temperament scores. Follow-up analyses as well as regression analyses for the specific hypothesis provided mixed results. Individuals lower on angry temperament tended to demonstrate higher levels of attentional interference for aggression words, but only in the *presence* of alcohol cues. Conversely, individuals higher on angry temperament evidenced higher levels of attentional interference, but only in the *absence* of alcohol cues.

It appears that the relationships among these variables are by no means straightforward. Studies that include an opportunity to aggress behaviorally may shed more light on whether one's level of attentional interference and self-reported personality traits can be combined to predict aggression in the presence of alcohol cues. The parafoveal visual task is recommended as the methodology of choice for these future studies.

# Introduction

Aggression represents a global health problem of enormous dimensions and involves behaviors such as homicide, suicide, domestic violence, and sexual violence (World Health Organization, WHO, 2001). WHO identified alcohol abuse as one of the primary individual risk factors for these types of aggression. Various data substantiate an alarming association between alcohol use and aggression. The U.S. Department of Justice Bureau of Justice Statistics (1997) reported that the following percentages of state prisoners were under the influence of alcohol at the time the offense was committed: murder - 45%, negligent manslaughter - 52%, assault - 45%, sexual assault – 40%, and robbery – 37%. Additionally, alcohol has been reported to be involved in about 70% of fatal automobile accidents, 88% of knifings, and 65% of spouse battering (Steele & Josephs, 1990).

Consumption of alcohol appears to be associated with the severity of aggressive behavior. Koss (1988) investigated this hypothesize using a national college sample of nearly 3,000 men, some of whom were perpetrators of sexually aggressive crimes. Male perpetrators reported that alcohol or substance use was involved 74% of the time during rape, 67% of the time during attempted rape, 35% of the time during sexual coercion, and 33% of the time during unwanted sexual contact (Koss, 1988 as cited in Testa, 2002). Although the majority of us do not become aggressive after consuming alcohol, the regrettable consequences of the interaction exact a heavy toll against our society, rendering the relationship between alcohol and aggression worthy of intense scrutiny. Ongoing investigations of this relationship attempt to identify variables that precipitate, mediate, or moderate drunken aggression, including 1) external socio-cultural or situational cues and 2) individual variables such as cognitions, mood, or personality traits. Researchers, governmental agencies, and various funding sources continue to invest extensive resources on research that will increase our understanding of this sometimes deleterious interaction. It is hoped that a more precise understanding of this interaction will facilitate the development of more effective intervention programs for those who drink and become aggressive.

## *Overview*

The current study focused primarily with the cognitive aspects of the alcohol-aggression relationship—attention to salient internal and external cues related to alcohol and aggression. More specifically, this study was designed to find out if a person's attention is more likely to be pulled toward aggression stimuli, especially in the presence of alcohol cues and/or in the presence of high self-reported expectations for acting aggressive while consuming alcohol. To this end, a brief summary of the literature regarding aggression, selective attention theory, alcohol and cognition, and alcohol and aggression is provided below. This is followed by a description of two methods of presenting stimuli that hold promise for enhancing our understanding of the confluence of aggressive stimuli, alcohol cues and personality variables upon attention. Finally, the specific hypotheses and methodology for the current study are presented.

## *Aggression*

### *Definitional Issues*

The definitions of the words *violence* and *aggression* are similar in their emphasis on the delivery of punishment to another organism. Of the two, "aggression" has been operationally defined with greater precision. Therefore, the term *aggression* will be used throughout this study.

Many definitions of aggression have been offered in the literature. Baron's (1977) definition of aggression is "any form of behavior directed toward the goal of harming or injuring another living being who is motivated to avoid such treatment" (p. 7). This definition excludes cases in which 1) hurtful behavior is intended to help another person and 2) is acceptable to the target (e.g., the harm received by a surgical or dental patient). It also implies that the essential feature of aggression is behavior that reflects intention to harm.

Renfrew (1997) proposed that "aggression is a behavior that is directed by an organism toward a target, resulting in damage" (p. 6). Renfrew argued that this definition is broad enough to cover a wide range of aggressive situations such as aggression toward animals or objects, and self-injurious behaviors. However, the emphasis on "resulting in damage" excludes unsuccessful attempts to hurt the target. Also, for many researchers, the impact of aggression toward animals or objects is not as interesting or relevant as aggression toward other people.

Buss (1961) defined aggression as “a response that delivers noxious stimuli to another organism” (p. 1). This definition ignores *intent* or *goal* to cause damage or injury because Buss insisted that intent is unnecessary in the analysis of aggressive behavior. In his view, “the relationship between reinforcement history of an aggressive response and the immediate situation eliciting the response” (p. 2) is the critical relationship because it is most likely to predict the occurrence and strength of aggressive responses. Buss’ definition fits well within a behavioral approach that circumvents unobservable cognitions such as intent. However, cognitions (e.g., intentions, expectancies, etc.), such as those implied by Baron’s definition, are central to an attentional approach, such as the one taken in this study.

Intention to harm another person whether damage is caused or not, appears to be an important aspect of aggression. Therefore, Baron’s definition of aggression will serve as the backdrop for the following discussion of the origins of aggression.

In addition to various definitional issues concerning aggression, researchers have struggled to distinguish among definitions of *aggression*, *anger* and *hostility*. One distinction recognizes that these terms are different facets of the same global construct: anger is the affective component; hostility is the complex cognitive, thought, or attitudinal component; and aggression is the behavioral component (e.g., Buss, 1961; Spielberger, Jacobs, Russell, & Crane, 1983; Epps & Kendall, 1995). Unfortunately, some investigators continue to use anger, hostility and aggression interchangeably, contributing to ongoing definitional ambiguities. One method of minimizing this ambiguity has been to distinguish between angry or hostile aggression on the one hand and instrumental aggression on the other. These distinctions are generally made using Buss’s (1961) definitions. Buss characterized all aggressive responses as involving an interpersonal context and either being reinforced by the victim’s pain (which is considered angry/hostile aggression) or by extrinsic rewards (which is considered instrumental aggression). Angry or hostile aggression, then, is reinforced by the victim’s emotional suffering, physiological reaction, or physical injury, whereas with instrumental aggression "the acquisition of some extrinsic reinforcer or the cessation of aversive stimuli are the crucial consequences, not the victim's discomfort" (p. 3).

Recently, however, the dichotomy between hostile and instrumental aggression has come under attack. Bushman and Anderson (2001) recommended "pulling the plug" (p. 273) on this dichotomy claiming that it has outlived its usefulness. The authors made a cogent argument that too many acts of aggression serve multiple purposes and include both impulsive anger and a premeditated, instrumental component. For example, when a boy shoves his brother out of a bus seat his intention might be to get the seat for himself, to raise his power status in front of other students, to get revenge because his brother called him a name earlier, or a combination of all three. The relative influence of each type of aggression is often incalculable. In fact, Bushman and Anderson expressed appreciation for the past utility of the hostile vs. instrumental aggression dichotomy, but suggested that psychologists will realize future advances in the study of human aggression by utilizing a knowledge structure (information-processing) approach, which will be discussed shortly.

Research related to the current study has centered on aggression that is performed concurrently with or secondary to anger arousal. While there may be an instrumental component to such aggression, the presence of anger arousal as a common theme makes it appropriate to focus primarily on literature related to angry aggression. However, instrumental aggression will be mentioned where appropriate.

*Salience* or *salient* are concepts encountered frequently within the alcohol, aggression, and selective attention literature. Generally, stimuli (e.g., thoughts, attitudes, and environmental objects or events) are regarded as salient when they stand out and enter conscious thought more readily because their conditions of activation are more easily satisfied (Krech & Crutchfield, 1948). Higgins (1996) has provided convincing arguments that the common view of salience is better described by the concept of "accessibility" which he defined as the activation potential of available knowledge. These distinctions will be elaborated upon later (in the section on Selective Attention). However, in order to be concordant with the extant literature, the term salience will be used throughout the current study.

*The Origins of Angry Aggression*

To understand the variables that may be most fruitful for investigating the alcohol-aggression relationship, it is helpful to understand how angry aggression is assumed to develop. Many models have been proposed to explain the development of aggressive behavior including the original frustration-aggression hypothesis (Dollard, Miller, Doob, Mowrer & Sears, 1939), social learning theory (Bandura, 1973), a cognitive neo-associationistic conception (Berkowitz, 1990), two social information processing models (Huesmann, 1988; Crick and Dodge, 1994) and an explication of knowledge structures (Bushman and Anderson, 2001). Each of these models will be discussed briefly followed by a summary of the important themes.

*Frustration-Aggression Hypothesis.*

Originally aggression was theorized to result as a direct consequence of frustration brought on by an undesirable interruption (thwarting) of goal-directed behavior (Dollard, Miller, Doob, Mowrer, & Sears, 1939). The theory specified that once frustration is experienced, the innate drive is to strike out at a target. If aggressive behavior is inhibited, the natural response toward aggression is thwarted and more frustration is produced. On the other hand, if aggression is exhibited, relief from the instigation to aggress occurs. This relief has been referred to as "aggression catharsis." However, several studies have provided evidence against the cathartic effect. Under conditions in which one would be expected to produce *less* aggression (e.g., after already having the opportunity to aggress as investigated by Geen, Stonner, & Shope, 1975, or over time as investigated by Favata, LeVasseur, Koenig, Ciarcia, Epps, & Roberts, 2003), participants actually produce *more* aggression (Lewis and Bucher, 1990).

The original frustration-aggression hypothesis also implied that frustration is always followed by aggression. However, participants who perceive their frustration as resulting from a legitimate reason are less likely to display aggression (Pastore, 1952; Cohen; 1955) Also, Bandura (1973) argued that awareness of likely punishers may cause a person's aggressive response to be inhibited or even extinguished. Both of these arguments suggest a mediational effect of cognition regarding the frustrating event, an effect that is not addressed by the original model. Therefore, variables such as prior learning (i.e., expectations) are likely to influence one's interpretation of cues in the environment, mediating whether one considers an event to be frustrating in the first place, and whether a frustrating event even warrants an aggressive response.

Both the lack of support for aggression catharsis and research indicating that frustration is not always followed by aggression cast doubt upon the tenability of the frustration-aggression hypothesis to explain the origins of aggression. Models of learning were instrumental in increasing our understanding of how aggression develops.

*Social Learning Theory.*

Social learning theory, as explicated by Bandura (1973), was the next notable model to describe the origins of aggression. Unlike the frustration-aggression hypothesis, social learning theory views frustration as merely one example of an emotional state that can lead to aggression. Here aggression is considered to result from learning—learning in a social context which feelings to label as "anger" and which behaviors are likely to punish another person or lead to reinforcers.

According to Bandura (1973), aggressive behavior sequences are learned via direct experience or observation. Through direct experience, a child may learn by interacting with others behaviors for which he or she is likely to be punished or rewarded. The frequency of aggressive behavior will be a direct function of how often the behavior was rewarded or punished as it was being learned. Through observation, a child may learn which behaviors exhibited by influential others (such as role-models) generate reward or punishment. Once an individual uses the modeled behavioral sequence and it is rewarded, this will increase the likelihood that the behavior will be repeated. Conversely, punishment for using the behavioral sequence will result in its extinction. Whether the behavior originated through vicarious learning or direct experience, after more successes than failures in obtaining the desired results, the behavioral sequence (e.g., aggression) will become part of that individual's repertoire for controlling his or her environment.

It is tenable that frustration gives rise to a variety of negative emotions which may instigate the drive to aggress (as in the original frustration-aggression hypothesis). It has also been suggested that the experience of negative affect, *in general*, produces emotional arousal (Sandoval, 1997). When this arousal is paired with the right reinforcement contingencies, aggression is produced. However, Bandura believed emotional arousal is not even necessary in the production of aggression (Sandoval, 1997). Awareness that an event is aversive may lead directly to aggression if the reinforcement contingencies are sufficiently rewarding.

Although social learning theory began to specify the role of emotional arousal in the mediation of aggressive behaviors, it did not address the role of cognition in the mediation of these behaviors (Sandoval, 1997). Bandura (1973) suggested that one's cognitive representations of reinforcement contingencies would mediate the interaction between behaviors and the environment. The more specific processes of cognition, such as how an individual assesses a situation and selects an appropriate response, were left to be explicated by information processing theorists (discussed later). But prior to this, negative affect was elegantly incorporated into a new model by Berkowitz (1983).

*Cognitive Neo-Associationism.*

In Berkowitz's modification of the original frustration-aggression hypothesis, negative affect arising from a range of aversive conditions is considered the basic source of anger and angry aggression (1983, 1989, 1990). Berkowitz continued to expand this model and suggested that aversive conditions produce both flight and fight tendencies (1993). He considered these tendencies to be networks of associatively linked physiological, motoric, and cognitive components (Berkowitz, 1998) and suggested that the associative linkage is relatively primitive, automatic, and can occur in the absence of reportable cognitions. A variety of factors—genetic, learned, and situational—influence which of the flight or fight networks are most strongly activated. If fight networks are activated, these factors (e.g., situational) will also influence whether the aggressive response is inhibited or exhibited.

One situational factor of interest for the current study was attentional focus. Berkowitz found in a series of studies (Berkowitz & Troccoli, 1990) that when attention is focused upon one's negative affect, emotional self-regulation is promoted, the link between negative affect and hostility (e.g., negative judgments about others) is diminished, and aggression is inhibited. However, not all evidence supports an inhibiting effect of attentional focus. Berkowitz (1998) reported that "highly aroused people are apt to focus on the main features of the situation confronting them to the neglect of matters that are relatively peripheral…. Thus, persons who are emotionally aroused because of an aversive event might well focus their attention narrowly on those they blame for the unpleasant occurrence" (p. 68), disregarding inhibiting cues such as possible punishment. Berkowitz' speculation parallels the theory of alcohol myopia which asserts that the range of attentional focus may be restricted after the consumption of alcohol, increasing the likelihood of aggression during volatile situations (Steele & Josephs, 1990). Regardless of whether attentional focus is eventually concluded to inhibit or increase the likelihood of an aggressive response, it is reasonable to assume that attentional focus is an important moderating variable.

In some cases, those who are highly aroused or have overlearned aggressive responses to certain situations (to the point of automaticity), may go from anger (an affect) directly to aggression (a behavior), without any reportable intervening cognitions (Berkowitz, 1990). However, once individuals engage in a higher order level of cognitive processing, "they consider the perceived causes of their arousal, the possible consequences of any action they might undertake, the goals they would like to attain, and also what sensation they are feeling and what ideas and memories have just occurred to them" (Berkowitz, 1990, p. 497). This indicates that processes (e.g., appraisals of rules and consequences, and attributions) not used in its production can mediate aggression. Further, this implies that understanding which types of internal and external cues render behavioral responses more automatic, and understanding which types of cues facilitate higher order cognitive processing, are worthy goals of aggression research.

Berkowitz's (1990) cognitive-neoassociationistic conception of anger and aggression improves upon prior models by offering a cognitive bridge between negative affect and aggression. The strength of his model is that it accounts for the original evidence linking frustration to aggression while also linking a variety of aversive events (pain, extreme temperatures, noxious odors, stress, provocation, or viewing disgusting or aggressive images) to negative affect, which then leads to aggression, sometimes depending upon the outcome of higher level cognitive processing and sometimes independently of those processes (for research related to aversive events the interested reader is referred to Berkowitz, 1983, 1989; Anderson, 1989; Hearold, 1986; Liebert & Spratkin, 1988; and, Geen 1998). One limitation of Berkowitz's model is that it does not address what causes the higher order cognitive processing or how the appraisals and attributions control reactions to the aversive events. Fortunately, the task of explaining the origins and consequences of cognitive processing has been undertaken by information processing theorists.

*Social Information Processing Models.*

In information processing theories, a *schema* is a representation in memory about a general set of facts, and how these facts are related (Medin, 2001). A *script* is a type of schema that contains information about sequences of ordered actions that occur in a stereotyped situation. Scripts help us understand events and make predictions about future events (Medin, 2001). Scripts are learned and augmented by children (and adults as well) through vicarious and direct social experience and are accessed in order to interpret the social environment and guide behavior.

According to Huesmann's (1988) information processing model of childhood aggression, the conditions most conducive to the learning of *aggressive* scripts appear to be those in which the child is reinforced for displaying aggression, often observes aggression, and is the object of aggression (Eron, 1994). Salient environmental cues will then activate those aggressive scripts. Salience is affected by one's familiarity with those cues as well as one's current emotional state (Sandoval, 1997). Once the relevant script is activated, the child evaluates 1) the appropriateness of the script with regards to internalized social norms, and 2) the likelihood that the script will obtain the desired results (Eron, 1994). Aggression is more likely to occur when salient cues activate an aggressive script, when the script has been repeatedly associated with the perception of a desired result (e.g., injury to another or a reward), and when the child feels confident that he or she can enact the activated script (Huesmann, 1988). Conversely, if salient, activating cues are not present, if there is a perception of negative results such as punishment, or if the child lacks self-confidence in enacting the script, aggression is less likely.

More recently, Huesmann and his colleagues (Guerra, Nucci, & Huesmann, 1994) proposed that aggressive actions are directed by "moral judgment" memory systems or knowledge structures. Guerra, et al. (1994) suggested that which knowledge structures direct aggressive actions depends upon several factors including 1) an individual's evaluative beliefs (i.e., right or wrong) and informational beliefs (i.e., potential consequences), 2) salience of situational cues (e.g., cues that focus attention on a particular aspect of a situation and activate relevant moral judgments), and 3) interpretive biases that influence whether the cue is perceived at all or distorted upon perception. They offered two sources of interpretive biases: interpersonal factors (e.g., mood states, personality, and attributional style) and sociocultural influences (e.g., family and peers, and social contexts such as school and religion). They also suggested that judgments become routinized, leading to behaviors that appear insensitive to the unique features of a given situation. That is, the behaviors become relatively *automatic* as a result of the moral judgment knowledge structures. It seems reasonable to conclude that automatic moral judgments and often-used or well-rehearsed behavioral scripts may represent an unfavorable combination in the production of aggression.

A major strength of information processing theories is that they can be used to describe how aggressive behavioral scripts become represented in memory (Sandoval, 1997). Early on, direct and observational learning facilitate the creation of knowledge structures (to be discussed in greater detail later) that link social cues to aggressive responses. These primitive structures are elaborated upon over time. When a child encounters a social problem, attention is directed toward the most salient cues (internal cues such as emotional state or external cues in the environment) and a comparison is made with scripts already in memory. Salient cues that are most similar to those present when the script was first encoded will increase the probability that the previous script will be retrieved. The retrieved behavioral script will then be evaluated for its appropriateness in the current situation.

Huesmann (1988) capitalized on an information processing approach to account for how a behavioral sequence is maintained in memory once it is encoded. He postulated that rehearsal is the primary method by which the behavioral sequence is maintained in memory for later accessibility. Rehearsal includes such behaviors as recalling the original script, fantasizing, or role-playing.

Another social information processing theory (Dodge, Pettit, McClaskey, & Brown, 1986) also postulated aggression as a function of a child's processing of environmental cues (external and internal) in social situations (Sandoval, 1997). The Dodge et al. paradigm is noteworthy for its elaboration of how scripts are developed and activated. A variety of labels have been applied to what were originally described as the five sequential steps undertaken for skillful social information processing. In general, these five steps consist of 1) cue encoding, 2) cue interpretation, 3) response generation, 4) response decision, and 5) response enactment (Dodge & Crick, 1990).

More specifically, in the first step of Dodge and Crick's model, relevant cues are selected from the environment. Attention to particular cues (e.g., a person, a situation, or an object in the environment) is mediated and moderated by heuristic rules and cognitive schemata that have developed over time. During the second step, cues are mentally represented in long-term memory and given meaning. Meaning is related to one's past experience with that *particular* person, situation, or object, as well as one's past experience with those *general* types of stimuli. The third step involves accessing possible behavioral responses to the cues through associative networks of related long-term information. Behavioral responses that have been accessed recently or frequently over time, may be quickly accessed and appear to be relatively automatic. However, the evaluation of that response's probability of achieving a certain outcome or be skillfully enacted (carried out in the fourth step), may lead to an inhibition of the selected response. Whichever response is chosen, during the final step the selected response is enacted using information from relevant scripts "to transform the selected response into verbal and motor behaviors" (p. 14). Monitoring of the response's effectiveness for achieving a particular outcome leads to further encoding of social cues, which is hypothesized to alter the response or start the sequence of social information processing all over again (Dodge & Crick, 1990).

Crick and Dodge reformulated their model in 1994 and proposed that the processing steps are not executed in a sequential fashion and numerous cycles through the steps (possibly in a different order each time) may be performed depending on environmental cues, such as social exchanges with others. Thus, the steps are viewed as more cyclical and transactional than linear or sequential as others become involved in the enactment of a script or other cues become more salient.

Skillful execution of these cycles is considered necessary for competent behavioral responding, whereas failure at any point may lead to inappropriate behaviors such as aggression. Empirical studies have provided some evidence that children's aggressive behaviors are related to biased or deficient processing during any cycle. Reviews of the research related to the specific "steps" can be found in Sandoval (1997). A review of the evidence for interventions based on the social information processing models discussed above can be found in Huesmann and Reynolds (2001).

Both of the social information processing models emphasize the impact of information in memory on the perception of new information. That is, a child's existing memories of situations and possible behavioral responses will influence which cues in a new situation are attended to and encoded (Sandoval, 1997). For example, a cue that has preceded punishment in the past may be especially salient for the child, and may inhibit an aggressive response. Both models also assume that if an aggressive behavioral script seems appropriate for the goal of hurting the victim or obtaining an extrinsic reward, an aggressive act will be chosen as the suitable response. In addition to describing how an aggressive response may be selected, both models imply that inefficient processing of social cues can produce inappropriate responses such as aggression.

*Knowledge Structures and Network Models.*

The above theories imply that there is an automatic nature to the cognitive elements of aggression. Bushman and Anderson (2001) relied heavily upon the assumption of automaticity to describe how aggression develops and used the construct of knowledge structures as a framework for appreciating the relevance of automaticity. First of all, they describe knowledge structures as organized networks of interrelated information (both schemas and scripts) that result from frequent activation of bits of related information (p. 276-277). Knowledge structures are compiled and augmented during childhood in order to guide behavior. They are activated by external cues (environmental) and by internal cues (e.g., emotional arousal and goal attainment). In turn, some cues become more salient than others. The most salient cue(s) will prime relevant schemas or activate relevant scripts, which will then influence which behavioral response is finally chosen. “The person first selects a script to represent the situation and then assumes a role in the script” (p. 277). Knowledge structures that are accessed with greater frequency will become overlearned and hence *automatic*, exerting a fast and efficient influence on incoming information and the behavioral response that is selected. That is, once a behavioral sequence becomes activated, it is more likely to be carried out whether the person is aware of a decision to act a certain way or not.

Salient cues are assumed to activate knowledge structures, which serve to bias some internal and external stimuli. Although salience of stimuli is difficult to establish a priori, research with children shows some progress. In one study (Dodge & Tomlin, 1987), groups of aggressive and nonaggressive children were to interpret the intentions of a provocateur in a hypothetical situation. Aggressive children were more likely than nonaggressive children to base their interpretations on schemata rather than information presented in a story. That is, aggressive children were more likely than their nonaggressive peers to rely upon previous experience rather than immediate social cues. In another study (Gouze, 1987), aggressive participants were more likely than their nonaggressive peers to focus their attention on aggressive social interactions in the environment. They also provided more aggressive solutions to hypothetical interpersonal conflict situations. This finding suggests that aggressive children may pay greater attention to aggressive cues in social situations—presumably because these cues are self-relevant.

Another study of children (Rabiner, Lenhart, and Lochman, 1990) provided some evidence for the role of automaticity. Children were given the task of solving a social problem under conditions that elicited reflective processing or under conditions that elicited automatic processing. Socially maladjusted children had difficulty processing social information adequately *only* under automatic conditions. Crick and Dodge (1994) suggested that most studies were not designed to evaluate processing deficits under automatic responding conditions. They also suggested that techniques that measure response time and evaluate priming effects would be valuable for future research on automatic processes.

A major advantage of the knowledge structure approach is that it avoids confounding the hostile-instrumental aggression dichotomy with the automatic-controlled information processing distinction (Bushman and Anderson, 2001). As Bushman and Anderson noted, "hostile aggression is, by definition, automatic—it is unreasoned, impulsive, uncontrollable, and spontaneous. By contrast, instrumental aggression is, by definition, controlled—it is reasoned, calculated, and premeditated" (p. 276). The confound exists because both complex decisions and affect-laden decisions can be made automatically or with careful thought. Bushman and Anderson argued that the knowledge structure approach suggests that the more frequently a knowledge structure is activated, the more automatic it becomes, regardless of whether it originated from impulsive anger or calculated, conscious intent. Additionally, assuming that hostile and instrumental forms of aggression are dichotomous presumes that these knowledge structures are somehow separate in the brain, when it seems more plausible that they interact or are part of the same knowledge structure. The knowledge structure approach facilitates the investigation of conditions that mediate or moderate aggression and avoids reliance upon distinctions that create more ambiguity and questions than clarity and answers.

Knowledge structures are conceptually similar to neural network models, especially major network models of semantic memory (Bushman and Anderson, 2001). Neural network models are considered to be analogous to the structure and function of neurons in the brain. Over the last six decades, neural network models have been revised and extended to a variety of research domains including computer science, economics and finance, and psychology. Within psychology, Anderson's latest revision of his adaptive control of thought model (ACT-R) represents an attempt to describe a variety of phenomena and data related to memory and learning (Medin, 2001). According to the ACT-R model, as information is processed in working memory, networks of nodes (concepts) are activated. Activation then spreads to neighboring concepts through links in the network—a process called *spreading activation*. Activation of any one node "is a function of both the number of activated concepts it is linked to and also the strength of the links to those nodes" (Medin, 2001, p. 224). The strength of a link is directly related to how frequently that link is used. However, even if the link is strong, activation dissipates from node to node and activation of a particular node may disappear altogether (fall out of working memory) as neighboring nodes become less active.

The ACT-R model provides a reasonable hypothesis for how information is brought to bear in a situation. First, external and internal cues that are salient for an individual will become activated in working memory. Then, related information (which is most likely to be information that was related to it in the past, Medin, 2001) will be activated through spreading activation. Concepts (or behavioral scripts) with the most activation (i.e., that have been most frequently used) will influence which behavioral response is selected.

In many ways the knowledge structures approach is similar to the ACT-R model. Aggression cues or stimuli that are salient for an individual will activate aggression-related knowledge structures or networks. If an individual has often enacted aggressive behavioral scripts in the past, he or she is more likely to enact them in the future, compared to other individuals who have been less aggressive. It follows, then, that measuring trait anger of an individual may offer some predictive utility in determining whether someone is more likely to aggress as compared to others. Although the current study will investigate two methodologies for predicting aggression cue activation related to trait anger, studies that use one of these methodologies *and* give participants opportunities to aggress would be needed to test this last assumption.

*Assumptions Generated from Models of Aggression*

Like definitions of aggression, models of aggression have evolved and have successfully accounted for instrumental and angry aggression, the effect of a variety of aversive events on subsequent aggression, and the initiation and maintenance of aggressive behaviors. Several testable assumptions have emerged from these models. One is that negative emotional reactions (such as frustration or anger) or goal-attainment, or both together, when paired with the right reinforcement contingencies, will produce aggression. Another assumption is that engaging in complex thinking will reduce aggression. Conversely, factors that limit or interfere with complex thinking are assumed to increase aggression. These factors include 1) automaticity, 2) distraction, which promotes superficial processing of relevant social information, 3) individual differences in social reasoning ability, which may be due to poor role models, or inconsistent rewards or punishments for aggressive behavior; 4) individual differences on a variety of personality dimensions, such as impulsivity and trait aggression, 5) intense emotions, which have been shown to interfere with the processing of incoming information, and 6) anything that would interfere with one's capacity to process a wide range of cues, including alcohol consumption (Smith & Mackie, 2000). Some of these factors can be manipulated (e.g., distraction) while others can be measured (e.g., trait aggression).

Another assumption generated by aggression models is the reciprocal nature by which salient cues and existing networks of social information (knowledge structures) interact to produce behavior. Cues that are salient for an individual will activate knowledge structures, which will in turn guide behavior. Conversely, existing knowledge structures will bias individuals toward some social cues, especially those that are self-relevant, while other cues are disregarded or ignored. That is, existing knowledge structures will differentially influence the processing of available information. Determining which cues someone is likely to attend to, whether attention is intentionally focused or not, may help us predict behavior a priori. Methods that help clarify the relationship between knowledge structure activation and aggressive behavior and can produce automatic effects may also increase our understanding of the alcohol-aggression relationship.

### *Selective Attention*

In order to investigate assumptions related to cognitive mediators of aggression, it is important to consider what is known about selective attention and automaticity. There is no universally accepted definition of attention in the psychological literature. It has been viewed as mental effort, concentration, focalization, or selective processing. Although there is considerable overlap among these concepts, attention appears to represent a variety of situations/processes. Johnston and Dark (1986) in their review of the literature, defined selective attention as "the differential processing of simultaneous sources of information" (p. 44). Although they did not define "processing," it may be regarded as the series of steps, sequential or simultaneous, taken to detect and analyze a stimulus and to decide upon a course of action based upon that analysis. Johnston and Dark further specified that simultaneous sources of information consist of internal events (memory and knowledge) and external events (environmental objects and situations) and that the information is analyzed perceptually, semantically, or both. Selective attention, then, implies that we select some information for further processing (because it is relevant in some way) while ignoring or filtering out other information (because it is irrelevant).

*Salience vs. Accessibility*

*Salience* is another concept that has been defined in various ways throughout the literature on selective attention and knowledge activation. As discussed earlier, salient stimuli have been viewed as those that stand out and enter thought more readily because their conditions of activation are more easily satisfied (Krech & Crutchfield, 1948). Others use the concept of salience to describe anything that commands one's attention (see Higgins, 1996). However, this view implies that any variable that influences attention is salient. Many other factors clearly influence which stimuli we attend to (such as effort, the difficulty of the current task, alertness, mood, etc.). Furthermore, such a broad definition does not allow distinctions to be made between salience and selective attention, salience and accessibility, or salience and knowledge activation (Higgins, 1996).

Higgins (1996) argued that salience is more appropriately viewed as "something about a stimulus event that occurs on exposure, without a prior set for a particular kind of stimulus, that draws attention selectively to a specific aspect of the event" (p. 135). Higgins further restricts salience to the properties of the stimulus event *only*, which may include features of the particular stimulus, properties of the immediate context in which the stimulus appears, and the relations among these properties. That is, a stimulus can be considered salient because of something about its absolute properties or because of something about its properties relative to those of other objects in the immediate situation.

Higgins' (1996) definition of salience does not include properties of the perceiver, such as expectancies or goals. These properties fall under the rubric of *accessibility*, which Higgins defined as the activation potential of available knowledge. However, salience and accessibility can interact to increase the likelihood that knowledge structures will be activated (p. 134). That is, the perceptual system is biased toward some internal or external stimuli because of 1) prior experience with that stimuli, 2) chronic or habitual expectancies or attitudes that have developed over time, and 3) recent thought or experience. Any of these biases may render one stimulus property as more distinctive when compared to nonbiased stimuli or stimulus properties that are available for further processing. Even for stimulus information that is impoverished, vaguely related, or fits into other knowledge categories better, its activation in the perceptual system will be easier and swifter than other cues. Thus, nonbiased stimuli that would normally serve to guide one's behavior in a social situation may be minimally or not at all processed (Bruner, 1957a, 1957b as cited in Higgins, 1996).

Although the above distinctions between salience and accessibility are important for future research intended to parse apart their relative effects on knowledge structure activation, the earlier definition of salience is still in common use. It is expected that Higgins' concise treatise on knowledge activation will facilitate an associated precision in future research endeavors. For the current study, stimuli that are considered salient are best viewed as those stimuli that have higher potential to activate knowledge structures. However, the term *salient* will continue to be used instead of accessibility.

*Early vs. Late Selection*

The idea that information is differentially attended has been well accepted by researchers. However, agreeing upon the precise point at which salient information becomes selected for further analysis has been the basis of the decades-long early selection versus late selection debate (see Pashler, 1998 for a review). Briefly, Johnston and Dark (1986) summarized the debate as to whether selection of stimuli for further processing takes place after sensory analysis but before semantic analysis, or if it always takes place after semantic analysis. In support for early selection they concluded, "selection based on sensory cues is usually superior to selection based on semantic cues"

(p. 48). However, they also recognized that early selection of relevant stimuli assumes early rejection of irrelevant stimuli. This assumption does not seem tenable since considerable evidence exists that irrelevant stimuli sometimes undergo semantic analysis (e.g., see Lewis, 1970; Treisman, 1960; MacKay, 1973; Corteen & Wood, 1972; and, Moray, 1959). Thus, the evidence supports both early and late selection models.

*Automatic vs. Controlled Attention*

Within selective attention a distinction was proposed to more fully explicate how environmental stimuli are chosen for further analysis. One way is via controlled attention, which has been described as a conscious, active, voluntary, effortful, flexible, or intentional cognitive process. The other way is via automatic attention, or automaticity, which has been described as a nonconscious, passive, involuntary, effortless, or unintentional cognitive process (see Bargh, 1992 and Johnston & Dark, 1986 for reviews of controlled and automatic attention).

Bargh (1992) described controlled attention as flexible but resource-limited. That is, controlled attention is a resource that can be allocated toward a task. The degree to which a stimulus is processed relates directly to how much attention is directed toward that stimulus, which in turn relates to how demanding the associated task is. Bargh's description mirrors that of capacity models. According to capacity theories, simple tasks do not interfere with each other. However, a difficult (or resource-demanding) task interferes with the processing of a simpler task. There are also multiple resource theories (as discussed in Medin, Ross, & Markman, 2001), which suggest that there are multiple pools of attentional resources that can be allocated to various tasks. The degree to which two tasks interfere with each other depends on the degree of overlap between the resource pools. For example, the resource pool for auditory tasks should not be the same as the resource pool for visual tasks. Therefore, attention could be directed toward auditory and visual tasks at the same time with minimal interference.

Johnston and Dark (1986) reviewed studies that investigated spatial attention and likened spatial attention to an attentional spotlight with an adjustable beam. However, adjustment capabilities are limited. The beam can be adjusted to include information directly outside of the foveal region (the parafoveal region), but the processing of information is most efficient for stimuli within the attentional spotlight (i.e., aligned with the center of the fovea and directed toward specific regions of space). The beam of the attentional spotlight can be adjusted in order to complete a task and can even be “split.” For stimuli outside of the spotlight, processing is most likely (albeit minimal) for *nonsemantic* stimuli but still at a considerable cost to processing speed and accuracy. Regarding semantic information that is presented visually, nonattended information that is more than about 3º from the visual angle of attended stimuli is unlikely to be processed (Rayner, 1978). For information that is presented aurally, nonattended information is intrusive when it is relevant. For example, in dichotic listening tasks, controlled attention to one channel can be interrupted by information in the other channel if the nonattended information conforms to active schema (i.e., is self-relevant).

This tendency to be attracted toward information that is not being directly attended but is self-relevant is described by the other selection process, the automatic process (Bargh, 1992). This process directs one’s attention to environmental stimuli without conscious intent. In the strictest sense, a process is regarded as automatic if it requires no cognitive resources to initiate it (i.e., attention is not intentionally focused) and if the process runs to completion once it has begun. One possible cause of the automatic process is top-down processing, which refers to the effect that old information (i.e., internal representations or expectations about the stimuli) has on the selection of new information. According to Broadbent (as cited in Johnston & Dark, 1986), as an individual learns associations among stimuli, the individual develops internal biases toward those stimuli. Therefore, even if stimuli are not relevant for a particular *task*, those stimuli may be relevant to the *individual*. These biases direct attention away from the stimuli that should be processed quickly and accurately for successful execution of a given task.

Johnston and Dark (1986) presented results from studies on the intrusiveness of irrelevant (nonattended) stimuli and concluded that selective attention can be guided by active schemata and that this process can be controlled or automatic. Selective attention is more likely to be categorized as controlled when the stimuli are purposefully attended to, but categorized as automatic when the stimuli are attended to because of an internal bias.

The internal bias may exist because schemata have been primed (activated) by recent thought or experience, or because those stimuli are self-relevant (chronically accessible) to the individual.

Bargh (1992) came to a similar conclusion but assigned this internal bias to one of two types of automaticity: *preconscious* or *postconscious*. Preconscious automaticity refers to the nonconscious selection of stimuli based upon stereotypical constructs held by the individual (i.e., chronic expectancies assembled over years of interacting with the environment). That is, stimuli are processed based upon their mere presence. Postconscious automaticity, on the other hand, is essentially the same except that the nonconscious selection of stimuli is based upon constructs, expectancies, or schemata that have been primed (preactivated ) by recent conscious thought or experience. That is, the stimuli would not be salient, or processed, based on their mere presence except that they have been recently activated in memory. The recent activation results in a lower threshold of accessibility for those stimuli.

Priming, in a research context, generally refers to procedures that activate knowledge structures. Priming can occur at any level of stimulus analysis (Rabbitt & Vyas, 1979 as cited in Johnston & Dark, 1986), ranging from low-level sensory analysis (e.g., find something green) to high-level semantic analysis (e.g., presenting the test word BREAD speeds up the recognition of the test word BUTTER). Considerable evidence for priming effects led Johnston and Dark (1986) to propose that the processing of low-level sensory or high-level semantic information can be primed toward sensory characteristics of stimuli (e.g., auditory vs. visual), toward identity of stimuli (i.e., physical codes in memory), toward semantic representations of stimuli (e.g. word meaning and synonyms), and toward schematic representations of stimuli (e.g., knowledge structures). Thus, "all levels of stimulus analysis can be biased simultaneously toward the characteristics of most of the relevant stimuli and some of the irrelevant stimuli. In some instances, these biases can be sufficiently strong that attention to the relevant or irrelevant stimuli appears to be automatic" (p. 65).

The interaction between controlled attention and automatic attention, and the effect of preconscious automaticity were elegantly investigated by Bargh (1982). He demonstrated that even when one is intentionally focusing on stimuli related to a primary task, stimuli that are unattended (and considered irrelevant to the primary task) can pull one's attention away from the relevant stimuli. In a focused-attention dichotic listening task participants were directed to attend to and shadow (repeat) the stimuli presented to one ear and to ignore the stimuli presented to the other ear. Bargh manipulated the relevance of stimuli by measuring participant levels on particular personality traits and then presenting traits that the participants were high on to either the attended or unattended channel. For example, a person that self-reported a high level of independence was presented with words like *assertive* and *nonconformist* to either the attended or unattended channel. Bargh hypothesized that self-relevant stimuli in the attended channel would facilitate attention (i.e., the stimuli would require less attentional effort) but that self-relevant information in the ignored channel would inhibit attention to the attended channel (i.e., the stimuli would require more attentional effort for the participants to stay focused). Although the participants demonstrated no awareness of the words in the unattended ear (as judged later by a momentary awareness test) the self-relevant words facilitated attention if they were in the attended channel and inhibited attention if they were in the unattended channel. Thus, according to Bargh (1982), automatic processes can either facilitate or inhibit the control process, requiring either more or less attentional effort depending on the self relevance of the stimuli that is presented.

Bargh (1992) also proposed that primed constructs, while they remain active in memory, are equivalent to the effects of preconscious automaticity on the selection of stimuli from the environment. In fact, Bargh (1996) claimed that "pre- and postconscious automaticity are functionally identical and the processing effects are the same; the only difference is in how the necessary level of accessibility is achieved (i.e., via chronic or temporary means)" (p. 174). Therefore, it is important for researchers to consider the biases that are created by primed constructs as they design their studies. In order to rule out the possibility of postconscious automaticity in his experiment, Bargh (1982) was careful to measure personality traits a month before the dichotic listening task was given. He was then more confident in his conclusion that attention to the contents of the unattended channel reflected a preconscious automatic process because those items tapped chronic expectancies.

After reviewing a plethora of studies related to central constructs and assumptions of selective attention, Johnston and Dark (1986) derived a set of empirical generalizations (eleven to be exact; several of which have been presented here) to explain attentional phenomena. They concluded that theories that view selective attention as the natural priming effects of prior processing on subsequent processing are able to accommodate all eleven empirical generalizations with relative ease. In addition, the view of selective attention as an effect of chronically active schemata precludes any reliance upon an active mental agent (or homunculus) to describe how stimuli are selected from the environment. This view of attention as a by-product of one's prior experience with stimuli is the view taken for the purposes of the current study. This view and the associated methods used for this area of research (notably dichotic listening tasks and parafoveal vision tasks, to be discussed next) provide a framework for investigating the activation of aggression-related knowledge structures and their effect upon the selection of information from the environment. Ultimately, one of these methods may provide an index of knowledge structure strength that is independent of self-report.

*Dichotic Listening Tasks for the Measurement of Attention*

Dichotic listening is a procedure that was originally developed by Broadbent in 1954 to study the impact of receiving multiple flight bearings, at the same time, on traffic controllers' attention (Bryden, 1988). Since then the basic procedure has been used for studying short-term memory, lateralization and ear advantage. Dichotic listening tasks were also essential in increasing our understanding of how people are able to focus their attention on one stimulus, but automatically attend to another stimulus that is particularly relevant for them (e.g., the cocktail party phenomenon). Research using the dichotic listening task spawned evidence for both early selection (e.g., Treisman & Geffen 1967) and late selection theories (e.g., MacKay, 1973; Corteen & Wood, 1972; and Moray, 1959; and, Lewis, 1970) and the procedure continues to be used to explore the sequential and simultaneous processing of information.

The basic procedure has been adapted in several ways and more recently has proliferated into a variety of psychological contexts such as attention and depression (Ingram, Bernet, & McLaughlin, 1994), attention and schizophrenia (Hugdahl, Rund, Lund, Asbjornsen, Egeland, Landro, Roness, Stordal, & Sundet, 2003), and attention and psychopathy (Hare & Leslie, 1984). In the study of information processing, the procedure has been used to understand when selection of stimuli takes place for further processing and whether selective attention can be guided by active schemata (Johnston & Dark, 1986). More recently, dichotic listening tasks have been used in electrophysiological studies to investigate the influence of attended and unattended auditory stimuli on event-related potentials in the brain (e.g., Bentin, Kutas, & Hillyard, 1995; and Holcomb, & Neville, 1990).

The general procedure for dichotic listening tasks is to present verbal stimuli or nonverbal stimuli (e.g., tones, car horns, flushing toilets or music) to the left auditory channel, the right channel, or both at the same time. Instructions to attend to one channel while ignoring the other are given in focused attention tasks. Bryden (1988) reported that the right ear (which activates the left auditory cortex) processes verbal stimuli more quickly and the left ear (which involves the right auditory cortex) processes nonverbal stimuli more quickly. However, there are inconsistencies across studies as well as variability among study participants. Thus, when lateralization effects are not under investigation, it is prudent to balance presentation of stimuli between the left and right ear by balancing the number of participants that are instructed to focus on each channel. Results from dichotic listening tasks have also revealed that stimuli that are presented to the unattended channel are more easily ignored when they are physically different (e.g., the voice in one channel is female while the other is male; Cherry, 1953). Therefore, the gender generating stimuli (e.g., word pairs or passages of text) is generally the same for both auditory channels when semantic level processing is under investigation.

Dependent measures of the allocation of attention to one channel vs. the other have included intrusions (i.e., responding with information presented to the unattended channel), and error rates (e.g., incorrect shadowing of stimuli presented to the attended channel). Intrusions and error rates are expected to be higher when attention is drawn away from the attended channel. Another method for measuring the allocation of controlled attention was developed by Bargh in 1982. He used a secondary task—reaction time (RT) to a probe stimulus—to index attention. Study participants were instructed to focus their attention on a primary shadowing task and to use any remaining attention to press a button to turn a light stimulus off as quickly as possible once it came on. Bargh's rationale was that latency to respond to the secondary task should be directly related to the amount of controlled attention being given to the primary task. If response latency were greater, then more effort, and thus more attention, was being used to stay focused on the primary task. He sought to validate this method of assessing spare processing capacity by including a no probe condition. When there were no differences in shadowing errors (the primary task) between the light probe and no probe conditions and no better than chance recognition of target items on a memory test, he concluded that RT to a probe was a valid measure of attentional capacity being used by the primary task. Bargh (1982) used this method of dichotic listening, shadowing, and reaction time to a probe to test his main hypothesis that self-relevant information in the attended ear should facilitate faster RTs to the probe and that self-relevant information in the unattended ear would interfere with RTs to the probe as the participant struggled to maintain attention on the primary task. As discussed earlier, his data supported his hypotheses.

Other researchers have turned to this methodology to help them study cognitive factors that might affect behavior. McCabe and Gotlib (1993) looked at attentional processing in clinically depressed people by having participants complete a focused-attention dichotic listening task and a concurrent light-probe task. They concluded that depressed people had attentional biases (what Bargh would call postconscious automaticity) for negative-content information fed into the unattended ear because their RTs to a stimulus probe were longer on the primary task than those of non-depressed people. Interestingly, the researchers found that when the participants were retested three months later and were no longer depressed, they no longer demonstrated attentional biases. It is reasonable to conclude that negative-content words were no longer salient for the formerly depressed participants because this information was no longer self-relevant.

Although McCabe and Gotlib's (1993) study focused on depression, it does seem clear that self-relevant information must be considered when attentional processes are being studied. When the effects of alcohol are considered in the light of theories of selective attention, it follows that a drinker's attention to stimuli in the internal or external environment is directed by recent thoughts or experiences or by chronic beliefs or expectancies that he or she may hold regarding the effects of alcohol on behavior when particular cues are present. Bargh's model shows promise as a method of measuring the salience of internal and external cues. Therefore, his method will be used to demonstrate an automatic attentional effect of aggression cues for those who report higher propensities to aggress, especially after the consumption of alcohol.

Although the reaction-time methodology has been helpful for understanding the influence of unattended verbal information on attention to a primary task, Bargh has more recently turned his interest toward understanding the influence of automatic attention on goal-directed behavior (e.g., see Bargh, 1992; Chartrand & Bargh, 1996; Bargh & Ferguson, 2000; and Bargh & Chartrand, 2000). This methodology utilizes a parafoveal vision task to demonstrate that information presented outside of conscious awareness can influence various behaviors. Before this study, a direct comparison of the dichotic listening task and the parafoveal vision task had not been made.

*Parafoveal Visual Tasks for the Measurement of Attention*

In memory and learning, both auditory and visual perception play a crucial role in the selection of stimuli, the conversion of stimuli to long-term memory, and the selection of responses for behavior. Parafoveal vision tasks are a more recent methodological choice for studying the selection of visual stimuli from one's environment for encoding and retrieval.

Parafoveal visual tasks require the participant to attend to information presented in the center of a computer screen (also the fixation point), while relevant or irrelevant information is presented to the parafoveal (peripheral) region of vision on the computer screen. The foveal region extends from 0° to 2° from the fixation point, whereas the parafoveal region extends from about 2° to 6° from the fixation point. Although parafoveal stimuli theoretically could be presented anywhere between 2° and 6° from the fixation point on any point along the circumference of the circle, usually the stimuli are presented equidistant from the fixation point to one of the four quadrants encompassed by that circle (e.g., at 45°, 135°, 225°, and 315° as in Chartrand & Bargh, 1996). To determine where the stimuli should be presented, Bargh and Chartrand (2000) provided the formula $Y = X/\tan(2^{o})$, where X = the distance between the fixation point and the parafoveally presented stimulus, and Y = the distance between the participant's eyes and the fixation point at the center of the computer monitor. Another method is to use Bargh et al.'s (1986) existing calculations. That is, each word should be placed in one of the quadrants such that the center of the word is 7.6 cm from the fixation point. This will ensure presentation of the stimuli to the parafoveal region as long as the participant's eyes are 99 cm away from (in front of) the monitor. Controlling the placement of the chair and monitor and instructing the participant to sit erect at all times further ensures that the stimuli are presented outside of the participant's foveal visual field.

It is wise to follow parafoveal stimuli with a masking stimulus at the same location for two reasons (Bargh & Chartrand, 2000). The first is that refresh rates on computer monitors often vary and a stimulus that has not decayed from the monitor is more likely to be perceived by the participant. The second reason is that a visual iconic memory trace of a stimulus may increase the likelihood of perceiving that stimulus. If a masking stimulus quickly replaces the parafoveal stimulus of interest, the participant is more likely to perceive only the jumble of letters that comprises the masking stimulus (e.g., Bargh generally uses the masking string "XQFBZRMQWGBX").

Another issue of concern involving parafoveal presentation of stimuli is the duration that the stimuli are presented. Rayner (1978) found that participants took at least 140 ms to move their eyes from the fixation point to the parafoveal word when they were explicitly instructed to do so. Bargh (2001) recommended using parafoveal presentations of 60 ms to 90 ms to avoid even "express saccades" (fast saccadic jumps of 100 ms; Fischer & Weber, 1993 as cited in Bargh, 2000).

Bargh and Chartrand (2000) have also varied the quadrant that the parafoveal stimulus is presented to as well as the onset of stimulus (between 2 and 7 seconds) so that the participant is unlikely to "predict" the location of the next parafoveal stimulus. To provide additional reassurance that the participant's attention is at the fixation point when parafoveal stimuli are presented, it is prudent to provide a task that involves the fixation point (Bargh & Chartrand, 2000). Since Bargh's (1982) dichotic listening task involves a primary task that is presented to the center of the screen, utilizing the same task for both methodologies will allow a direct test of the ability of each methodology to provide an index of selective attention to self-relevant stimuli that is presented outside of conscious awareness.

Parafoveal visual tasks (or subliminal priming tasks as it is referred to by Bargh & Chartrand, 2000) have been used in a variety of research endeavors. In the context of reading, researchers have used these tasks to investigate whether a semantic priming effect occurs for words in sentences that are outside of the foveal visual region. For example, research by Altarriba, Kambe, Pollatsek, & Rayner (2001) did not support a semantic priming effect. However, when words were presented individually, there did appear to be a semantic priming effect as far as 3° from central fixation (Rayner, 1978).

There is other evidence to suggest that parafoveal words are processed at a semantic level. In a parafoveal priming condition (Di Pace, Longoni, & Zoccolotti, 1991; Experiment 1), participants were presented with nonwords at the fixation point concurrently with a lateral parafoveal stimulus, which consisted of words that were semantically related to the target words and, finally, the target word (e.g., *mesod* centrally concurrently with *flight* laterally, followed by the target word *eagle*). Participants were expected to show a facilitation effect when parafoveal words were related to target words (i.e., faster reaction times to respond "yes" when the target word represented an animal) as opposed to the negative priming and baseline conditions. The results supported their hypothesis. Di Pace, et al. also found that the facilitation effect was smaller for parafoveally presented words than for foveally presented words and only existed if the inter-stimulus interval between parafoveal word and target word was short (200 ms vs. 2000 ms). They regarded this as evidence for the assumption that automatic processing effects decay at a rapid rate. This is consistent with theories of selective attention.

Bargh and his associates have used subliminal priming tasks to investigate a variety of automatic effects such as the increased likelihood for men to sexually aggress when their “power→sex association” is activated (Bargh, Raymond, Pryor, & Strack, 1995); the effect of goal activation on impression formation (Chartrand & Bargh, 1996); and the effect of subliminal priming on negative mood (Chartrand, Bargh, & van Baaren, 2003). However, these tasks are generally conducted in order to prime a particular construct or behavior of interest. For example, to investigate an effect of priming on mood (Chartrand, et al., 2003) participants were exposed to strongly valenced negative or positive stimuli in a subliminal priming task (i.e., a parafoveal vigilance task). The stimuli were presented parafoveally concurrently with a brief flash to the left or right visual field. Participants indicated whether they detected a flash on the left or right of the screen by pressing the appropriate key as quickly as possible. They found that repeated exposure to positive or negative stimuli produced a concurrent mood as self-reported on mood scales.

Another study (Chartrand & Bargh, 1996) successfully primed participants to form impressions of a person described in a variety of behavioral phrases. Participants in the study were subliminally primed with words like *impression*, *judgment*, *personality*, and *evaluate*, (as opposed to a no-goal priming condition) and then read more phrases indicating honest behaviors or more phrases indicating dishonest behaviors. If they had been primed with an impression formation goal, subsequent trait ratings of a target person were much more likely to coincide with either dishonest or honest ratings (depending on which one they had been exposed to more often within the behavioral phrases). Chartrand & Bargh (1996) concluded that the effect of nonconscious activation (subliminal priming) of memory representations was as effective as explicit instructions for forming an impression of a target person.

As with other studies conducted by Bargh and his associates, reaction times to the vigilance task were not reported as being analyzed. It is likely that the authors would not see these reaction times as an index of automatic attention to unattended stimuli. However, in a recent review of automaticity research, Bargh and Chartrand (2000) indicated that using a *dual-task* parafoveal visual paradigm, such as the one used in Bargh’s (1982) dichotic listening task with a concurrent light-probe task, may index how efficiently one is able to process attended information under conditions of scarce attentional resources. If a nonattended stimulus is self-relevant, it should interfere with attention to the primary task, which will be reflected in fewer resources available for the secondary task, hence slower reaction times.

*Limitations of Dichotic Listening and Parafoveal Visual Tasks*

The appeal of the dichotic listening task is in its potential to measure the effect of attended versus unattended information on task performance. Ultimately, however, the participant's attentional focus is not under the experimenter's direct control. Various techniques have been used to measure attentional drift to irrelevant stimuli, such as shadowing tasks (e.g., errors and intrusions typically indicate attentional shift), and post-hoc recognition or recall tasks. One argument against using these techniques is that lack of errors or intrusions or inability to report unattended stimuli does not equate lack of attention to or nonprocessing of the stimuli.

Parafoveal visual tasks also suffer from lack of experimenter control over intentional shifts to unattended stimuli. In addition to the visual masking procedure described earlier, reassurance that the participant did not attend to irrelevant stimuli is available by viewing eye movements (as with a video camera) and, again, recognition or recall tasks. Unfortunately, the use of video cameras to track saccadic eye movement is costly, cumbersome, and intrusive. Additionally, it is difficult to track saccades concurrently with stimulus presentation.

Despite the limitations of using either the dichotic listening or parafoveal visual dual-task methodologies, either task may be expected to demonstrate aggression-related knowledge structure activation. That is, individuals that are higher on measures of trait aggression will demonstrate a form of chronic (preconscious) activation when their attention to a secondary task is made more effortful (response latencies are longer) in the presence of unattended aggression cues. It was hypothesized that this effect would be reliable for both the parafoveal and the dichotic listening methodologies as long as dual primary and secondary tasks were used.

*Alcohol and Cognition*

A great deal of research in the last few decades has been devoted to exploring the nature of alcohol's cognitive impairment. Although cognitive theory borrows heavily from and is related to various aspects of learning theory and social psychology, implicit is the understanding that without clarification of the cognitive domain, a comprehensive model of alcohol's influence on excessive social behaviors, such as aggression and risk-taking, may never be achieved. Predicting when recently perceived information or information represented in memory (e.g., expectancies) will have a disproportionate influence upon behavior (over and above environmental cues, personality variables, or the pharmacological properties of a drug), is a challenge that cognitive theorists face. Predicting when an individual will be the life of the party on one occasion or commit a violent crime the next is a challenge that alcohol researchers face.

*Physiological and Expectancy Effects*

The evidence clearly indicates that alcohol consumption is related to inappropriate and excessive behaviors. Early models attributed these behaviors to the *disinhibiting* effects of alcohol. That is, alcohol reduces one's ability to refrain from acting upon behavioral impulses (e.g., acting upon an impulse to be more sociable or aggressive when one is generally shy or nonviolent). However, the earlier disinhibition models assumed a more overall effect of alcohol that was not supported by the research. According to Steele and Josephs (1990), alcohol itself does not directly cause excessive or inappropriate behavior. They pointed out that an individual's specific reactivity to the drug could not account for a person's behavior because his or her behavior may vary from one occasion to the next.

Alcohol consumption has clearly been demonstrated to cause a slowing of motor responses as it depresses the central nervous system. However, there is evidence to suggest that even alcohol's impairment of motor performance is not a pure effect of ethanol on tissue. The degree of impairment on motor performance appears to be mediated by the thoughts or expectancies that an individual holds about the drug. Fillmore and Vogel-Sprott (1995), in their efforts to identify factors that might account for alcohol's variable effects on behavior, examined whether motor response varied with expectations about how alcohol would affect their performance on a specific task. The degree of impairment anticipated on a motor skill task after consuming alcohol accounted for a significant proportion of impairment demonstrated—whether alcohol or placebo was consumed. In fact, expectancies for participants in the alcohol condition accounted for 12.3% of the variance of a participant's change in performance. Likewise, expectancies for those in the placebo condition accounted for 17.2% of the variance. These findings are not specific to alcohol. Expectations about task performance after the consumption of caffeine have yielded a similar pattern of results. That is, increases in actual task performance have been predicted by the strength of the participant's expectancies about their performance, regardless of whether they had consumed caffeine or a placebo (Fillmore, Mulvihill, & Vogel-Sprott, 1994).

It is reasonable to hypothesize that understanding an individual's expectancies is an important precursor in predicting behavior because a drug's physiological effects do not occur independently of expectancies. This assumption prompted an explosion of alcohol expectancy research in the past few decades. However, researchers have had only partial success in using expectancy theory to predict the behavior of drinkers, and most of that success applies to the initiation and maintenance of drinking behaviors (e.g., Carey, 1995; Chassin, & Molina, 1993; Goldman, Brown, & Christiansen, 1987; Reese, Jones & McMahon, 1994; and, Zucker, Kincaid, Fitzgerald & Bingham, 1996). A potential prevention strategy proposed by Darkes and Goldman (1993) focuses on the arousal and sociability expectations of participants. When these expectancies are challenged in comparison to a no-treatment control, alcohol consumption and expectancies show reliable decreases at post-treatment and after a booster session six weeks later. Although studies like this are encouraging, researchers have had little success in predicting most other individual behavior, such as when aggression might occur. This lack of predictive power has serious implications for the use of expectancy theory in the assessment and treatment of alcohol-related problems such as aggression.

Why has it been so difficult for researchers to predict an individual's behavior after consuming alcohol? One reason is that researchers have struggled to define the term "alcohol expectancy." Very generally it refers to an intervening variable of a cognitive nature (Goldman, et al., 1987) and is used in the literature to indicate the belief that one has consumed alcohol and how one thinks it will affect his or her behavior. The use of the word "belief" in association with "expectancy" has been criticized for its implication that expectancies are consciously accessible information (Goldman, Del Boca, & Darkes, 1999). Instead, expectancies should be regarded as memory templates that organize incoming information; expectancies do not require conscious awareness or focused attention. In relation to alcohol, expectancies should be viewed as memory templates that reflect "the reinforcement value of alcohol acquired as a function of biological, psychological, and environmental risk variables" (Goldman, et al., p. 216). Further, these memory templates or expectancies serve to anticipate which behaviors should be performed under which circumstances depending upon what was learned about alcohol and its contexts during previous encounters.

Measurement issues may also contribute to the inconsistency of results regarding the relationship between expectancies and alcohol. A major difficulty in separating alcohol expectancy effects from the pharmacological effects is that there appear to be several different types of expectancies. For example, expectancies about how other people behave after drinking alcohol are different from expectancies about how alcohol will affect one's own behavior. Scales used in the service of predicting an individual's behavior should consist of items that tap expectancies of one's own behavior after consuming alcohol (Leigh & Stacy, 1993). Negative expectancies (e.g., punishment) regarding the outcome of alcohol consumption is considered as important as positive expectancies (reinforcement) and attempts have been made to measure both types of outcome expectancies (e.g., Leigh & Stacy, 1993).

The expectancy model clearly overlaps with the knowledge structures approach offered by information-processing theory. Both approaches imply that networks of memory templates bias the perception of incoming information and that behavioral outputs are selected based upon the similarity of incoming information to the networks of information already represented in memory. The value of expectancy theory is that it may help clarify extant outcome expectancies and predict their relevant salience in a given situation. *Alcohol myopia* is a theory that outlines the mechanisms by which more salient information may have a disproportional influence upon behavior.

*Alcohol Myopia*

One cognitive theory, developed in the late eighties (Steele and Southwick, 1985; Steele and Josephs, 1990), suggested that alcohol causes behavioral disinhibition through impaired cognitive processing of relevant cues. Thus, alcohol's variable effects are due to an *interaction* of the pharmacological and cognitive effects. In this theory, "alcohol myopia" is defined as a state of shortsightedness in which drinkers process fewer cues less well than non-drinkers. That is, alcohol intoxication causes a restriction in information processing that influences the salience of both external cues (environmental cues) and internal cues (expectancies, memories, and mood), increasing the likelihood of socially excessive behaviors such as aggression. Even cues that are attended to are assumed to be processed superficially and relevant information is not given due consideration before a behavior is initiated and carried out.

The theory of alcohol myopia provides some predictive value. An example may demonstrate the utility of alcohol myopia for predicting aggressive behavior. A man in a bar may be drinking, with the expectation that he will become more relaxed. After consuming a moderate amount of alcohol, he notices a large man staring at him in a hostile way. Will there be a bar fight? According to alcohol myopia theory, the myopic effects of alcohol consumption should increase with dosage. The more salient a cue is (e.g., the hostile- looking male), and the drunker the person gets, the more likely it is that an aggressive response would prevail over more distal yet more appropriate behavioral responses. The likelihood of an aggressive response may also be mediated by attitudes or beliefs that the inebriated person holds. For example, he may hold a chronic belief that people who stare are rude and deserve to be "taught a lesson." If the person holds this belief, becomes intoxicated, and sees a hostile-looking male staring at him, alcohol myopia theory would predict a bar fight.

The above scenario falls under a class of alcohol's social effects that Steele and Josephs (1990) termed *drunken excess*. They posited that whenever there is a conflict between inhibiting and provoking cues (whether these cues are internal or external), the most salient aspects of the event will have a disproportionate influence upon the behavioral response that is selected. If relevant pressures that would normally inhibit inappropriate responses to salient cues are not allowed normal processing, the inebriated person's behavior will appear impulsive and excessive. As salience of cues change, the strength of the competing responses will change, with the stronger cue saving or wrecking the day. If the knowledge structure that includes information about rudeness (the salient, instigating cue from the previous example) is activated frequently and a behavioral sequence that includes aggression often follows, staring may be interpreted as something worth fighting about. Other relevant yet more distal social cues (a bar fight might lead to arrest) may be less likely to overcome the aggressive behavioral sequence once it has been initiated. Thus the drinker's perceptions appear myopic in that the focus is on stimuli that are nearer in time or proximity.

Several research endeavors have utilized the response conflict component of the drunken excess construct to investigate precursors to aggression and other socially excessive behaviors such as sexual aggression (Testa, 2002); drinking and driving (MacDonald, Zanna, & Fong, 1995); and, high-risk sexual behavior (Kaly, Heesacker, & Frost, 2002; MacDonald, Zanna, & Fong, 1996; Morris & Albery, 2001). Unprotected sex is one example of drunken excess that arguably includes an inherent response conflict. MacDonald, Zanna, and Fong (1996) investigated cognitive precursors to unprotected sex and provided strong evidence that alcohol myopia can explain the relationship between alcohol consumption and decreased condom use. Alcohol myopia theory would predict that in a conflicting situation where people express intentions to use condoms but condoms are unavailable, intoxicated people will pay less attention to distal, inhibiting cues (e.g., the risk of pregnancy or getting a sexually transmitted disease), and more attention to immediate, provoking cues (e.g., the attractiveness of the partner, the partner's willingness to have sex). As a result of this cognitive process, intoxicated people should endorse higher likelihood of intentions and justifications for having unprotected sex.

The relationship between alcohol consumption and decreased condom use was investigated by having intoxicated and sober participants watch a video showing a male and female leaving a bar and going to the female's apartment to have consensual sexual intercourse. The couple in the video did not have access to condoms, indicating a risky situation, but the female was attractive and willing to have sexual intercourse. The video was stopped at this point, representing a response conflict for the viewer. The researchers asked students who indicated positive attitudes toward using condoms, and reported that they regularly did use them, what they would do next. They found that intoxicated participants were more likely than sober participants to endorse intentions and justifications to have sexual intercourse. Further, intoxicated participants indicated more awareness of the potential for condoms to protect them against sexually transmitted diseases and that having intercourse without them in a situation similar to the one in the video could be characterized as "extremely foolish" behavior. The authors interpreted the results as compelling evidence for the alcohol myopia perspective.

The central assumptions of the alcohol myopia model with respect to drunken excess include response conflict, salience of cues, and impaired cognitive processing. Some findings provide evidence for these assumptions. For example, Mulvihill, Skilling, and Vogel-Sprott (1997) provided evidence that alcohol impairs cognitive processes that govern response inhibition. They demonstrated this effect using a "go-stop" task in which go signals are considered to initiate an activating process and stop signals are considered to initiate an inhibiting process (Logan, Cowan & Davis, 1984; Mulvihill, et al.). When go and stop signals are presented simultaneously (response activation vs. response inhibition), these processes compete. Depending on which process finishes first, the response is either executed or inhibited. Mulvihill et al. showed that participants who were given moderate doses of alcohol were less able than participants in a placebo or control group to inhibit their responses to go signals when they were concurrently provided with a stop signal. Since their measure of response activation (reaction time) was unaffected for all three groups, they concluded that alcohol primarily affects response inhibition—not response activation.

Zeichner, Allen, Petrie, Rasmussen, and Giancola (1993) examined the interaction between alcohol drug effects and the salience of cues, specifically information regarding threat. The drug condition included alcohol, placebo, and control. The salience condition included low threat (positive trait) or high threat (negative trait) information that described the participants themselves (salient condition) or described others (nonsalient condition). Intoxicated participants attended to threat information (negative traits) longer than participants in the placebo or control group when the traits described themselves (salient condition). "Presumably, in the salient negative information condition, alcohol limited the subject's attention to the most threatening or salient aspect of their situation" (p. 731). The authors concluded that these findings were consistent with Steele and Joseph's (1990) attention-allocation model and that further research should focus on the interactive effects of alcohol intoxication and salience of environmental cues in emotionally charged situations such as aggressive situations.

Another study (Herzog, 1999) is unique in that it investigated the effects of alcohol on the second stage of a two-stage social inference (attributional) process and suggests a link between alcohol and automaticity. The first stage of social inference involves identifying and classifying a person's behavior into dispositional terms (the degree to which the behavior is driven by the enduring personality traits of the person) or situational terms (the degree to which the aspects of the person's environment are influencing his or her behavior). This stage is often regarded as a more automatic process based upon heuristic methods of categorizing the vast array of available information (e.g., stereotypes, schemas, and behavioral scripts). The second stage involves a corrective stage in which the opposite influences are taken into account. This stage is considered to be a more deliberate, controlled process and requires a higher expenditure of cognitive resources than the first stage.

Since alcohol is thought to impair the cognitive processing of information that is more distal in time or place, Herzog (1999) hypothesized that intoxicated participants would be less likely than sober participants to engage in the more effortful, corrective stage of social inference. When both sober and intoxicated participants were asked to rate how influential *disposition* was in the behavior of actors in a series of videos, intoxicated participants rated dispositional influences as significantly higher than sober participants. Similarly, when both groups were asked to rate how influential *situational factors* were on the behavior of the actors in the videos, intoxicated participants exaggerated the influence of situational factors. The author suggested that sober participants did not exaggerate the relative influence of either dispositional or situational factors because they were able to consider both influences regardless of the condition they were assigned to, and were able to adjust their ratings accordingly. The author concluded that these findings were consistent with the alcohol myopia perspective.

Although the above studies provide evidence for the tenability of the alcohol myopia model, direct evidence for the model is meager. This is partly due to the relatively few studies that have been conducted and the abundance of alternative hypotheses offered by the investigators and other authors. Sayette (1999) observed that the alcohol myopia model, among other cognitive models, offers indirect evidence for the alcohol-behavior relationship and that, ultimately, validity of models like this will rest on studies that more directly test this relationship. The current study may provide a method by which salience of a given construct (in this case, aggression and/or alcohol cues) can be determined *before* a person is given the opportunity to aggress. Salience, of course, is a central assumption of the alcohol myopia model.

*Alcohol Cues*

The current study is intended to demonstrate that aggression cues are chronically salient to individuals who report higher levels of aggression/trait anger. In a similar fashion, alcohol cues are expected to be chronically salient to individuals who report higher levels of drinking experience. A plethora of evidence exists for this assumption and is exemplified by several modified Stroop color-naming studies. Cox, Blount, and Rozak (2000) used the Stroop paradigm to investigate the interference effects of neutral, alcohol-related, and concern-related words on alcohol abusers' and nonabusers' attention. Alcohol abusers responded more slowly to naming the color of stimuli that were related to alcohol (e.g., *beer*, *vodka*) than to naming the color of stimuli that were related to personal concerns (e.g., *divorce*, *dog*). Nonabusers showed no differential interference.

Another modified Stroop color naming study (Sharma, Albery and Cook, 2001) also demonstrated attentional interference from alcohol-related words. The investigators found that in-treatment abstinent problem drinkers were significantly slower to name alcohol-related words than to name neutral words. Interference from alcohol-related stimuli was also found for a "high-drinker" control group. Those in the "low drinker" control group showed no differential interference for alcohol-related vs. neutral stimuli.

Finally, in a more rigorous investigation of alcohol cue interference (Stormark, Laberg, Nordby, & Hugdahl, 2000), alcoholics demonstrated longer reaction times to both alcohol-related and emotion-related words than neutral words on a Stroop task. They also evidenced significantly larger skin conductance responses to alcohol words than to any other words. These effects were not duplicated in the nonalcoholic controls. The researchers concluded that alcoholics' attention is biased toward alcohol stimuli, and that alcoholics have difficulty disengaging their attention from those stimuli. They further suggested that alcoholics' processing of these cues is automated.

Another investigation of alcohol-related cue salience (Townshend & Duka, 2001) also revealed an attentional bias to alcohol-related stimuli. However, in this study a dot probe detection task was used. Participants were instructed to look at a fixation cross (presented for 500 ms.) when it appeared in the center of the computer monitor. Then two pictures appeared (for 500 ms.), one on each side of the screen. One picture was related to alcohol and one was related to stationery (e.g., a hand holding a glass of wine on one side and a hand holding a stapler on the other). After the stimuli were presented, a dot appeared on either the same side as the alcohol-related picture or on the opposite side. An attentional bias score was calculated for each participant by taking the mean reaction time for when the dot and alcohol-related word were presented in the same location and subtracting it from the mean reaction time for when the dot and alcohol-related words were presented on opposite sides of the screen. The researchers found that heavy social drinkers responded significantly more quickly than occasional social drinkers to the dot probe when it replaced the alcohol-related picture on the same side. They interpreted this as evidence for an attentional bias toward those stimuli. However, the researchers conducted the same task using words instead of pictures and found no differences between the two groups. This may be partly explained by the nature of the stimuli. The words represented a variety of concepts related to drinking (e.g., withdrawal-related words, craving-related words, and concrete words like *beer* and *wine*). The variety of stimuli but small number of words in each category may have reduced the sensitivity and power of the task for detecting attentional biases.

Another explanation for the lack of differences regarding alcohol word stimuli in the aforementioned study (Townshend & Duka, 2001) is that an initial, automatic orientation toward self-relevant word stimuli has been found only for *shorter* intervals between onset of the cue word and onset of the target (interstimulus intervals; ISIs; Posner & Snyder, 1975). At longer ISI's (e.g., 500 ms.), participants have enough time to direct their attention away from the stimuli. Slower RT's at 100 ms. ISI's are theorized to represent difficulties in shifting attention, while faster RT's at 500 ms. ISI's are assumed to reflect an avoidance of those stimuli and a more conscious effort at shifting attention from those stimuli (Stormark, Field, Hugdahl, and Horowitz, 1997).

One study (Stormark, et al., 1997) investigated the influence of shorter vs. longer ISIs directly and found that abstinent alcoholics showed longer reaction times when alcohol-related words were presented at a 100 ms. ISI (automatic orientation) but faster reaction times (avoidance) when alcohol-related words were invalidly cued at 500 ms. ISI. In the study by Townshend and Duka (2001) words were presented at 500 ms ISI. This may have given participants the opportunity to avoid some of the word stimuli, especially the ones that were not an integral part of the heavy social drinkers' knowledge structures (e.g., withdrawal effects of drinking). This avoidance was likely to vary across subjects and may have reduced differences between groups.

Although evidence is converging that alcohol-related stimuli interrupt attention for participants with heavier drinking experience, it is less clear how the presentation of alcohol cues and aggression cues simultaneously would impact attention and how these stimuli would effect a nonalcoholic population. From the above discussion, it seems reasonable to assume for the current study that college students who are presented with aggression cues at a subliminal level of awareness in a room devoid of alcohol cues, would show longer latencies to respond to those stimuli if they are high on trait aggression. Those who also have a lot of drinking experience may be expected to demonstrate the longest latencies of all. This is related to the assumption that alcohol and aggression knowledge structures will be more tightly interwoven and more frequently activated, resulting in a more automatic effect on the processing of aggression-related stimuli.

For students tested in a room full of alcohol cues (i.e., a barlab), it is reasonable to assume that alcohol cues would be especially salient for those with more drinking experience and higher levels of trait anger. Their levels of interference on attention should be the highest. The current proposal will investigate this hypothesis.

*Alcohol and Aggression*

Although the theory of alcohol myopia may be useful for predicting alcohol's various social effects, when attempting to understand the alcohol-aggression link it is useful to understand the more basic nature of the relationship between alcohol and aggression. Bushman and Cooper (1990) conducted a meta-analysis of 30 experimental studies with male confederates and male participants who were social drinkers. They concluded "alcohol influences aggressive behavior as much or more than it influences other social and nonsocial behaviors" (p. 350). They reported an average effect size for alcohol vs. control to be $d(+) = 0.25$. The average effect size for alcohol vs. placebo was calculated to be $d(+) = 0.61$. They speculated that the average effect size for the alcohol vs. placebo condition is larger because there are methodological problems with the alcohol vs. control condition. The most serious problem is that the control groups generally see through the beverage deception. Sometimes the placebo groups see through the deception as well. However, since the psychological and pharmacological effects of alcohol occur together anyway, Bushman and Cooper recommended that the alcohol vs. placebo comparison is the best estimate of the effects of alcohol on aggression.

Recent research continues to provide evidence for an alcohol-aggression relationship. One study (Lange, 2002) demonstrated that participants with higher blood alcohol levels (BACs; .05-.18) who associated alcohol with aggression were more likely to identify ambiguous behavior (via vignettes) as more aggressive than those who associated aggression with amiability. These authors concluded that alcohol affected the perception of aggression.

Many studies have investigated the alcohol-aggression relationship using the Taylor Aggression Paradigm (TAP; Taylor, 1993) or modifications of it. In these competitive reaction time tasks, participants are generally provided with information (e.g., using feedback lights) about the level of shock the opponent has selected for them if the participant is slower to respond (i.e., loses the "trial"). Participants are assumed to use this information to set subsequent shock levels. Aggression, then, is operationally defined in these tasks as the intensity and/or duration of shocks selected for a fictitious opponent for each competitive trial. Since the amount of wins versus losses is predetermined and distributed evenly in all conditions (Chermack & Giancola, 1997), direct comparisons can be made between shock levels and durations set by participants who are intoxicated and those set by participants who are not.

In general, investigators have found that intoxicated participants are reliably more aggressive than participants who have received a placebo or a nonalcoholic beverage (Chermack & Taylor, 1995; Laplace, Chermack, & Taylor, 1994; Giancola & Zeichner, 1997). This finding may not generalize beyond the college student population or the laboratory. However, as noted by Chermack and Giancola (1997) a few studies have attempted to address external validity and found that aggressive responses within the laboratory correlate positively with peer and counselor rated aggression, with self-report aggression inventories, and with histories of antisocial behavior (see also Anderson & Bushman, 1997; Giancola & Chermack, 1998; and, Tedeschi & Quigley, 1996).

*Situational Variables*

A variety of situational factors have been found to intensify the alcohol-aggression relationship. These include provocation, frustration, threat, social pressure (to aggress), and response conflict (as operationalized in the alcohol myopia perspective of drunken excess). On the other hand, social pressure (to avoid aggression) and self-focused attention can also decrease aggression. (See Chermack & Giancola, 1997; Gustafson, 1993; and Ito, Miller, & Pollock, 1996 for reviews of the literature concerning these variables.) Provocation appears to be one of the most important moderators of the alcohol-aggression relationship. In fact, provocation has been claimed to be a more potent elicitor of aggression than either gender or beverage condition (Giancola, Helton, Osborne, Terry, Fuss, & Westerfield, 2002).

To date, studies directly investigating the interaction between aggression and alcohol cues (without the consumption of alcoholic or nonalcoholic beverages) have not been conducted. Based on the idea of knowledge structure activation, it may be that participants in a barlab would respond more aggressively than control participants in a room devoid of alcohol cues if they self-report higher levels of aggressive states or traits and they have more extensive drinking experience. Only one study investigated the impact of drinking experience on alcohol-related aggression (Laplace, Chermack, & Taylor, 1994). Surprisingly, of participants categorized with low-, moderate-, or high-drinking experience, only participants with low-drinking experience were more aggressive (using the TAP) after consuming alcohol. Although the current study would not investigate the interaction between intoxication and aggression, it may provide a baseline measure of the influence of person variables. That is, a methodology that can measure the influence of alcohol and aggression cues to automatically interfere with a participant's attention to a primary task would provide a useful baseline before the participant is given the opportunity to aggress subsequent to provocation or frustration, or before they are given alcohol.

Situational factors are clearly essential for understanding the alcohol-aggression relationship. Additionally, attention (whether automatic or controlled) to situational cues (e.g., provocation, threat, social pressure), as specified by the alcohol myopia perspective, is arguably the most convincing mechanism by which these variables influence the alcohol-aggression relationship (Gustafson, 1993). However, lack of attention to individual differences (or person variables) limits the explanatory value of cognitive theories. As research exploring individual differences has accumulated, investigators have begun to incorporate these findings into their models (e.g., Chermack & Giancola, 1997).

*Gender*

The data regarding the willingness or tendency for men and women to aggressive at equivalent levels is mixed. In the absence of alcohol, there is evidence that both women and men experience anger but that women respond with less physical aggression than men (Frost & Averill, 1982). Another study found that men were aggressive toward other men when provoked but not toward women, and women were aggressive toward men when provoked but not toward women (Taylor & Epstein, 1967). Interestingly, the highest levels of aggression in the study were found for highly provoked women competing with men. However, this finding is in contrast to another study (Richardson, Vandenberg, & Humphries, 1986) in which women were less likely than other men to set extreme shock levels toward men.

In the presence of alcohol, the data are also mixed. Direct comparisons are often difficult due to variations in the type and amount of alcohol administered, the choice of aggression measures, and the type of noxious stimuli inflicted on or by the participants (Dougherty, Bjork, Bennett and Moeller, 1999) as well as variations in gender of the fictitious opponent, confederate or even experimenter. One study found that intoxicated men were more aggressive than sober men toward a fictitious female opponent (Richardson, 1981). Gustafson (1991) did not show an increase in aggression for women as a function of alcohol when a nonaggressive response was available toward the fictitious male opponent. Another study (Bond & Lader, 1986) demonstrated an increase in aggression for both intoxicated men and women when provocation level was low but only for men when provocation was high. However, a recent study (Giancola, et al., 2002) demonstrated almost the opposite. Intoxicated men were more aggressive then intoxicated women under low provocation, but men and women were equally aggressive under high provocation. These authors (Giancola, et al. 2002) concluded that alcohol increases aggression for men but that only provocation will lift aggression–related inhibitions for women.

Some studies have focused more on gender differences related to direct and indirect forms of aggression. In some cases, indirect aggression increased for intoxicated women but not men (Rohsenow & Bachorowski, 1984). Giancola and Zeichner (1995) operationalized direct aggression as shock intensity and indirect aggression as shock duration and found that intoxicated men showed an increase in both forms of aggression, while intoxicated women only showed increases in indirect aggression. However, the authors recommended interpreting this finding with caution since shock duration fits questionably with most definitions of indirect aggression.

There appears to be at least one plausible generalization that can be made regarding gender differences for alcohol-related aggression: men show a consistent increase in aggressive responding while drinking. Although this generalization cannot be applied to women, at least one study found that aggression increased equally for men and women over cumulative doses of alcohol (Dougherty, Bjork, Bennett and Moeller, 1999). In the Dougherty et al. study, participants who showed higher levels of aggressive responding under placebo conditions (indicating baseline individual differences) also showed the highest increases in aggression under alcohol conditions. This finding suggests that variables beyond gender are critical for understanding the alcohol-aggression relationship—specifically, individual difference variables.

*Individual Difference Variables*

The study of individual difference variables as moderators in the alcohol-aggression relationship has gained momentum over the last two decades. Alcohol expectancies would certainly vary by individual, but, as discussed earlier, alcohol expectancies appear to play a negligible role in the alcohol-aggression relationship. The role of alcohol-*aggression* expectancies may also be trivial but the jury is still out. Some studies indicate that alcohol-aggression expectancies do not facilitate aggression beyond dose. One such study (Chermack & Taylor, 1995) used a three-question scale to determine whether participants had a high or low score on alcohol-aggression expectancies (Effects of Drinking Questionnaire; EDQ; Dermen & George, 1989) and then randomly assigned participants to a high-dose or placebo-dose condition in which they all performed a competitive reaction time task with a fictitious opponent. Participants in the high-dose condition set higher shock intensities for the opponents than those in the placebo condition. The main effect of expectancy was not significant, nor was there a significant interaction of dose X expectancy. On the other hand, participants in the high-dose condition did select more severe shock intensity levels as "opponent" shock levels increased. This finding appeared to be driven by participants who had scored high on the alcohol-aggression scale of the EDQ. Thus, it appeared that intoxicated participants with high expectancies for alcohol-related aggression were the most reactive to increased levels of provocation. It is possible that high levels of alcohol consumption and provocation are both necessary for expectancy effects to emerge (Chermack & Taylor, 1995). However, it may also be the case that alcohol-aggression expectancies are not adequately measured.

A few other studies (Dermen & George, 1989; Leonard & Senchak, 1993; and Quigley & Leonard, 1999) indicated that the belief that alcohol leads to aggression *does* moderate the alcohol-aggression relationship. These studies are correlational and, in one (Quigley & Leonard, 1999), the findings did not hold up over time. A recent study (Leonard, Collins, & Quigley, 2003) investigated a host of variables (e.g., personality and socio-cultural factors) related to alcohol consumption and aggression within bar environments. With respect to alcohol-aggression expectancies (measured using the Alcohol Effects Questionnaire; Rohsenow, 1983), the investigators hypothesized that these expectancies would moderate the alcohol-aggression relationship, and that the belief that alcohol causes aggression would be related to both the number of episodes resulting in aggression and aggression severity. They found that a belief that alcohol causes aggression was *not* necessary for an association between alcohol consumption and aggression. They also found that participants were more likely to behave aggressively during an episode when they held this belief, but that the opponent was less likely to be harmed during the episode. The authors suggested that alcohol-aggression expectancies might serve in the initiation of aggression, but not in the continuation, escalation, or cessation of an aggressive episode. Further, the authors found that once aggression was initiated, forces within the social environment (people instigating the participant and his opponent during the aggressive episode, and no one trying to defuse the situation) were predictive of more severe aggression and greater harm to the opponent. Interestingly, angry temperament was not reliably associated with aggression in this study. But, again, the authors suggested that individual differences may influence the initiation of aggression, but other factors (i.e., eggers-on) may be more crucial in the escalation of aggression (Leonard, Collins, & Quigley, 2003).

Findings from an earlier study offer some experimental support for this alternative explanation. Bailey and Taylor (1991) found that when men self-reported moderate to high levels of aggressive tendencies (as measured by the Assault subscale of the Buss-Durkee Hostility Inventory, Buss & Durkee, 1957), they were significantly more likely to set higher shock levels at a faster rate toward their provokers in a reaction time task. Although the level of shock intensity set by men who self-reported nonaggressive tendencies never reached the level set by men who self-reported aggressive tendencies, the former clearly set higher shock levels when intoxicated. The authors speculated that when the intentions of the target were ambiguous (during block one), a high dose of alcohol appeared to have an instigative effect upon all of the individuals in the study, regardless of whether they self-reported high, moderate, or low levels of aggression. When the antagonist was clearly more provocative (blocks two and three), the effects of alcohol appeared to depend more on disposition. That is, those who self-reported moderate or high levels of aggression set increasingly higher shock intensities, whereas those low on aggression were more restrained.

A more recent study (Parrott & Zeichner, 2002) partially replicated the above results. Participants were categorized as low, moderate, or high trait anger according to their responses on the Trait Anger Scale (TAS, Spielberger et al., 1980, 1983). Participants completed a modified TAP in either an alcohol or a no-alcohol condition. Shock intensity and duration, as well as the proportion of shocks set at the highest level, served as indices of aggression. Regardless of beverage condition, men who were categorized as moderate or high on trait anger displayed significantly higher aggression on all of the indices of aggression. Unexpectedly, only intoxicated participants rated as moderate trait anger selected higher shock intensities and a greater proportion of shocks at the highest level than their sober counterparts. The authors suggested that the lack of difference for low trait anger participants likely reflects an aggression-inhibiting effect. For high trait anger participants, the lack of difference may reflect a ceiling effect. They also suggested that a placebo condition and a measure of alcohol-aggression expectancies might have enhanced the interpretation of the current findings.

As previously mentioned, Giancola et al. (2002) have concluded that provocation is the most reliable predictor for alcohol-related aggression across gender. Even if this conclusion is accurate, other factors clearly moderate the alcohol-aggression relationship. In an earlier study, Giancola and Zeichner (1995) investigated the combined predictive ability of subjective intoxication, BAC level, provocation, and aggressive personality traits on physical aggression in men and women. They found that aggressive personality traits and BAC level predicted physical aggression under both high and low provocation for men. None of the variables were predictive of aggression for intoxicated women, and subjective intoxication was not predictive of aggression for men when provocation was high.

In a more recent study, Giancola (2002) again found that provocation was the strongest elicitor of aggression in a modified TAP. More importantly, alcohol was more likely to increase aggression for men with higher levels of trait anger as measured by the Spielberger Trait Anger Scale. The author suggested that research should continue "to delineate a multivariable risk profile" in the effort to predict when aggression is likely to occur subsequent to alcohol intoxication (Giancola, 2002, p. 1357). In an attempt to specify additional factors within a "risk profile" Giancola used a similar methodology in another study (2003) and measured self-reported levels of empathy (empathic concern for others and the ability to see things from another person's point of view as measured by two subscales of the Interpersonal Reactivity Index). Alcohol was found to increase aggression for men who self-reported lower empathy on these two subscales. Interestingly, for both of the above studies, alcohol had no effect on female aggression regardless of trait anger or empathic concern (Giancola, 2002; Giancola, 2003).

The above studies highlight some variables that reliably influence the alcohol-aggression relationship. Provocation appears to be a crucial situational variable for men and women, and trait anger appears to be a crucial individual difference variable—especially for men. For women, potential "risk" variables have proven harder to identify. One study (as cited in Dougherty, et al., 1999) found that women who self-reported menstrual symptoms were more aggressive than those who did not. The authors summed up the current state of research well when they concluded that studies like this "clearly underscore the need for taking into account individual characteristics that may help us better understand why alcohol increases aggression in some persons but not in others" (p. 329).

*Attentional Effects and Automaticity*

Another aspect of the alcohol-aggression relationship involves attention. Although alcohol intoxication does not appear to change attentional capacity (Lamb & Robertson, 1987), it appears to influence the relative importance of the most salient information from the internal and external environment. In one study (Jeavons and Taylor, 1985), the attention of half of the intoxicated participants and half of the sober participants were directed toward a nonaggressive norm intended to reduce participant's aggression toward a bogus opponent. Mean shock settings by each group clearly indicated that intoxicated participants whose attention was not directed toward the nonaggressive norm were the most aggressive. For intoxicated participants whose attention was directed toward the nonaggressive norm, their levels of aggression were comparable to the sober participants, and lower than participants who were not provided with a nonaggressive norm.

Zeichner, Pihl, Niaura, and Zacchia (1982) also attempted to evaluate the role of attention in the production of alcohol-mediated aggression. Some intoxicated participants were forced to attend to the consequences of their behavior (a tone indicating how much pain an opponent felt after receiving shock), some were distracted from attending to those consequences, and some did not receive any attentional instructions at all. Zeichner et al. expected that participants in the forced-attention condition could not fail to attend to the information about how much pain their opponent was experiencing and that this processing of relevant information would lower aggressive responding. They were surprised to find that those in the forced-attention condition actually *increased* the duration of time that participants pressed the shock button. In contrast, for participants who were distracted from the pain, shock durations were significantly shorter. The authors concluded that an information-processing deficit interpretation was not applicable. However, they also suggested that alcohol restricted attention to the shock manipulation rather than the behavioral contingencies (which are more distal in nature). In this case, their self-focused attention combined with alcohol may have been more arousing (e.g., they become more aware of threat of harm). Those that were distracted from the salient threat of harm were able to inhibit their aggressive responding. Of course, an interpretation such as this awaits further investigation.

To date, there are no known alcohol studies that have investigated the interaction between automaticity and aggression. The current study may validate a methodology that can look at the automatic activation of knowledge structures related to aggression and alcohol cues for those who self-report higher levels of trait anger or higher alcohol-aggression expectancies. Measurement of a chronic, automatic effect is considered necessary for understanding the alcohol-aggression link.

### *The Current Study*

The current study investigated whether high self-reported levels of aggression, trait anger, or alcohol-aggression expectancies (which all reflect chronically accessible knowledge structures) are related to the salience of aggression stimuli in the presence or absence of alcohol cues (which both reflect external cues). This study assessed the predictive utility of the parafoveal visual versus dichotic listening methods of presentation to demonstrate the effects of self-relevant aggression cues upon two behavioral measures of attention—reaction time and error rate.

#### *Hypotheses*

Three main hypotheses were formulated in regard to one's performance when aggression cues are presented via a computer task either dichotically or parafoveally:

1. Participants who self-report higher levels of <u>trait anger</u> will demonstrate longer latencies and higher error rates (more attentional interference) when exposed to self-relevant cues of aggression than those who report lower levels of trait anger. This effect will hold whether participants are tested in the presence or absence of alcohol cues.
2. Participants who self-report higher levels of <u>alcohol-aggression expectancies</u> will demonstrate longer latencies and higher error rates when exposed to aggression cues than those who report low levels of alcohol- aggression expectancies. Setting should moderate this effect. That is, the effect should hold only for participants tested in the presence of alcohol cues.
3. Higher alcohol-aggression expectancies will predict longer latencies to respond and higher error rates on the computer tasks after the effects of trait anger are partialled out. However, this effect will hold only for participants tested in the presence of alcohol cues.

Although a specific hypothesis was not formulated in regard to the relative predictive utility of the parafoveal visual computer task versus the dichotic listening computer task, patterns of significance and effect sizes were examined to suggest which methodology may be most helpful for investigating attentional interference, trait characteristics, and alcohol cues.

# Method

*Design*

This study included two dependent measures (error rate and reaction time) and two independent variables (Word Type and Setting). Word Type had two within subject (WS) levels (NonAggression and HiAggression) and Setting had two between subject (BS) levels (Barroom and Cleanroom). Therefore, this study was a 3 (WS) X 2 (BS) mixed design. Error rate and reaction time were analyzed separately, as were Dichotic Listening Task (DLT) and Parafoveal Visual Task (PVT) data.

*Condition Assignment*

Participants were assigned to one of four conditions: Barroom Parafoveal, Barroom Dichotic, Cleanroom Parafoveal, or Cleanroom Dichotic. The attended Channel (Left vs. Right) was counterbalanced within the DLT condition. Setting and Task assignments were decided by flipping a coin and filling the other cells by default as necessary. Since there were constraints upon departmental availability of room space, if the next Setting condition was not available, the participant was run in the same Setting condition rather than being rescheduled.

*Power*

While effect sizes regarding error rate are theoretically related to the dependent variables examined in this study, our experiences suggested that they would be quite small (e.g., Edington, 1996). Although error rate was investigated in the current study, sample size needed was based upon expected effects for reaction time. Similar methodologies investigating reaction time and/or parafoveal presentation of stimuli (Bargh, 1996; di Pace, Longoni, & Zoccolotti, 1991; Ortells & Tudela, 1996) indicated that 100 participants (25 participants for each computer task and in the presence or absence of alcohol cues) should provide ample power for detecting mean differences in reaction times.

Power analyses regarding reaction time means were conducted for N = 79. Significant differences were found for Word Type on the PVT with power at 1.00. Reaction time means across Word Type for the DLT were not significant, and power was calculated to be .56. Participant recruitment was ended at N = 79 (Dichotic X Cleanroom = 20; Dichotic X Barroom = 18; Parafoveal X Cleanroom = 19; and Parafoveal X Barroom = 22).

*Participants*

Three hundred eighty five undergraduate students at the University of South Florida completed questionnaire data for the first part of this study (Phase I). Eighty-five of the 385 students who completed the Phase I questionnaires participated in Phase II of the study. The data of six participants were not used in any analyses because examination of error rate data revealed that these participants had error rates that were unacceptably high. Since the other 79 participants were able to complete either task with error rates no higher than 19%, it is more likely that the six participants with error rates in the range of 47% to 61% did not attend adequately to the instructions. Therefore, data for these six participants was excluded from all reaction time (RT) and error rate (ER) data analyses and demographics are reported for $N = 79$[1].

The mean age for the Dichotic Listening Task (DLT) sample ($N = 38$) was 22.95 years (SD = 4.06, range 19 to 35). For the Parafoveal Visual Task (PVT; $N = 41$) sample, excluding one 63-year-old female, the mean age was 21.83 years (SD = 2.62, range 19 to 31). Mean ages were not significantly different for the two task types, $t(62.75) = 1.44$, p = .15. Fourteen of the 79 participants were male (18%) and 65 were female (82%). This overrepresentation of females is expected given the high number of female undergraduates within undergraduate psychology classes at this university. To evaluate the difference among the proportion of males vs. females completing the PVT vs. the DLT, a contingency table analysis was conducted. Gender was not significantly different across tasks, Pearson $\chi^2$ (1, $N = 79$) = .03, $p = .88$. The sample included 14 African American (17.7%), 11 Hispanic (13.9%), 51 Caucasian (64.6%), 2 Asian American (2.5%), and 1 Latino (1.3%) participant. Race/ethnicity was not significantly different across tasks, Pearson $\chi^2$ (4, $N = 79$) = 5.72, $p = .22$.

To evaluate whether students who never came in for Phase II were significantly different on demographic characteristics or on the measures of interest for Phase I, a comparison group of Phase II noncompleters was randomly selected from the 300 remaining participants. This resulted in a comparison of 79 Phase II completers and 79 Phase II noncompleters. No differences emerged for age, gender, race/ethnicity, household income, the trait anger variables, or the alcohol-aggression expectancy variables.

*Phase I Materials*

Participants were given a number of measures to complete during Phase I. These measures were the State Trait Anger Expression Inventory (STAXI; Appendix B), the Aggression Questionnaire (BPAQ; Appendix C), the Expectancy Questionnaire for Alcohol and Aggression—Low Dose (EQAAL; Appendix D), a questionnaire made up of other alcohol-aggression expectancy subscales (Appendix E), a demographics questionnaire (Appendix F), and a request for further participation (Appendix A). Only the psychometric properties of the STAXI and the EQAAL measures will be considered below. The BPAQ and the questionnaire including other expectancy subscales were included in Phase I for later study. The demographics questionnaire and request for further participation will not be discussed further.

*State-Trait Anger Expression Inventory.*

The State-Trait Anger Expression Inventory (STAXI; Spielberger, 1988) was used to measure participants' levels of anger proneness (trait anger) as well as the manner in which they typically express their anger. The STAXI evolved from earlier measures of the experience and expression of anxiety and anger as important factors in the etiology of hypertension and coronary heart disease in the late 1960's (e.g., see Spielberger, Gorsuch, & Lushene, 1970; Spielberger, 1980). Spielberger has spent decades refining the measurement of state anger (operationalized as a relatively short-lived emotional state) and trait anger (operationalized as a longer-standing personality characteristic) to assess individual differences in the experience of anger (State-Trait Anger Scale or STAS; Spielberger, 1980; Spielberger, et al., 1983). Spielberger maintained that individuals high in trait anger would more frequently perceive a wider range of situations as anger provoking than those low in trait anger and that they would experience more frequent and more intense elevations in state anger over time.

Although the measurement of state and trait anger proved useful in some contexts, Spielberger, Sydeman, Owen, and Marsh (1999) realized that understanding the experience of anger is not enough to develop strategies and treatments for maladaptive anger. They claimed that it is essential “not only to distinguish, both conceptually and empirically, between the experience of anger as an emotional state (S-Anger) and individual differences in anger proneness as a personality trait (T-Anger), but also to identify and measure the characteristic ways in which people express their anger” (p. 1006). This led to the development of the Anger Expression scale or AX Scale, which provided a distinction between anger-in (suppressed anger; AX/In) and anger-out (verbally or physically expressed anger; AX/Out). Research with the AX scale indicated an anger control factor, which was developed into the third subscale of the AX, the anger-control (AX/Con) subscale. The STAS and the AX scales were combined to create the State-Trait Anger Expression Inventory (STAXI; Spielberger, 1988).

The STAXI has continued the role of the STAS and AX in research on the relationship between anger and health-related factors such as hypertension, as well as a variety of other constructs (for examples of the use of the STAS, AX, and STAXI in research the interested reader is referred to Spielberger, Reheiser, & Sydeman, 1995). The STAXI has also been proposed and evaluated as a screening and outcome measure with mixed but promising results (e.g., Foley, Hartman, Dunn, Smith, & Goldberg, 2002; Mahon, Yarcheski, & Yarcheski, 2000; Cornell, Peterson, & Richards, 1999). The STAXI’s ability to measure anger-related states, traits, and its expression (i.e., aggression) suggests that it can be useful for providing evidence that these constructs are highly correlated with aggressive behavior in laboratories, and, more importantly, in naturalistic settings.

The STAXI is comprised of: a 10-item trait anger (T-Anger) scale that measures individual differences in anger proneness; a 10-item state anger (S-Anger) scale that measures one’s current subjective feelings of anger; and a 24-item Anger Expression (AX) scale that measures internalized, seething anger (AX/In—8 items), externalized aggressive behavioral tendencies (AX/Out—8 items), and effort expended controlling the expression of anger (AX/Con—8 items). The AX/EX measure indexes the frequency that anger is experienced and expressed and is calculated by combining items from other STAXI scales. A factor structure analysis of the T-Anger and S-Anger scales (Spielberger, 1988) indicated that the T-Anger Scale should be broken into two subscales. Angry Temperament (T-Anger/T) is intended to measure one's tendency to experience and express anger without provocation. Angry Reaction (T-Anger/R) is intended to measure one's tendency to express anger when criticized or treated unfairly.

The STAXI has been found to have good psychometric properties (Fuqua, et al., 1991; Moses, 1992; and, Spielberger, 1988). Factor analysis of the S-Anger scale yielded high item-remainder correlations and alpha coefficients of .93 for both sexes. Internal consistency of the T-Anger subscales was evaluated separately for males and females using college and Navy samples (Spielberger, 1988, p. 8). Item-remainder correlations were acceptably high for both subscales and alpha coefficients ranged from .84 to .89 for the T-Anger/T subscale and from .70 to .75 for the T-Anger/R subscale. In the current study, internal consistency estimates of reliability were calculated with both males and females and yielded a somewhat lower, although still acceptable, result for S-Anger (alpha = .85). For the T-Anger subscales, coefficients for males and females together were comparable to previously obtained results with alpha = .85 for T-Ang/T but somewhat lower for T-Ang/R with alpha = .68. Item-remainder correlations for the AX/In and AX/Out subscales of the AX scale in Spielberger's (1988) study were much lower but still satisfactory and alpha coefficients for all three of the AX subscales ranged from .73 to .85. Coefficients were highest for the AX/Con subscale (.84 for females and .85 for males) and lowest for the AX/Out subscale (.75 for females and .73 for males) with AX/In coefficients falling in between (.81 for females and .84 for males). In the current study, AX/In coefficient alpha was .78, AX/Con alpha was .82, and AX/Out alpha was .78.

Correlations among the STAXI scales in the Spielberger (1988) study were as expected (e.g., essentially zero between AX/In and AX/Out). Test-retest stability coefficients for the state and trait anger scales of the State-Trait Personality Inventory

(STPI; Spielberger, Jacobs, Crane, Russell, Westberry, Barker, et al., 1979) and for the AX subscales have been reported for males and females separately (Jacobs, Latham, & Brown, 1988). As would be expected, coefficients for the state anger scale (.27 for males and .21 for females) were much lower than for the trait anger scale (.70 for males and .77 for females). Additionally, coefficient values for the AX subscales (a range of .64 to .70 for males and .73 to .81 for females) were comparable to the trait scale values.

The T-Ang/T and T-Ang/R subscales were of most interest for the current study. The mean T-Ang/T score reported by Spielberger (1991) for college students was 6.56 for males ($SD$ = 2.67) and 6.71 for females ($SD$ = 2.73). The mean T-Ang/R score reported by Spielberger for college students was 9.84 for males ($SD$ = 2.55) and 10.18 for females ($SD$ = 2.60). In the current sample, mean T-Ang/T scores for the Parafoveal Visual Task (PVT) were 5.57 for males ($SD$ = 1.81; $N$ = 7) and 6.00 for females ($SD$ = 1.71; $N$ = 34). For the Dichotic Listening Task (DLT), mean T-Ang/T scores were 5.71 for males ($SD$ = 1.89; $N$ = 7) and 5.90 for females ($SD$ = 2.34; $N$ = 31). For the T-Ang/R subscale, mean scores for the PVT were 8.71 for males ($SD$ = 2.75) and 8.44 for females ($SD$ = 1.74). On the DLT, mean scores were 8.14 for males ($SD$ = 2.12) and 8.19 for females ($SD$ = 2.56). The maximum obtainable score for each subscale is 16 and the lowest is 4. This indicates that most respondents indicated having an angry temperament somewhere between "almost never" and "somewhat." For the T-Ang/R subscale, sample means were somewhat higher than the means for T-Ang/T but they were still considerably lower than the means that Spielberger reported.

Concurrent validity of the STAXI was provided using 270 naval recruits and 280 college undergraduates (Spielberger, 1988). T-Anger scale scores were compared with scores from the Buss-Durkee Hostility Inventory (BDHI) and the Hostility and Overt Hostility scales of the Minnesota Multiphasic Personality Inventory (MMPI). All correlations were significant at <.01 for both males and females. Spielberger (1988) also studied the correlations between the STAXI T-Anger and S-Anger scales and the Eysenck Personality Questionnaire (EPQ) subscales and the Trait and State Anxiety and Curiosity Scales of the State-Trait Personality Inventory (STPI). Moderate correlations between the EPQ Neuroticism scales and the T-Anger scale as well as between the State and Trait Anxiety scales from the STPI and the T-Anger scale were significant and interpreted by Spielberger (1988) as consistent with the theory that individuals high in neuroticism and trait anxiety frequently experience angry feelings that they suppress (p. 12). Correlations of the T-Anger scale with the EPQ Extraversion scale and the STPI S- and T-Curiosity scales were essentially zero and suggested that T-Anger is not related to those personality constructs.

Convergent and divergent validity for the AX/EX scale has also been provided (Spielberger, Johnson, Russell, Crane, Jacobs, & Worden, 1985). Correlations of the AX subscales with the STPI state and trait curiosity subscales were relatively nonexistent, but significant correlations were found with trait anxiety for both males and females (ranging from .24 to .34). Correlations between the AX/EX total anger expression scores and the STPI anger measures were lower although still significant with the exception of the STPI T-Anger/T and AX/EX correlation for females, which was essentially zero.

In an analysis of the 44-item STAXI (Fuqua, Leonard, Masters, Smith, Campbell & Fischer, 1991), as well as a replication analysis (Forgays, Forgays, & Spielberger, 1997) the structure of the measure was examined to determine whether the use of the different subscales is justified. The researchers concluded that the structural validity of the STAXI was better than expected and that the scale structure they found was similar to that claimed for this instrument.

*Expectancy Questionnaire for Alcohol and Aggression—Low Dose.*

The current study views aggressive scripts as knowledge structures in memory that represent information about when and why it might be appropriate to use aggression in a given situation, and what will happen as a result. Alcohol scripts are viewed in a similar fashion. It is reasonable to expect that knowledge structures about aggression secondary to alcohol use will contain information about the circumstances under which someone drinking alcohol would be aggressive and what the outcomes might be. Therefore the Expectancy Questionnaire for Alcohol and Aggression—Lo Dose version (EQAAL; Epps, Hunter, LeVasseur, Steinberg, & Hancock, unpublished manuscript) was used in the current study to measure expectancies that participants hold about behaving aggressively following the consumption of low but behaviorally significant doses of alcohol. Questions from other measures that tap alcohol and aggression related expectancies were also included for later study (i.e., the Alcohol Expectancy Questionnaire, Brown, Goldman, Inn & Anderson, 1980; the Drinking Expectancy Questionnaire, Young & Knight, 1989; the Comprehensive Effects of Alcohol Questionnaire, Fromme, Stroot, & Kaplan, 1993; the Effects of Drinking Alcohol scale, Leigh & Stacy, 1993; and, the Alcohol Expectancy Questionnaire-3, George, Frone, Cooper, Russell, Skinner, & Windle, 1995). The items taken from these measures are provided in Appendix E but the psychometric properties of their respective scales will not be discussed.

The EQAAL is a 23-item scale representing a cognitive-behavioral taxonomy of alcohol-aggression expectancies divided into four factors. Factor analysis indicated two affective factors labeled Unprovoked Anger Expectancies (UnpAng; 8 items) and Reactive Anger Expectancies (AngReac; 7 items), one cognitive factor labeled Expectancies of Hostile Cognitions (HostCog; 3 items), and one behavioral factor labeled Expectancies to Maintain Control (ExpCon; 5 items). Confirmatory factor analysis revealed the following factor loadings: UnpAng = .70; AngReac = .68; HostCog = .71; and, ExpCon = .78. High internal consistency was demonstrated by computing Chronbach's alpha (UnpAng = .88, AngReac = .81, HostCog = .76, and ExpCon = .82). Intercorrelations between the various scales ranged from -.014 to .53. The higher intercorrelations were among the two anger factors and the hostile cognitions factor. Six-week test-retest reliability with a separate group of students revealed the following Pearson product-moment correlations: UnpAng = .80, AngReac = .57, HostCog = .56, and ExpCon = .79. No significant differences were found on any of the subscales according to gender or ethnicity. Although the EQAAL shows promise as a more precise measure of alcohol-aggression expectancies, studies that provide evidence of discriminant and convergent validity are lacking.

The current study provides additional evidence for internal consistency. Coefficient alphas for three of the four factors were quite high and were as follows: Unprovoked Anger Expectancies = .93, Expectancies of Hostile Cognitions = .77, Reactive Anger Expectancies = .88, and Expectancies to Maintain Control = .90.

*Phase II Materials*

During Phase II, participants completed the Positive and Negative Affect Schedule (PANAS; Appendix G). Then they completed either the Dichotic Listening Task (DLT) or the Parafoveal Visual Task (PVT) in the presence or absence of alcohol-related stimuli. During either task they were exposed to aggressive and nonaggressive stimuli (word stimuli are included in Appendix H) while they responded to a reaction time task. Upon completion of the computer task, they completed a recognition task (Appendix I) followed by the PANAS again, and the Brief Drinker Profile (Appendix J; for later study). Finally, participants were debriefed about the study (Appendix K) and awarded their extra credit points.

*Positive and Negative Affect Schedule.*

It was possible that exposure to aggression stimuli would induce or increase negative affect. To investigate this possibility, the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was given to participants before and after they completed the computer task in Phase II. Both times the participants were instructed to read the adjectives and "indicate to what extent you feel this way right now, that is, at this very moment."

The PANAS consists of 10 positive adjectives and 10 negative adjectives that are assumed to represent two orthogonal dimensions of mood—positive affect and negative affect. In order to develop these scales, a range of descriptors (60 adjectives taken from Zevon and Tellegen, 1982) that loaded .40 or greater on the relevant positive or negative factor and that did not load |.25| on the other factor, were selected. Of 12 positive descriptors, two more items were dropped that had relatively high secondary loadings on the negative affect factor for a final pool of 10 items. Of the 25 negative descriptors, two content categories were dropped altogether leaving two items from each of five content categories (distressed, angry, fearful, guilty, and jittery). For example, the items that represent "angry" are *hostile* and *irritable*. The authors obtained PANAS ratings using six time frames (moment, today, past few days, past few weeks, year, and in general) and found acceptably high alpha reliabilities (ranging from .86 to .90 for positive affect and from .84 to .87 for negative affect) and low correlations between the scales (ranging from

-.12 to -.23, indicating about 1-5% shared variance). Test-retest reliability indicated stability over a two-month time period, with greater stability over longer time frames. Validity for the PANAS was also acceptable, based upon good factorial validity and expected correlations with measures of related constructs (Watson, Clark, & Tellegen, 1988).

In the current study, coefficient alphas for the positive affect scale were .87 (Time 1) and .88 (Time 2). Coefficient alphas for the negative affect scale were .64 (Time 1) and .72 (Time 2). When comparing the positive and negative affect scales at Time 1, alpha was .22. At Time 2 alpha was .04. Overall, the scales appear to measure orthogonal constructs as maintained by Watson, et al. (1988).

*Dichotic Listening Task (DLT)*. The participants' primary task was to attend to one channel of a DLT while they simultaneously performed a computer task. The computer program was created using Superlab Pro, Version 2, which presented word pairs dichotically (through headphones) and number strings (on the monitor) using a Dell PC.

During the computer task, participants indicated by the press of a button whether the *center* number in a five-digit string of numbers was odd or even. Between number strings, a capital X was placed in the center of the screen and served as the fixation point. Two seconds later, the .wav file played and the number string appeared. After two seconds, or as soon as the odd or even button was pressed, the X reappeared. The computer program recorded, in milliseconds, the time between onset of the number string to the pressing of the red ("odd") key or the blue ("even") key. If no key was pressed within 2 seconds of stimulus presentation, RT was recorded as .00 seconds and the response was marked as incorrect. All participants were presented with 10 Blank trials, 10 Practice Trials, 80 Word Type Trials mixed with 10 Blank Trials, and 10 final Practice Trials. Within a type of trial, a different randomly generated order of stimuli was presented to each participant to control for order effects.

*Word Pairs.* The words presented to the unattended channel consisted of words rated as high aggressive, ambiguously aggressive, low aggressive or nonaggressive (as used in Edington, 1997; see Appendix H). Two types of aggressive words (high and nonaggressive) were selected in order to examine whether these levels would be predictive of differential cognitive interference. Low aggressive and ambiguous aggressive words were also included. However, these two word types were included for later study. All of the words presented simultaneously to the attended channel consisted of additional nonaggressive words.

Twenty word pairs comprised each of the Word Type conditions—called NonAgg, LoAgg, AmbAgg, and HiAgg—for a total of 80 word pairs. All four types of words were selected from a normed database of over 5000 words and their associated links compiled by Nelson, McEvoy and Schreiber (1999). Words in the HiAgg category were associated with aggression-related concepts from 60-95% of the time. Examples include *brawl, stab* and *fight*. Words in the AmbAgg category were related to aggression concepts 35-50% of the time. Examples include *tank*, *strike*, and *punch*. LoAgg words were associated with aggression-related concepts 10-20% of the time and included *mask*, *fray*, and *hide*. The NonAgg words had no evident association with aggression-related concepts. Examples included *store*, *few*, and *desk*. Additionally, both words in the word pairs began with the same consonant sound. For example, *stab* was paired with *store*.

Ten words, without a paired word, were presented before the practice words (Blanks). Ten NonAgg word pairs were presented at the beginning of the computer task to investigate practice effects (Practice words) and another 10 Blanks were mixed in with the 80 pairs of experimental words. This yielded 100 word pairs and 20 Blanks that were presented at a rate of one pair approximately every four seconds.

Word pairs were recorded and saved as sound .wav files using the Adobe Audition program. Detailed information about the word stimuli is provided in Appendix H. All of the words were recorded using the same male voice. The Superlab program accessed these files and used them for the Dichotic Listening Task. The audio presentation typically lasted from .50 to .80 seconds.

*Parafoveal Visual Task.* The Parafoveal Visual Task (PVT) computer program was also written with Superlab Pro, Version 2.14 and presented on a Dell PC. Participants completed the same odd vs. even number decision-making task as in the Dichotic Listening Task. However, the experimental words (Word Type) were presented as written words within the parafoveal visual field of the participant. Single nonaggressive words played in stereo on the headphones. The PVT methodology resembled that of Chartrand and Bargh (1996), Experiment 2. On a computer screen, these researchers presented a word and a subsequent masking stimulus at an angle of 45°, 135°, 225°, or 315° from asterisks in the center of the screen (the fixation point). These four quadrants coincided with an area approximately 7.6 cm from the fixation point. Thus, stimuli were presented to the parafoveal visual field, which has been shown to be from 2° to 6° of visual angle.

In order for the experimental word stimuli to appear within the parafoveal range, participants in the current study were situated in front of the screen such that their eyes were 65 cm from the fixation point. The center of the word stimulus appeared 2.6 cm above, below, to the left, or to the right of the fixation point. Detailed information about the parafoveal stimuli is provided in Appendix H. The distance of 65 cm from the monitor insured that if the participant leaned forward 5 cm (approximately 2 inches) or back 5 cm, the stimulus would still be presented within 2° to 6° of visual angle.

Chartrand and Bargh (1996) used brief prime word duration, immediate masking, and parafoveal presentation of words to prevent conscious awareness of subliminally primed stimuli. These precautionary measures were observed in the current study as well. Experimental words were presented for a duration of 100 milliseconds, which is halfway between the duration Bargh et al. (1995) used and the minimum that Rayner (1978) suggested. The masking stimulus, "WQXQW," replaced the experimental word for the next 60 milliseconds. Response time to press the odd or even key after stimulus presentation was recorded by the Cedrus RB-610 Response Pad. Cedrus has reported that the response pad provides reaction time data that is accurate to within 1 millisecond.

*Experimental Settings.* The barroom is a room at the University of South Florida created as an analogue drinking environment filled with typical drinking paraphernalia. The "clean" room is another room in the same building that is devoid of any alcohol related cues. Participants were assigned to one of the two settings in order to examine whether alcohol cues would increase or decrease overall reaction times or error rates to aggression stimuli.

*Recognition Task.* Recognition tasks are often used to determine whether awareness of stimuli has occurred (Bargh, 1982; Edington, 1996; Epps, Hunter, LeVasseur, Steinberg, & Hancock, 1997). Usually, some words that were presented during the relevant task are listed on a sheet of paper along with some words that the participant had not been exposed to, and the participant is asked to check off words he or she recognizes. Better than chance recognition of words to which participants were exposed may indicate awareness of those stimuli. In the current study, minimal to no awareness of the stimuli presented via the Dichotic Listening Task (DLT) or the Parafoveal Visual Task (PVT) was expected to occur.

For this study, one recognition task was created to determine whether participants were momentarily aware that alcohol or aggression related stimuli were presented to the unattended channel in the DLT or parafoveally in the PVT. The recognition task that was used is provided in Appendix I. The recognition task contained 14 "Control" words, which were words that participants were instructed to listen to in the attended channel of the DLT or in stereo for the PVT. The recognition task also contained eight Experimental words that had been presented to the unattended channel or parafoveally. Eighteen New words were selected that participants had not been exposed to during any task. These words were similar in length and general meaning to words that they had been exposed (e.g., *hate* and *maim* were selected as equivalent aggression words for *shout* and *gun*). New words were selected from Nelson, et al. (1999) database. Participants were instructed to check off words that they recognized seeing or hearing during their respective task.

The additional questions on the recognition task were intended to provide information about whether the participants had guessed the purpose of the computer task, or if they were aware of a connection between completing the computer task and filling out a variety of aggression and alcohol-aggression related questionnaires during a previous, supposedly unrelated experiment (i.e., during Phase I).

*Procedure*

Phase I was conducted over Fall 2004 through Summer 2005. Students were recruited via an online research data management program, Experimentrak, used by the

University of South Florida's Psychology Department. Participants completed the questionnaires either online or in groups of 10 to 20 in small classrooms. Minor changes were made to the questionnaires, Informed Consent, and the Debrief form in order to accommodate an online format. Participants were asked to complete the AQ, the EQAAL, the STAXI, and a demographic questionnaire (see Appendix F) for extra credit toward their course grade. After completing the questionnaires, participants were asked to indicate their willingness to be contacted at a later date for participation in a larger study (see Appendix A) and were given a debrief form (see Appendix K). For the online participants, the request for participation in another study was omitted. Whether participants completed the Phase I questionnaires in classrooms or online, they were contacted at least two later and asked to participate in Phase II. The time delay was included to reduce the possibility that alcohol- or aggression-related concepts would be active, or recently primed, during Phase II of the study.

Participants who had indicated interest in the larger study on the questionnaires; who did not indicate motor, hearing, or visual impairments; and who indicated that English was their native/first language were contacted at least two weeks later by phone or e-mail and invited to participate in a computer task study (Phase II). Those completing the questionnaires online had already passed a screener (which included similar questions about impairments and first language) and were contacted at least two weeks later by e-mail and invited to participate in Phase II. Whether recruited by phone, e-mail, or online, some deception was necessary to increase the likelihood that participants were unaware that the two phases of the study were related. All participants of Phase II were fully debriefed about the connection between the two phases before leaving the lab.

Recruitment of participants to return for Phase II of the study was inadequate. A few weeks after Phase II was initiated, a lottery was instituted. When participants were contacted about participation in Phase II, they were told that when they arrived for the study their participation identification number (IDN) would be entered into a lottery that included three $20 drawings. They were told that if they then decided to participate, their IDN would be entered into the drawing again. When recruitment did not appear to improve, Informed Consent was changed to specify monetary remuneration and participants were paid $5 for their participation in addition to being included in the lottery.

Before a participant arrived, he or she was assigned to one of the two tasks and one of the two settings. Upon arrival, participants were asked if they had any impairment that would prevent them from completing the computer tasks and if English had been their primary language since birth. Those that were appropriate for the study were shown to the designated area of the lab and seated in front of the computer. They were asked to complete the PANAS before instructions were given regarding the computer task.

For the Dichotic Listening Task, participants were told that they would be doing two tasks at one time. Their most important task was to listen to the word presented in the ear they were instructed to attend and count the number of words that started with the letter "L." They were also told to ignore any words they might hear in the other channel. Participants were told that if they could report the correct number of L words within plus or minus two, their IDN would be entered into the lottery again. At the same time that word pairs were presented, participants completed a decision-making task. Participants were instructed to decide whether the center number of a five-digit stimulus appearing in the center of the computer screen represented an even number or an odd number (e.g., 04863). Participants were asked to respond as quickly and as accurately as possible by pressing a key to indicate that the number was odd, or a different key indicating that the number was even. For example, for the word pair *kill-key*, participants would have ignored the word *kill* and would not have counted the word *key* and, at the exact same time, they would have pressed the EVEN button to indicate that the center number in the string *04863* was even.

For the Parafoveal Visual Task, participants completed the same two tasks. There were two fundamental differences: 1) all of the words presented on the headphones were single nonaggressive control words presented in stereo, and 2) the experimental word of the word pair was presented on the computer screen to the participant's parafoveal region (i.e., at 2˚ to 6˚ angle from the fixation point). For the word pair *scream-lake*, participants would have heard the word *lake* in stereo on their headphones, they would have counted it as an L word, they would not have been expected to notice the word *scream* flashed to their parafoveal region, and, at the same exact time, they would have pressed the ODD button because the center number in the string *23501* is odd.

To insure that the experimental word stimuli were always presented to the parafoveal region, a ruler was used to measure 65 centimeters between the participant's eyes and the center of the monitor. The chair was stationary and participants were instructed to maintain this position during the computer task and told that the distance between their eyes and the computer would be measured again after completion of the task.

For either computer task, all 100 word-pairs (and 20 Blanks) took approximately 11 minutes to complete. Once instructions had been given, the participant donned the headphones, the experimenter left the room, and the participant began the task. Upon reentering the room, the experimenter asked all participants to report the number of L words they heard and to complete the Recognition Task (Appendix I). Participants were then given the PANAS to complete for a second time. Next, they were asked a number of questions about their patterns of drinking in order to obtain an estimate of their standard ethanol consumptions units over the last three months. This estimate was obtained using a brief version of the Comprehensive Drinker Profile (Marlatt & Miller, 1986; Appendix J). Finally, all participants were told about the purpose of the study and the minor deception involving the connection between Phase I and Phase II. They were then given a debrief form (Appendix K) to take with them.

## Results

*Descriptives*

Visual inspection of histograms indicated that the Reaction Time (RT) sample means for the two word types were normally distributed. Measures of kurtosis and skewness were within acceptable ranges (all within ± 1). For Error Rate, sample means were not normally distributed for the Dichotic Listening Task (DLT), with measures of kurtosis and skewness as high as 5.31 and 2.27, respectively. Overall, ER means for the DLT tended to bunch up around .00 (no errors) with relatively few means over .10 for word type HiAgg. Therefore, any results using Error Rate means from the DLT should be interpreted with appropriate caution.

Table 1

*Means, Standard Deviations, and Intercorrelations for RT HiAgg—NonAgg Difference Scores and Trait Anger Predictor Variables for PVT Completed in the Presence of Alcohol Cues (N = 22)*

| Variable | *M* | *SD* | 1 | 2 |
|---|---|---|---|---|
| RT HiAgg—NonAgg DS | 52.76 | 64.67 | -.68* | .01 |
| Predictor Variable | | | | |
| 1. Trait Anger/Angry Temperament | 6.36 | 1.71 | -- | .30 |
| 2. Trait Anger/Angry Reaction | 8.82 | 1.26 | | -- |

*Note.* RT = Reaction Time; DS = Difference Scores; HiAgg = High Aggression Word Type; NonAgg = Non Aggression Word Type; PVT = Parafoveal Visual Task
*$p < .001$

The possible bias that could exist in the data due to outliers for the RT data was considered. Response latencies higher than 2000 milliseconds (2 seconds) were recorded as missing data for RT and as an error. By design, this cutoff limited the potential for extreme outliers to exist in the data. When considering the two Word Types of interest (NonAgg and HiAgg) and a cutoff of three standard deviations, there were roughly 45 outliers out of 3,160 data points (approximately 1.4%). However, the data were fairly evenly spread across the data and were not deleted from the analyses.

Table 2

*Means, Standard Deviations, and Intercorrelations for RT HiAgg—NonAgg Difference Scores and EQAAL Predictor Variables for PVT Completed in the Presence of Alcohol Cues (N=22)*

| Variable | *M* | *SD* | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| RT HiAgg—NonAgg DS | 52.76 | 64.67 | .01 | -.29 | -.47* | .06 |
| Predictor Variable | | | | | | |
| 1. EQAAL – AngReac | 21.18 | 6.81 | -- | .22 | .48 | .62** |
| 2. EQAAL – ExpCon | 18.96 | 6.11 | | -- | .57** | -.19 |
| 3. EQAAL – HostCog | 6.86 | 2.27 | | | -- | .27 |
| 4. EQAAL – UnpAng | 16.59 | 6.40 | | | | -- |

*Note.* RT = Reaction Time; HiAgg = High Aggression Word Type; NonAgg = Non Aggression Word Type; EQAAL = Expectancy Questionnaire for Alcohol and Aggression – Low Dose; DS = Difference Score; AngReac = Angry Reaction Expectancies; ExpCon = Expectancies to Maintain Control; HostCog = Expectancies for Hostile Cognitions; UnpAng = Unprovoked Anger Expectancies; PVT = Parafoveal Visual Task
**p* < .05, ***p* < .01

Correlations among the trait anger measures and HiAgg—NonAgg difference score means used in the regression analyses are presented in Table 1. Correlations among the EQAAL subscales and HiAgg—NonAgg difference score means are presented in Table 2.

*Preliminary Analyses*

*Reaction Time for Word Type.* The first step in evaluating each of the hypotheses for this study was to demonstrate differential responding across Word Type. Mean RTs were calculated for each type of word and a Repeated Measures Analysis of Variance (ANOVA) was used with two levels (NonAgg and HiAgg Word Type) of the within-subject factor and two levels (Setting: Barroom vs. Cleanroom) of the between subject factor. ANOVA was used in an attempt to control familywise error. DLT and PVT data were analyzed separately.

Statistical analyses failed to indicate a significant interaction between Word Type and Setting for the DLT [$F(1, 36) = 3.05$, $p > .05$] or the PVT [$F(1, 39) = .46$, $p > .05$]. Therefore, main effects were inspected. The main effect of Word Type for the DLT was not significant [$F(1, 36) = .76$, $p > .05$] with low power (.14). The main effect of Word Type for the PVT was significant [$F(1, 39) = 25.87$, $p < .001$] with power at 1.00.

RT means in milliseconds for the DLT were 696.32 ($SD$ = 172.53; NonAgg), and 684.82 ($SD$ = 154.97; HiAgg). RT means for the PVT for the two word types were 651.15 ($SD$ = 211.42, NonAgg) and 698.17 ($SD$ = 219.62; HiAgg). RT means as a function of Task X Word Type are shown in Figure 1.

RT means in milliseconds for the DLT in the barroom setting were 665.24 ($SD$ = 152.69; HiAgg) and 703.79 ($SD$ = 176.95; NonAgg). In the cleanroom setting, RT means were 702.44 ($SD$ = 158.79; HiAgg) and 689.59 ($SD$ = 172.77; NonAgg).

RT means in milliseconds for the PVT in the barroom setting were 730.15 ($SD$ = 239.29; HiAgg) and 677.39 ($SD$ = 219.48; NonAgg). For the PVT in the cleanroom setting, RT means were 661.14 ($SD$ = 194.12; HiAgg) and 620.76 ($SD$ = 203.26; NonAgg). RT means for the PVT as a function of Setting X Word Type are shown in Figure 2.

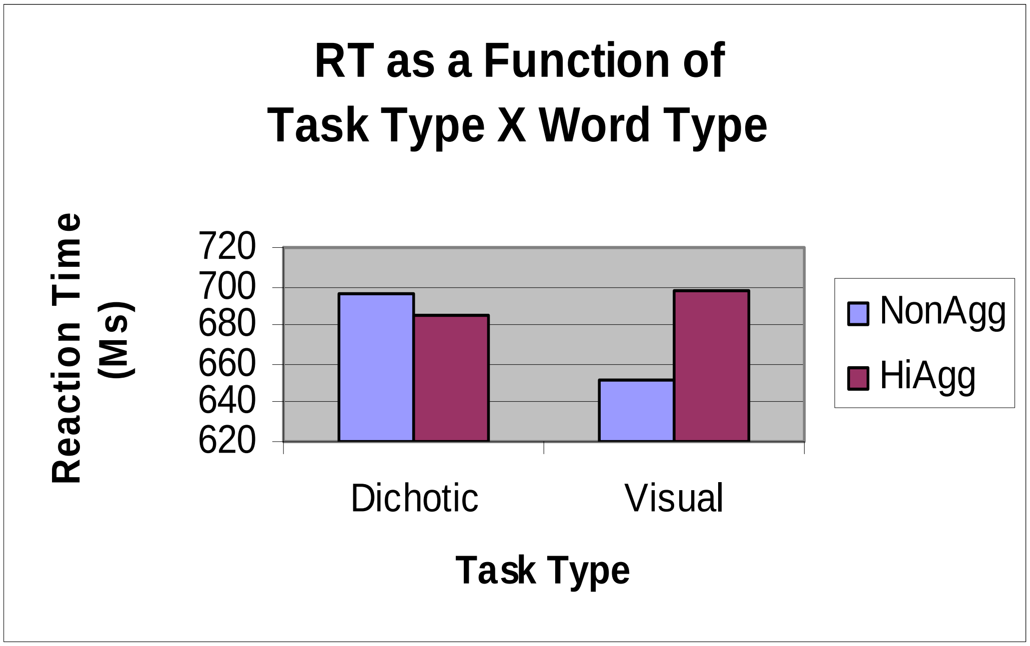


*Figure 1*. RT as a function of task type X word type.

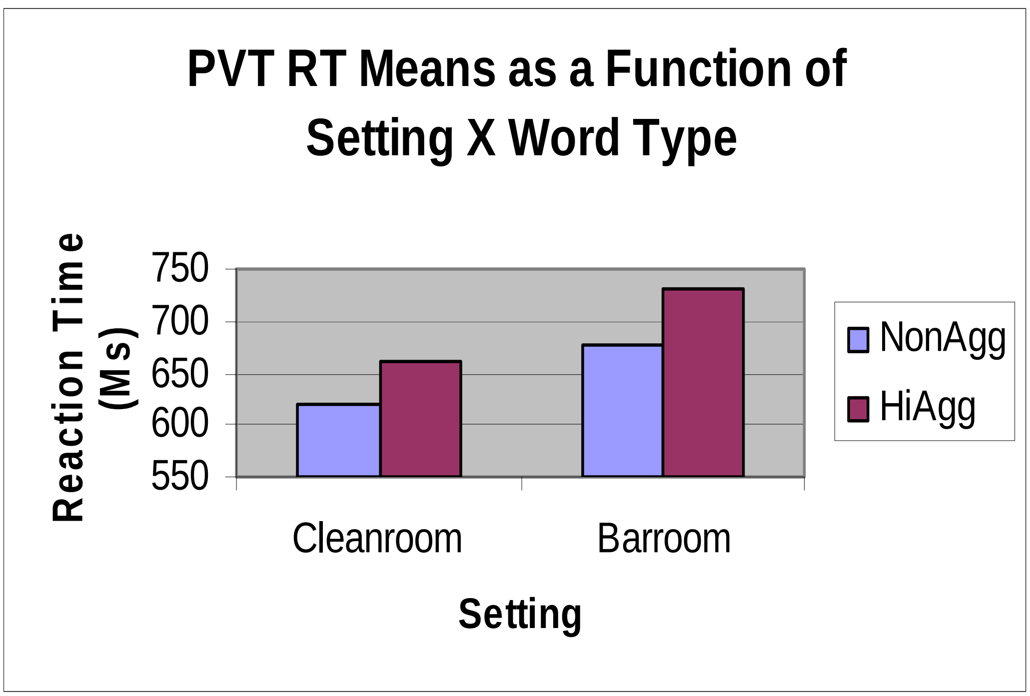


*Figure 2*. PVT RT Means as a function of setting X word type.

*Error Rate for Word Type.* The number of errors (incorrectly selecting Odd vs Even) made by each participant was summed and converted to a mean error rate (percentage) for both Word Types (NonAgg and HiAgg). The analyses used for ER mirrored those used for RT.

Statistical analyses indicated that the interaction between Word Type and Setting for ER was not significant for the DLT [$F(1, 36) = .31, p > .05$] or the PVT [$F(1, 39) = .67, p > .05$]. The main effect of Word Type for the DLT was not significant [$F(1, 36) = .31, p > .05$] with low power (.08). The main effect of Word Type for the PVT was significant [$F(1, 39) = 28.94, p < .001$] with power at 1.00.

ER mean percentages for the DLT for the two word types were 3% (*SD* = 4.7%; NonAgg) and 2.6% (*SD* = 4.6%; HiAgg). ER means for the PVT were 4.5% (*SD* = 5%, NonAgg) and 10.6% (*SD* = 6.1%; HiAgg). ER means are shown in Figure 3 as a function of Task Type X Word Type.

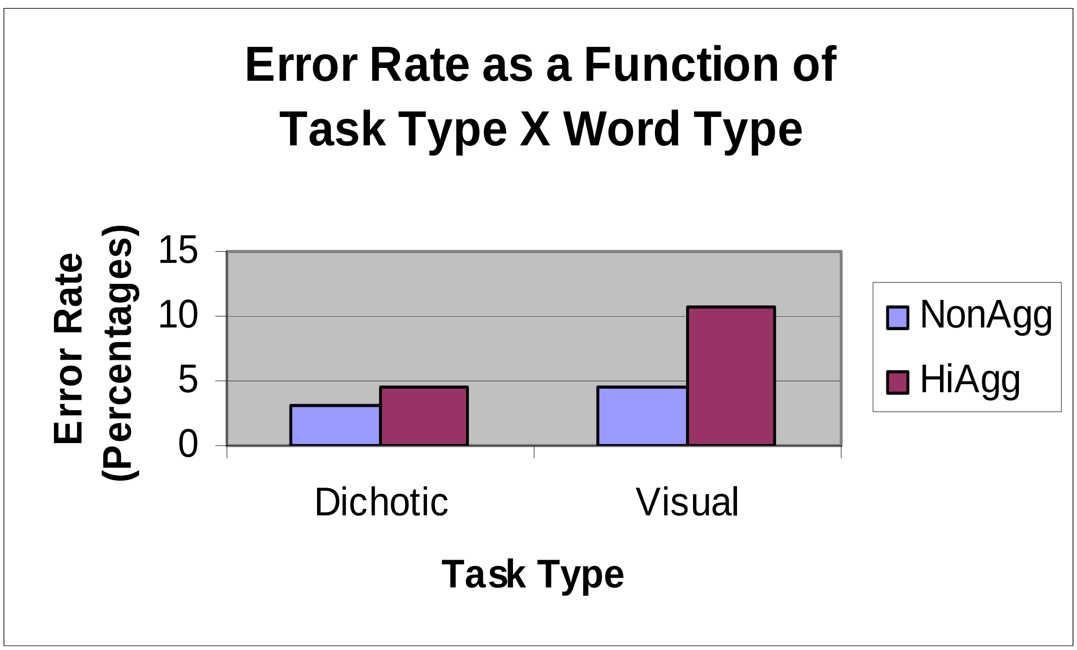


*Figure 3*. Error rate as a function of task type X word type.

Main effects for Setting were not significant for the DLT when considering ER means [$F(1, 36) = .39$, $p > .05$; power = .09]. Main effects for Setting also were not significant for PVT ER means [$F(1,39) = .63$, $p > .05$; power = .12]. ER mean percentages for the DLT in the cleanroom setting were 3% (*SD* = 4%; NonAgg) and 3% (*SD* = 3%; HiAgg). In the barroom setting, ER mean percentages were 3% (*SD* = 6%; NonAgg), 3% (*SD* = 6%; HiAgg). ER mean percentages for the PVT in the cleanroom setting were 4% (*SD* = 5%; NonAgg) and 11% (*SD* = 4%; HiAgg) For the PVT in the barroom setting, ER mean percentages were 10% (*SD* = 8%; HiAgg). It is apparent when looking across task that the presence of alcohol cues did not appear to make a difference in the distribution of error rates or reaction times.

*Implications of Differential Responding Across Word Type.* The significant main effect of Word Type on Error Rate was unexpected. As previously noted, error rate was not found useful for detecting mean differences in word type on a dichotic listening task (Edington, 1996). The lack of mean differences for the DLT was replicated in the current study. But, for the PVT, ER means differed significantly by Word Type. According to the theory driving the current methodology, higher error rates for words that are more aggressive in nature should reflect more attentional interference from (or the pulling of attention toward) those words. The current results for the PVT supported this assumption for ER and RT.

Both ER and RT appeared to measure the ability of aggression words presented parafoveally to pull attention away from a decision making task. Although this finding is important because it suggests that the PVT may be a useful methodology for investigating automatic attention, the predictive value of the overall methodology was central to this thesis. Therefore, regression analyses were necessary to better understand the relationship between participant's self-reported trait aggression or alcohol-aggression expectancies and the attentional interference that could arise from aggression words.

Overall, ER means were higher and latencies to respond (RT means) were longer when participants were exposed to high aggression stimuli presented parafoveally. This finding made it possible to use the magnitude of the difference to reflect each individual's sensitivity to HiAgg words vs. NonAgg words. That is, the difference scores in the current study were regarded as a meaningful index of the magnitude of attentional interference caused by HiAgg words for each participant. To investigate the potential usefulness of such an index, a difference score was calculated by simply subtracting the NonAgg mean from the HiAgg mean for both ER and RT data. This method of calculating a difference score was comparable to that used by Townshend and Duka (2001). To investigate Hypotheses 1 through 3, all of the regression analyses were conducted using ER and RT HiAgg *means* as the criterion variables first and then the analyses were repeated using the ER and RT HiAgg—NonAgg mean *difference scores* as the criterion variables. The results of both approaches are provided.

*Analyses of Alcohol Cue Moderation*

For each hypothesis, Setting (and hence alcohol cues) was tested as a moderator of the specified relationship. In the current study, moderation was considered to be the combined influence of two variables after controlling for the effects of each variable alone. If the interaction of the two variables successfully predicts the criterion variable, moderation could be said to have occurred. If moderation occurs, it is reasonable to disambiguate the combined effects by repeating the analyses at each level (e.g., Barroom vs. Cleanroom) of the moderating variable. This method follows the approach suggested by Pedhazur (1997). Therefore, in the current study, the moderating effect of Setting was explored by entering a trait anger subscale or EQAAL subscale and Setting (coded as 1 for Cleanroom and 2 for Barroom) into the regression equation first, and the product of those two variables second. Significant interaction terms were then parsed apart by entering the relevant subscale in one step with either Barroom or Cleanroom cases selected, and vice versa. Since the main effects for Word Type were not significant for the Dichotic Listening Task (DLT) using RT or ER data, DLT data were not examined.

*Hypothesis 1*

Participants who self-report higher levels of <u>trait anger</u> will demonstrate longer latencies and higher error rates (more attentional interference) when exposed to self-relevant cues of aggression than those who report lower levels of trait anger. This effect will hold whether participants are tested in the presence or absence of alcohol cues.

*HiAgg Word Type, Trait Characteristics, and Alcohol Cue Moderation.*

To evaluate Hypothesis 1, multiple regression analyses using Parafoveal Visual Task (PVT) data were conducted. Each trait anger subscale (representing the predictor variable) from the STAXI was regressed on HiAgg word RT means and ER means (representing the dependent variable). The subscales included the Trait-Anger/Angry Temperament (T-Ang/T) subscale and the Trait-Anger/Angry Reaction (T-Ang/R) subscale.

Neither T-Ang/T nor T-Ang/R with Setting as a moderator predicted responses to HiAgg words presented parafoveally when using either ER data or RT data. Therefore, difference scores were examined.

*Difference Scores, Trait Characteristics, and Alcohol Cue Moderation.*

Using HiAgg—NonAgg ER difference scores, the regression equation including T-Ang/T, Setting, and the interaction term was significant [$R^2 = .22$, adjusted $R^2 = .16$, $\Delta F\ (1, 37) = 4.35$, $p < .05$]. Examination of the bivariate correlations between T-Ang/T and ER difference scores for participants tested in the Barroom revealed that T-Ang/T was *positively* associated with ER difference scores [$r(22) = .50$, $p < .01$; $t(22) = 2.55$, $p < .05$]. That is, angry temperament tended to increase as attentional interference (mean ER differences) increased. The bivariate correlation in the Cleanroom was not significant [$r(19) = -.02$, $p > .05$] indicating that alcohol cues (Setting) moderated the effect of trait angry temperament on the magnitude of the difference for HiAgg vs NonAgg error rates.

Using HiAgg—NonAgg RT difference scores, a different pattern emerged. The regression equation including T-Ang/T, Setting, and the interaction term was again significant [$R^2 = .37$, adjusted $R^2 = .31$, $\Delta F\ (1, 37) = 16.86$, $p < .001$. However, examination of the bivariate correlations between T-Ang/T and RT difference scores for participants tested in the Barroom revealed that T-Ang/T was *negatively* associated with RT difference scores [$r(22) = -68$, $p < .001$, $t(22) = -4.09$, $p < .01$]. That is, angry temperament tended to increase as the magnitude of attentional interference (mean RT differences) decreased. This time, the bivariate correlation in the Cleanroom was also significant [$r(19) = .41$, $p < .05$]. However, the model was not [$R^2 = .17$, adjusted $R^2 = .12$, $F(1, 18) = 3.44$, $p > .05$]. This may be due to the instability of the regression coefficient [Beta = .41, $t(19) = 1.86$, $p > .05$]. For the Trait Anger/Angry Reaction (T-Ang/R) subscale of the STAXI, no main effects or interaction effects were observed.

In order to more fully investigate the relationship between trait angry temperament and reaction time for participants in general (that is, between subjects), PVT participants were blocked into high or low trait angry temperament. This yielded 20 participants with a score of 5 or lower (the Low T-Ang/T group) and 17 participants with a score of 7 or higher (the High T-Ang/T group). Therefore, a 2 (Word Type: NonAgg vs. HiAgg) X 2 (Setting: Barroom vs. Cleanroom) X 2 (Angry Temperament: High vs. Low) repeated measures ANOVA was conducted with RT as the dependent variable. As expected, the main effect for Word Type was significant. However, there was also a significant three-way interaction between Word Type, Setting, and Angry Temperament, $F(1, 34) = 11.86$, $p < .01$ with power observed at .92.

Next, four follow-up paired t-tests were conducted to examine simple effects for Word Type. For participants completing the PVT in the barroom, those who self-reported *lower* trait anger had significantly longer RT means for HiAgg words ($M = 704.52$, $SD = 297.18$) than for NonAgg words [$M = 621.35$, $SD = 248.31$; $t(8) = -3.37$, $p = .01$]. For those higher on T-Ang/T, no differences emerged in the barroom [$t(10) = -1.20$, $p > .05$] for HiAgg words ($M = 616.43$, $SD = 195.18$) versus NonAgg words ($M = 599.93$, $SD = 227.66$). For participants completing the task in the cleanroom, the pattern of results was reversed. That is, for participants who reported *higher* levels of angry temperament, RTs to HiAgg words ($M = 739.90$, $SD = 191.78$) were significantly longer than RTs to NonAgg words [$M = 670.54$, $SD = 186.63$; $t(5) = -5.11$, $p = .004$]. The RT means for HiAgg words ($M = 732.50$, $SD = 215.94$) were not significantly different from NonAgg words ($M = 713.20$, $SD = 216.45$) for participants lower on angry temperament when tested in the cleanroom [$t(10) = -1.48$, $p > .05$)].

It is apparent that the ANOVA results and t-tests replicated the results produced by examining the data using regression and interaction terms. Overall, support for Hypothesis 1 using either method of analysis was mixed. Using ER difference scores, the positive relationship between angry temperament and the magnitude of attentional interference in the Barroom was predicted. The negative association that resulted in the Barroom when using RT difference scores was not predicted.

*Hypothesis 2*

Participants who self-report higher levels of alcohol-aggression expectancies will demonstrate longer latencies and higher error rates when exposed to aggression cues than those who report low levels of alcohol-aggression expectancies. Setting should moderate this effect. That is, the effect should hold only for participants tested in the presence of alcohol cues.

*HiAgg Word Type, Alcohol-Aggression Expectancies, and Alcohol Cue Moderation.* To investigate Hypothesis 2, each alcohol-aggression subscale (representing the predictor variable) from the EQAAL was regressed individually on HiAgg word means (representing the dependent variable). The four subscales of the EQAAL include Unprovoked Anger Expectancies (UnpAng), Angry Reaction (AngReac), Hostile Cognitions (HostCog), and Expectancies for Maintaining Control (ExpCon). It is important to keep in mind that participants reported likely alcohol-aggression expectancies for when they were drinking a *low* dose of alcohol.

Using ER data, none of the regressions for the main effect of an EQAAL subscale or Setting or the interaction term approached significance. Using RT data, the regression equation including AngReac, Setting, and the interaction term approached significance in relation to HiAgg RT means [$R^2 = .19$, adjusted $R^2 = .12$, $\Delta F\ (1, 37) = 4.03$, $p = .05$]. Examination of the bivariate correlations for participants in the Barroom revealed that AngReac was negatively associated with HiAgg RT means [$r(22) = -.51$, $p < .05$, $t(22) = -2.62$, $p < .05$]. Overall, when participants reported that they were less likely to react with anger after consuming a low dose of alcohol, they were more likely to show attentional interference from aggression cues when in the presence of alcohol cues. This effect did not hold in the absence of alcohol cues [$r(19) = -.03$, $p > .05$].

The regression equation including HostCog, Setting, and the interaction term was significantly related to HiAgg RT means [$R^2 = .28$, adjusted $R^2 = .22$, $\Delta F\ (1, 37) = 7.97$, $p < .01$]. Examination of the bivariate correlations for participants in the Barroom revealed that HostCog was negatively associated with HiAgg RT means [$r(22) = -.64$, $p < .01$,

$t(22) = -3.75$, $p < .01$]. When participants reported that they were less likely to be suspicious of others after consuming a low dose of alcohol, they were more likely to show attentional interference from aggression cues when in the presence of alcohol cues. Again, the relationship was not significant in the absence of alcohol cues [$r(19) = .03$, $p > .05$].

Although the regression equation using the interaction term representing Expectancies to Maintain Control (ExpCon) and Setting to predict HiAgg RT means was not significant [$R^2 = .16$, adjusted $R^2 = .09$, $\Delta F$ (1, 37) = 2.33, $p > .05$], the moderate bivariate correlation between HiAgg RT means and ExpCon was significant [$r(41) = -.31$, $p < .05$]. Thus, the effect of Setting was examined. In the Barroom, ExpCon was negatively associated with HiAgg RT means [$R^2 = .22$, adjusted $R^2 = .18$, $\Delta F$ (1, 37) = 5.47, $p < .05$]. In addition, the regression coefficient was significant [$t(22) = -2.34$, $p < .05$]. Since lower scores on this scale reflect decreased expectancy to maintain behavioral control while drinking a low dose of alcohol, the negative association suggested that participants who reported fewer control expectancies were also likely to show greater attentional interference to HiAgg stimuli. Additionally, the lack of an association between these two variables for participants tested in the Cleanroom provides additional evidence for the moderating effects of alcohol cues [$r(19) = -.02$, $p > .05$]. Regression equations using Unprovoked Anger Expectancies and Setting were not significant.

*Difference Scores, Alcohol-Aggression Expectancies, and Alcohol Cue Moderation.* As with trait variables, scores representing the difference between HiAgg—NonAgg RT means and HiAgg—NonAgg ER means were used as the criterion variable with EQAAL subscales as the predictor variables in multiple regression analyses. The potential moderation effect of Setting was investigated as well. For ER difference scores none of the regression equations were significant. When considering RT difference scores, the regression equation including HostCog, Setting, and the interaction term was significantly related to the magnitude of the difference between HiAgg vs. NonAgg RT means [$R^2 = .19$, adjusted $R^2 = .12$, $\Delta F$ (1, 37) = 7.52, $p < .01$]. Examination of the bivariate correlations for participants tested in the Barroom revealed that HostCog was negatively associated with RT difference scores [$r(22) = -.47$, $p = .05$, $t(22) = -2.39$, $p <$

.05]. This relationship suggested that when participants reported that they were less likely to be suspicious of others after consuming a low dose of alcohol, the magnitude of attentional interference was greater when in the presence of alcohol cues. An inverse relationship approached but did not reach significance in the Cleanroom [$r(19) = .31$, $p = .10$] probably due to the unstable regression coefficient [$t(19) = 1.36$, $p > .05$].There were no significant regression equations for the other three EQAAL subscale predictors when using ER or RT difference scores.

Although significant results were obtained in relation to the Angry Reaction and Expectancies for Hostile Cognitions subscales of the EQAAL, the relationships with HiAgg words were negative. Expectancies to Maintain Control were also negatively associated with HiAgg RT means but lower scores on this subscale reflect fewer expectancies to maintain control while drinking alcohol. Thus, in the presence of alcohol cues, greater interference to aggression cues was also associated with higher expectancies for losing control while drinking. Conversely, greater attentional interference to aggression cues (using HiAgg means or RT difference scores) was associated with a lower level of expectancies to react with anger or view others' intentions suspiciously when drinking a low dose of alcohol. Hence, support for this hypothesis was mixed.

*Hypothesis 3*

Higher alcohol-aggression expectancies will predict longer latencies to respond and higher error rates on the computer tasks after the effects of trait anger are partialled out. However, this effect will hold only for participants tested in the presence of alcohol cues.

*Alcohol-Aggression Expectancies After Controlling for Trait Anger.*

In order to investigate whether the EQAAL measure could predict HiAgg means beyond trait anger for participants tested in the Barroom, T-Ang/T was entered on step 1 and then the EQAAL subscale that demonstrated the highest correlation with HiAgg RT means (HostCog) was entered on Step 2. The analysis was then repeated using RT difference scores and then again using ExpCon since this variable had successfully predicted HiAgg RT means in the expected direction. It was decided to use predictor variables sparingly because the ratio of the number of predictors to the sample size was too small and inclusion of all four EQAAL subscale scores was likely to result in an overestimation of $R^2$ in addition to unstable regression coefficients (Pedhazur, 1997).

For participants tested in the Barroom, the regression equation was significant when regressing HostCog onto HiAgg RT means after T-Ang/T [$R^2 = .41$, adjusted $R^2 = .35$, $\Delta F\ (1, 19) = 13.00$, $p < .01$]. The regression coefficient for HostCog was also significant [Beta = -.65, $t(22) = -3.31$, $p < .01$]. When considering HiAgg RT means as the criterion variable it appears that participants showed more attentional interference from high aggression words when they reported fewer expectancies for thinking suspiciously about others' intentions if they had consumed a low dose of alcohol, regardless of their standing on the trait anger construct. This finding held after trait anger was partialled out but only in the presence of alcohol cues. That is, the bivariate correlation between HostCog and HiAgg means was not significant in the Cleanroom [$r(19) = -.03$, $p >$ 05].

When predicting RT difference scores for participants in the Barroom, HostCog was significantly predictive beyond trait anger [$R^2 = .57$, adjusted $R^2 = .53$, $\Delta R^2 = .11$, $\Delta F\ (1, 19) = 5.04$, $p < .05$]. Additionally, regression coefficients were significant for both T-Ang/T [Beta = -.60, $t(22) = -9.92$, $p < .01$] and HostCog [Beta = -.35, $t(22) = -2.25$, $p < .05$]. In the Cleanroom, the bivariate correlation between T-Ang/T and the RT difference score was significant and in a positive direction [$r(19) = .41$, $p < .05$]. However, the bivariate correlation using HostCog was not significant [$r(19) = .31$, $p = .10$]. Additionally, neither regression equation was significant in the Cleanroom, probably due to the instability of the regression coefficients [Beta of T-Ang/T = .36, $t(19) = 1.21$, $p > .05$; Beta of HostCog = .09, $t(19) = .29$, $p > .05$].

When using ER difference scores instead of RT difference scores, regression equations were not significant. Also, when considering ExpCon and HiAgg RT means, ExpCon was not predictive after partialling out the effects of T-Ang/T [$\Delta R^2 = .03$, $\Delta F\ (1, 19) = 1.25$, $p > .05$].

For participants in a barroom environment, a consistent and significant relationship was uncovered between a measure of alcohol-aggression expectancies (HostCog) and attentional interference from aggression stimuli even after controlling for trait anger (see Table 3). Unfortunately, the direction of the associations between alcohol-aggression expectancies and attentional interference were contrary to expectation. Although the finding is intriguing, this hypothesis was not supported.

Table 3

*Regression Model Predicting Attentional Interference (HiAgg—NonAgg Difference Scores) from Aggression Stimuli Presented Parafoveally in the Presence of Alcohol Cues*

| Predictor Variable | *B* | ß | *t* | *p* | $R^2$ | Adj $R^2$ | $\Delta R^2$ | $\Delta F$ |
|---|---|---|---|---|---|---|---|---|
| Step 1 | | | | | | | | |
| STAXI T-Ang/T | -25.60 | -.68 | -4.09 | .001 | .46 | .43 | .46 | 16.75* |
| Step 2 | | | | | | | | |
| STAXI T-Ang/T | -22.85 | -.60 | -3.92 | .001 | | | | |
| EQAAL HostCog | -9.83 | -.35 | -2.25 | .037 | .57 | .53 | .11 | 5.04* |

*Note.* RT = HiAgg = High Aggression Word Type; NonAgg = Non Aggression Word Type; STAXI T-Ang/T = State-Trait Anger Expression Inventory Trait Anger/Angry Temperament subscale; EQAAL = Expectancy Questionnaire for Alcohol and Aggression – Low Dose; HostCog = Expectancies for Hostile Cognitions
*$p < .05$.

*Supplemental Results*

*PANAS scores at Time 1 and Time 2.* For the Dichotic Listening Task (DLT), the overall mean for the Positive Affect scale at Time 1 ($M = 2.90$, $SD = .77$) was significantly higher than the mean at Time 2 [$M = 2.69$, $SD = .84$; $t(36) = 2.76$, $p < .01$]. For the Parafoveal Visual Task (PVT), Positive Affect means were equivalent from Time 1 ($M = 2.85$, $SD = .62$) to Time 2 [$M = 2.75$, $SD = .66$; $t(38) = 1.71$, $p > .05$. For the Negative Affect scale, overall means were not significantly different between Time 1 and

Time 2 for either computer task. DLT means for Negative Affect were 1.28 (*SD* = .30) at Time 1 and 1.21 (*SD* = .32) at Time 2. PVT means for Negative Affect were 1.27 (*SD* = .24) at Time 1 and 1.26 (*SD* = .27) at Time 2. Overall, participants experienced a slight decrease in Positive Affect when completing only the DLT and did not experience a change in Negative Affect when completing either task.

It is possible that feelings related to the construct of *anger* could change when a person is exposed to words of an aggressive nature even if overall negative affect did not change. Two negative affect adjectives were of special interest in the current study—*hostile* and *irritable*—since they are considered to represent the construct of *angry*. When these two adjectives were examined across computer task and time, no differences emerged. Given the overall pattern of results for the PANAS, it was unlikely that, at least subjectively, participants were experiencing a meaningful change in negative affect as a result of their exposure to aggression related words.

*Recognition Task.* Participants were expected to check off a higher percentage of Control Words (words that they were instructed to attend to) than Experimental words (unattended and parafoveal) or New words (words they had never been exposed to). On average, participants checked off 41% of the 14 Control words. On average, they also checked off 20% of the eight Experimental words, and 19% of the New words. Thus, the rate of endorsement for words participants had never seen or heard was equivalent to the rate of endorsement for unattended words.

Regarding the words on the Recognition Task that had been chosen to represent HiAgg (e.g., *shout* and *gun*), comparable distractor words were selected to represent this category (e.g., *hate* and *maim*). Comparison of the average number of HiAgg vs. New (HiAgg equivalent) words checked off revealed no difference ($t < 1$). In fact, a majority of participants checked off none of these words. Additionally, there appeared to be no discernible difference in the overall patterns of checked words for participants completing either task. Although it cannot be unequivocally concluded that conscious awareness of the experimental aggression-related words did not occur for a few participants, overall the pattern suggests that participants were unable to meaningfully discriminate between unattended stimuli and new stimuli. So, results were generally not a product of conscious awareness of unattended stimuli.

Participants were also asked to write down any other words they thought they might have seen or heard that were not listed on the recognition task. It was not surprising that most of the words participants recalled started with the letter "L." Other experimental words listed that participants had been exposed to (in the unattended channel or parafoveally) included *rape*, *kill*, and *shoot*. All of these words were reported by participants in the DLT condition. Other words that participants in the PVT condition reported included *wow*, *quick*, *yellow*, and *window*. It is interesting to note that the masking stimulus for the PVT was represented by the string "WQXQW." It is reasonable to consider that *wow* and *quick* are examples of words that someone might report when a stimulus is only presented for 100 milliseconds outside of his or her foveal region.

# Discussion

*Comparison of the Dichotic Listening Task vs. the Parafoveal Visual Task*

A specific hypothesis was not formulated regarding whether the Parafoveal Visual Task (PVT) methodology or Dichotic Listening Task (DLT) methodology would be most helpful for investigating the confluence of trait characteristics, alcohol-aggression expectancies, and aggression stimuli on attention. However, a comparison of the two methodologies was the overarching purpose of the current investigation. Power estimates, as discussed earlier, provided strong evidence that with an equal number of participants, the PVT (observed power = 1) was a more sensitive and useful task for investigating qualitative differences among Word Type Reaction Time and Error Rate means than the DLT (observed power ranged from .10 to .56).

It is possible that, with more participants, differences would have emerged across Word Type for the DLT. However, this still suggests that the PVT is a ore sensitive procedure. Further, it would be difficult to explain a trend for which the data did not conform to a relatively linear relationship (see Figures 1 and 2). The quantitative difference between NonAgg and HiAgg words on the PVT made it possible to calculate difference scores that may more meaningfully reflect within subject differences to such an elusive "black-box" phenomenon as attentional interference.

*Error Rate vs. Reaction Time*

Error Rate (ER) means showed an equivalent trend to Reaction Time (RT) means for PVT data. Overall, ERs were low indicating that most participants had no trouble completing the primary "L-word" counting task as well as the secondary odd vs. even decision-making task. ER data proved extremely useful for detecting a small group of participants who were either unable to, or, more likely, did not choose to follow directions to "respond as quickly and accurately as possible." Poor compliance with the directions was indicated by ERs no better than chance.

ER means when used as the criterion variable in regression analyses were not as useful as RT means. Given the frequency with which participants made no or relatively few errors, it is reasonable to conclude that ER was not sensitive enough to detect minute changes in attention.

*HiAgg Means Vs. HiAgg—NonAgg Difference Scores*

Although ER means differed significantly across Word Type in the expected direction, individual ER means were not predicted by any of the trait anger or alcohol-expectancy measures. HiAgg RT means were predicted by three of the four alcohol-expectancy measures. Using a difference score that should reflect an individual's level of interference from HiAgg words as opposed to NonAgg words also uncovered significant relationships among predictor and criterion variables. The nature of the relationships were contrary to predictions with the exception of the positive association between T/Ang-T and ER difference scores in the presence of alcohol cues.

Overall, it appears that ER means, RT means, and difference scores all had something important to add in the investigation of differential responding to Word Type for the Visual Task. That is, error rate means pointed out participants who may not have attended to task directions, RT means provided information about how attentional interference varied *across* participants, and difference scores provided information about how attentional interference varied *within* participants.

*Power for the Regression Analyses*

In this study, ER and RT means reflected meaningful differences across Word Type. However, for ER, only the regression equation used to predict ER difference scores (HiAgg mean – NonAgg ER mean) in relation to Trait Anger/Angry Temperament was significant. For HiAgg RT means and RT difference scores, several regression equations were significant. A larger sample may clarify the relative usefulness of using an RT difference score instead of an RT mean as the criterion variable in regression analyses.

Overall, effect sizes for the significant regression equations were medium (~ .30) to large ~.50). Estimates of adjusted $R^2$ ranged from .12 to .38. Although effect sizes were encouraging and moderate to strong bivariate correlations were observed, some regression coefficients were unstable. This is likely due to the small ratio between predictors and sample size. For example, if all of the EQAAL subscales had been used to predict attentional interference above and beyond trait angry temperament, the ratio would have been approximately 1: 4. This is far below the most liberal of recommendations (i.e., 1:15; Pedhazur, 1997).

Overall, the data did not support the prediction hypotheses or the support was mixed. Given the concerns about adequate sample size for the regressions, the following conclusions are speculative.

*Hypothesis 1*

Support for the hypothesis that higher self-reported levels of trait anger would predict higher levels of attentional interference from aggression stimuli was only provided when using ER mean difference scores (mean HiAgg ER—mean NonAgg ER) for participants tested in the presence of alcohol cues. The association between these two variables was positive, as specified in the hypothesis, and the effect did not hold in the absence of alcohol cues.

Since this is the only hypothesis for which ER mean difference scores were successfully predicted, and the result does not fit with the pattern of the rest of the results, it may be that this finding is spurious, especially given the sample size for the regressions and the overall inability of the current methodology to predict error rate differences.

Reaction time difference scores (HiAgg RT mean – NonAgg RT mean), on the other hand, appeared to be more meaningful and useful for uncovering relationships among trait anger, alcohol-aggression expectancies, and attentional interference. However, for Hypothesis 1, the association between trait angry temperament and the magnitude of attentional interference was predicted to be positive and was, in fact, negative. One possible explanation for this finding is that students who generally experience fewer angry feelings may be more attentive to stimuli in their environment that represents a potential threat. Since the negative association between trait angry temperament was found only in the Barroom, it is likely that alcohol cues and aggression cues combined to put lower angry temperament participants on the alert. Conversely, those with relatively higher levels of trait angry temperament were able to ignore aggression stimuli while in the presence of alcohol cues.

It may be, for the current study, that lower trait anger participants in the Barroom (which might be considered low stress environment when alcohol cues interact with aggression cues), experienced a similar attentional bias while participants higher in trait anger were able to ignore aggression stimuli in the Barroom. Literature on the interference of threat words was reviewed in order to shed some light on this unexpected finding. One study (MacLeod & Rutherford, 1992) found an interaction between high vs. low anxious participants under high vs. low stress and naming latencies to threatening Stroop words. The authors used a difference score (color naming latencies to threat words minus color naming latencies to nonthreatening words) to index individual susceptibility to attentional interference (p. 486). Low trait anxious individuals under high stress displayed a lower magnitude of interference from threatening Stroop words than high trait anxious individuals. This effect was reversed when participants were under low stress. That is, low trait anxious individuals under low stress showed greater interference to threat words than high trait anxious individuals under low stress. However, it appears that the findings of MacLeod and Rutherford do not support this alternative explanation.

Another explanation for the lack of findings in the predicted direction involves the conditional compensatory responses (CCR) theory (Siegel, Baptista, Kim, McDonald, & Weise-Kelly, 2000). CCRs are initiated by the central nervous system to counteract the effects of a drug such as alcohol. Further, CCRs have been found to occur in the presence of cues that had earlier been paired with the consumption of a particular drug. Examples of these cues are drug-related paraphernalia and the context (environment) under which the drug is consumed. It is possible that a classically conditioned response to alcohol cues in the barroom prompted a compensatory emotional reaction.

Although the interaction between Word Type X Setting was found to be nonsignificant, and follow-up analyses for Setting at each level of Word Type were not significant, Barroom clearly showed a moderating effect in the regression analyses. Also, the pattern of Reaction Time (RT) means, without exception, indicated that RT means in the barroom for a given word type were always higher than RT means in the cleanroom for the same word type. This does not suggest an overall compensatory effect. If a compensatory effect were occurring, it would most likely occur for participants with heavier drinking experience since CCRs are presumed to represent the effects of drug tolerance. Although drinker status could be calculated from the Comprehensive Drinker Profile data collected during this study, the sample size was too small to investigate such a hypothesis. The tenability of a conditional compensatory response must await further investigation.

*Hypothesis 2*

It was predicted that alcohol-aggression expectancies would predict attentional interference from aggression stimuli but that this effect would be moderated by the presence of alcohol cues. When AngReac, HostCog, and ExpCon, were used as predictors of HiAgg RT means, each regression equation was significant for participants tested in the Barroom. However, the direction of the relationships for the AngReac and HostCog variables were negative, and, thus, did not conform to our predictions. The relationship between ExpCon and HiAgg RT means was also negative, but the scale is scored such that lower scores reflect higher expectancies for losing control while drinking a low dose of alcohol. This finding supported our predictions.

Higher scores on the AngReac scale would suggest higher expectancies to react with anger while drinking a low dose of alcohol in response to a particular event. It is possible that participants with higher AngReac expectancies more easily dismissed the aggression cues since there was nothing obviously threatening about the Barroom environment (i.e., nothing to which to react with anger). The same may be said for HostCog scores. Higher scores on this scale would indicate a higher tendency for an individual to have suspicious thoughts about the intentions of others while drinking a low dose of alcohol. Again, those with higher scores may have more readily dismissed aggression stimuli in a clearly nonhostile situation. That is, the activation of aggression scripts would undoubtedly include information about the types of circumstances under which internal tendencies to feel angry would manifest. Those with lower scores, on the other hand, may have fewer or less strongly interconnected scripts for what would happen in the presence of alcohol cues, and, consequently, their attentional system was more alert to the relatively “novel” aggression stimuli. As with hypothesis 1, it could be illuminating to measure drinking experience with a larger sample to explore the relationship between higher vs. lower drinking experience and attentional interference from aggression stimuli.

Regarding the capacity of Expectancies to Maintain Control (ExpCon) to predict automatic attentional interference, the significant association was in the expected direction. That is, participants who reported that they would be more likely to lose control while drinking a low dose of alcohol were also more likely to show greater interference to aggression stimuli. This result is encouraging in that expectancies to behave aggressively should more clearly relate to actually behaving aggressively than to merely having angry feelings that are not necessarily expressed behaviorally.

In fact, numerous studies are emerging in the literature in which distinctions are being made about the qualitative differences among behavioral, affective, and cognitive elements of aggression. For example, Giancola, Saucier, and Gussler-Burkhardt (2003) found that self-reported affective aggression was not related to behavioral aggression whether or not a low dose of alcohol was consumed. They suggested that the experience of anger is causally unrelated to behavioral manifestations of anger (p. 1951). Although the present study did not provide an opportunity for individuals to exhibit aggression and no alcohol was consumed, it is important to understand the extent to which individuals are biased toward aggression stimuli in the presence of alcohol cues. The tendency of participants with a lower rate of expectancies to maintain control to demonstrate attentional interference suggested a behavioral component that may not be tapped by trait angry temperament alone. Unfortunately, the results in respect to Hypothesis 3 indicated that expectancies to maintain control did not predict attentional interference beyond trait angry temperament. Future research may eventually disambiguate the components of aggression and determine which ones are causally related to attentional interference or behavioral aggression.

*Hypothesis 3*

Overall, the use of T-Ang/T and HostCog provided the greatest explanatory evidence for the relationship between trait anger, alcohol-expectancies, and attentional interference. Not surprisingly, given the prior results, the direction of the relationships did not conform to our predictions and ExpCon did not predict attentional interference beyond trait angry temperament.

The finding, that in the Barroom, T-Ang/T and HostCog contributed uniquely to HiAgg RT means and HiAgg—NonAgg difference scores, and that HostCog contributed beyond T-Ang/T, is indeed intriguing. The results suggested that after holding trait anger constant, lower scores on negative hostile cognitions explained 53% of the variance in the magnitude of attentional interference from aggression stimuli. This supports the continued need to evaluate alcohol-aggression expectancy networks in addition to trait characteristics.

*Alcohol Cues*

Repeated Measures ANOVA failed to reveal a main effect for Setting or an interaction effect for Word Type X Setting. However, it was apparent from the regression analyses that alcohol cues moderated the relationships among the variables. This was as predicted. It is likely that alcohol cues served to activate aggression networks in some fashion. Whether that knowledge structure activation will ultimately be found to represent a suppression of attention toward aggression cues or not remains to be explored. Depending upon the outcome, a next step could be to explore whether actual behavioral aggression increases or decreases. Predicting the salience of internal cues (e.g., knowledge structures that include alcohol-aggression-related information) and external cues (alcohol stimuli and aggression stimuli) is a goal implied by alcohol myopia theory. Although the current methodology did not directly investigate assumptions of the alcohol myopia model, the mixed results of this study support the contention that the salience of cues is a highly complex matter. Studies such as this may eventually help identify and predict relative cue salience.

*Limitations of the Current Study and Future Directions*

The most problematic concern for interpreting the results of this study is that the sample size was not optimal for the regression analyses. It might be possible to increase sample size for both the questionnaire and computer task data by collecting all of the data over one session. Such a procedure would need to avoid a priming effect if nonconscious processes are being investigated.

The possibility was explored that the differences in reaction time between NonAgg and HiAgg words could be due to the increase in reaction times caused by responding to “L” words. Seven “L” words were presented during the DLT and eight “L” words were presented during the Parafoveal Visual Task (PVT). For the DLT, none of the “L” words were presented within the two word types of interest. For the PVT, two of the “L” words were presented within word types of interest.

Within the NonAgg category, *note-lamp* was presented resulting in a mean reaction time (RT) of 698.18 ($SD$ = 321.92). The mean RT for the other 19 NonAgg words was 631.71 ($SD$ = 200.50). The NonAgg “L” word RT mean was not significantly different from the mean RT of the other nineteen NonAgg words, $t(38) = 1.70$, $p = .10$. Leaving the RTs for this word pair in the analyses accounted for an increase in total mean RT by approximately 4 ms.

Within the HiAgg category, *scream-lake* was presented yielding a mean reaction time of 853.49 ($SD$ = 411.82). The mean RT for the other 19 HiAgg words was 689.88 ($SD$ = 216.27). These two RT means were significantly different, $t(40) = 3.32$, $p < .01$. Leaving the RTs for the word pair in the analyses resulted in an increase in total mean RT by about 9 ms. When the data were reanalyzed, the same pattern of results emerged. Therefore, it is highly unlikely that the results of the current study were due to the inclusion of RTs for two “L” words. Although it is unclear why the mean for the HiAgg “L” word was significantly higher than the mean for the other 19 HiAgg words, in similar future studies it would be prudent to delete words such as the “L” word that may contribute to measurement error.

Another concern for the current study is that the sample was over represented by females. It may be that females expect aggressiveness to increase for males who are drinking, but not for themselves. The range restriction caused by endorsing items in a manner consistent with this assumption (as noted in the section regarding the psychometric properties of the STAXI) may have dampened the predictive ability of the measures of interest. Since participants were aware that the questionnaires would include questions about alcohol and aggression, perhaps this sample of college students wanted to present themselves in a more positive light than samples that provide responses outside of an alcohol-aggression context. In the future, adding a measure of social desirability (e.g., the Marlowe-Crowne Desirability Scale; Reynolds, 1982) may shed light on this potential threat to valid responses.

Using the current methodology, an indication of how often a participant may have actually aggressed (with or without the consumption of alcohol) was not available. Future research will need to index the occurrence of behavioral aggression in order to more fully understand obtained differences in attentional interference for aggression stimuli. That is, perhaps an individual that had self-reported higher levels of trait anger *and* had reported prior instances of aggression would be biased toward aggression stimuli. Or perhaps he or she would be more likely to ignore aggression stimuli. Further it may be possible to predict behavioral aggression from attentional interference when the participant is then given the opportunity to aggress. Validating a methodology to investigate these hypotheses was the ultimate goal of this project. In the final estimation, the Parafoveal Visual Task provides such a methodology.

The results of the current study suggested that the relationship between attentional interference and trait anger or alcohol-aggression expectancies is not straightforward, especially when research into these relationships relies upon self-report. One of the hopes of this study was to develop a methodology that may someday augment or even replace self-report. That is, if attentional interference (and therefore automatic attention to external cues) can be indexed and then shown to relate to aggressive behavior, the need for self-report would be obviated. This is a worthy goal of research since people are apt to give reports about feelings, thoughts, and behaviors that include biases in how that information was stored in memory, biases regarding how they want to be viewed, and other biases that may serve any number of unknown or indeterminate goals. It is concluded that the current methodology holds promise for further exploring attentional interference to aggression stimuli beyond what an individual may report.

Another limitation of the current study is that the obtained results may not generalize to other aggression stimuli or beyond this analog drinking environment. Attentional interference is arguably a complex phenomenon that is challenging to study. This study represents a small step toward a methodology that may help us understand the link between attentional interference from (or bias toward) aggression stimuli in the presence of alcohol cues and how that interference relates to trait characteristics and alcohol-aggression expectancies. Understanding these relationships may eventually guide us toward new strategies and interventions for those who drink and become aggressive.

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Footnote

[1] Since significant mean error rate differences were not found in an earlier study (Edington, 1996), the potential effect of unreliable data on mean reaction time was considered to be of primary importance in the current study. Analyses revealed that when reaction time data from participants with chance-level error rates (*N* = 6) was compared with data from those that made relatively few mistakes (*N* = 79), standard errors calculated using Repeated Measures ANOVA were quite different. For low error rate participants completing the Dichotic Listening Task the standard error was estimated at 24.77. For the Parafoveal Visual Task, standard error was 33.55. For high error rate participants completing the Dichotic Listening Task, standard error was 153.58 and, for the Parafoveal Visual Task, standard error was 162.10. Standard errors were roughly five times higher for participants with an error rate at a level no better than chance, further supporting the notion that the reaction time data from these six participants was unreliable.

Appendices

## Appendix A

### Request for Further Participation

Our lab is conducting several other experiments at this time. These include the completion of various computer tasks. Most of these tasks require from 45 minutes to 1 hour and 15 minutes. Individuals may receive **up to 3 experimental points** for participating in any one of these experiments.

**ARE YOU INTERESTED IN BEING CONTACTED FOR PARTICIPATION IN ANY OF THESE STUDIES?**

______ NO

______ **YES** (If **YES**, PLEASE COMPLETE THE FOLLOWING QUESTIONS.)

Do you have any hearing, visual, or motor impairments, or any other impairment, that would prevent you from completing various computer tasks?

_______ NO

_______ YES

_______ DON'T KNOW/UNSURE (Please describe_______________________________.)

Is English your first/native language?

_______ NO

_______ YES

**NAME** (please print) _________________________________________________

**PHONE NUMBER(S)** (where you can be reached): (_____)______________________

(_____)______________________

**E-MAIL ADDRESS**: _________________________________________________

Appendix B

State Trait Anger Expression Inventory (STAXI)

**Part 1 Directions:** A number of statements that people use to describe themselves are given below. Read each statement and then circle the appropriate number to indicate how you feel ***right now***. There are no right or wrong answers. Do not spend too much time on any one statement, but give the answer that seems to best describe your ***present feelings***.

| | | Not At All | Somewhat | Moderately So | Very Much So |
|---|---|---|---|---|---|
| 1. | I am furious | 1 | 2 | 3 | 4 |
| 2. | I feel irritated | 1 | 2 | 3 | 4 |
| 3. | I feel angry | 1 | 2 | 3 | 4 |
| 4. | I feel like yelling at somebody | 1 | 2 | 3 | 4 |
| 5. | I feel like breaking things | 1 | 2 | 3 | 4 |
| 6. | I am mad | 1 | 2 | 3 | 4 |
| 7. | I feel like banging on the table | 1 | 2 | 3 | 4 |
| 8. | I feel like hitting someone | 1 | 2 | 3 | 4 |
| 9. | I am burned up | 1 | 2 | 3 | 4 |
| 10. | I feel like swearing | 1 | 2 | 3 | 4 |

**Part 2 Directions:** A number of statements that people use to describe themselves are given below. Read each statement and then circle the appropriate number on the answer sheet to indicate how you ***generally*** feel. There are no right or wrong answers. Do not spend too much time on any one statement, but give the answer that seems to best describe how you ***generally*** feel.

| | | Almost Never | Sometimes | Often | Almost Always |
|---|---|---|---|---|---|
| 11. | I am quick tempered | 1 | 2 | 3 | 4 |
| 12. | I have a fiery temper | 1 | 2 | 3 | 4 |

| | | Almost Never | Sometimes | Often | Almost Always |
|---|---|---|---|---|---|
| 13. | I am a hotheaded person | 1 | 2 | 3 | 4 |
| 14. | I get angry when I'm slowed down by others/ mistakes. | 1 | 2 | 3 | 4 |
| 15. | I feel annoyed when I am not given recognition for doing good work | 1 | 2 | 3 | 4 |
| 16. | I fly off the handle | 1 | 2 | 3 | 4 |
| 17. | When I get mad, I say nasty things | 1 | 2 | 3 | 4 |
| 18. | It makes me furious when I am criticized in front of others | 1 | 2 | 3 | 4 |
| 19. | When I get frustrated, I feel like hitting someone | 1 | 2 | 3 | 4 |
| 20. | I feel infuriated when I do a good job and get a poor evaluation | 1 | 2 | 3 | 4 |

**Part 3 Directions:** Everyone feels angry or furious from time to time, but people differ in the ways that they react when they are angry. A number of statements are listed below which people use to describe their reactions when they feel *angry* or *furious*. Read each statement and the circle the appropriate number on the answer sheet to indicate how *often* you *generally* react or behave in the manner described when you are feeling angry or furious. There are no right or wrong answers. Do not spend too much time on any one statement.

| ***WHEN ANGRY OR FURIOUS…*** | | Almost Never | Sometimes | Often | Almost Always |
|---|---|---|---|---|---|
| 21. | I control my temper | 1 | 2 | 3 | 4 |
| 22. | I express my anger | 1 | 2 | 3 | 4 |
| 23. | I keep things in | 1 | 2 | 3 | 4 |
| 24. | I am patient with others | 1 | 2 | 3 | 4 |
| 25. | I pout or sulk | 1 | 2 | 3 | 4 |

Appendix B (Continued)

| ***WHEN ANGRY OR FURIOUS…*** | Almost Never | Sometimes | Often | Almost Always |
|---|---|---|---|---|
| 26. I withdraw from people | 1 | 2 | 3 | 4 |
| 27. I make sarcastic remarks to others | 1 | 2 | 3 | 4 |
| 28. I keep my cool | 1 | 2 | 3 | 4 |
| 29. I do things like slam doors | 1 | 2 | 3 | 4 |
| 30. I boil inside, but I don't show it | 1 | 2 | 3 | 4 |
| 31. I control my behavior | 1 | 2 | 3 | 4 |
| 32. I argue with others | 1 | 2 | 3 | 4 |
| 33. I tend to harbor grudges that I don't tell anyone about | 1 | 2 | 3 | 4 |
| 34. I strike out at whatever infuriates me | 1 | 2 | 3 | 4 |
| 35. I can stop myself from losing my temper | 1 | 2 | 3 | 4 |
| 36. I am secretly quite critical of others | 1 | 2 | 3 | 4 |
| 37. I am angrier than I am willing to admit | 1 | 2 | 3 | 4 |
| 38. I calm down faster than most other people | 1 | 2 | 3 | 4 |
| 39. I say nasty things | 1 | 2 | 3 | 4 |
| 40. I try to be tolerant and understanding | 1 | 2 | 3 | 4 |
| 41. I'm irritated a great deal more than people are aware of | 1 | 2 | 3 | 4 |
| 42. I lose my temper | 1 | 2 | 3 | 4 |
| 43. If someone annoys me, I'm apt to tell him or her how I feel | 1 | 2 | 3 | 4 |
| 44. I control my angry feelings | 1 | 2 | 3 | 4 |

Appendix C

Buss Perry Aggression Questionnaire

Instructions: Following are some statements which may or may not describe YOU. Beside each statement, circle the number representing the rating which best describes YOU.

| Extremely Unlike Me | Mostly Unlike Me | Somewhat Like Me | Mostly Like Me | Extremely Like Me |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

| | Extremely Unlike Me | Mostly Unlike Me | Somewhat Like Me | Mostly Like Me | Extremely Like Me |
|---|---|---|---|---|---|
| 1. Once in a while I can't control the urge to strike another person. | 1 | 2 | 3 | 4 | 5 |
| 2. I tell my friends openly when I disagree with them. | 1 | 2 | 3 | 4 | 5 |
| 3. I flare up quickly but get over it quickly. | 1 | 2 | 3 | 4 | 5 |
| 4. I am sometimes eaten up with jealousy. | 1 | 2 | 3 | 4 | 5 |
| 5. At times I feel I have gotten a raw deal out of life. | 1 | 2 | 3 | 4 | 5 |
| 6. I often find myself disagreeing with people. | 1 | 2 | 3 | 4 | 5 |
| 7. When frustrated, I let my irritation show. | 1 | 2 | 3 | 4 | 5 |
| 8. Given enough provocation, I may hit another person. | 1 | 2 | 3 | 4 | 5 |
| 9. Other people always seem to get the breaks. | 1 | 2 | 3 | 4 | 5 |
| 10. I sometimes feel like a powder keg ready to explode. | 1 | 2 | 3 | 4 | 5 |

Appendix C (Continued)

| | | Extremely Unlike Me | Mostly Unlike Me | Somewhat Like Me | Mostly Like Me | Extremely Like Me |
|---|---|---|---|---|---|---|
| 11. | If somebody hits me, I hit back. | 1 | 2 | 3 | 4 | 5 |
| 12. | I wonder why sometimes I feel so bitter about things. | 1 | 2 | 3 | 4 | 5 |
| 13. | I am an even-tempered person. | 1 | 2 | 3 | 4 | 5 |
| 14. | Some of my friends think I'm a hothead. | 1 | 2 | 3 | 4 | 5 |
| 15. | I get into fights a little more than the average person. | 1 | 2 | 3 | 4 | 5 |
| 16. | If I have to resort to violence to protect my rights, I will. | 1 | 2 | 3 | 4 | 5 |
| 17. | When people annoy me, I may tell them what I think of them. | 1 | 2 | 3 | 4 | 5 |
| 18. | I know that "friends" talk about me behind my back. | 1 | 2 | 3 | 4 | 5 |
| 19. | Sometimes I fly off the handle for no good reason. | 1 | 2 | 3 | 4 | 5 |
| 20. | There are people who pushed me so far that we came to blows. | 1 | 2 | 3 | 4 | 5 |
| 21. | I am suspicious of overly friendly strangers. | 1 | 2 | 3 | 4 | 5 |
| 22. | I can't help getting into arguments when people disagree with me. | 1 | 2 | 3 | 4 | 5 |
| 23. | I can think of no good reason for ever hitting a person. | 1 | 2 | 3 | 4 | 5 |

Appendix C (Continued)

| | | Extremely Unlike Me | Mostly Unlike Me | Somewhat Like Me | Mostly Like Me | Extremely Like Me |
|---|---|---|---|---|---|---|
| 24. | I have become so mad that I have broken things. | 1 | 2 | 3 | 4 | 5 |
| 25. | I sometimes feel that people are laughing at me behind my back. | 1 | 2 | 3 | 4 | 5 |
| 26. | My friends say that I'm somewhat argumentative. | 1 | 2 | 3 | 4 | 5 |
| 27. | When people are especially nice, I wonder what they want. | 1 | 2 | 3 | 4 | 5 |
| 28. | I have threatened people I know. | 1 | 2 | 3 | 4 | 5 |
| 29. | I have trouble controlling my temper. | 1 | 2 | 3 | 4 | 5 |

Appendix D

Expectancy Questionnaire for Alcohol and Aggression—Low Dose (EQAAL) version

**Instructions:** Many people believe that drinking alcohol can influence how angry they feel and how aggressive they act. We would like to know how you think having *a few drinks* of alcohol (enough to make you buzzed) affects you. Please circle the number that best describes to what extent you agree or disagree with each statement below. (If you do not drink at all, you can still fill this out. Just answer the questions according to what you think you would feel like if you did drink.)

When I have had a few drinks of alcohol I am more likely to: ______________________

| | Strongly Disagree | Disagree | Slightly Disagree | Slightly Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| 1. get furious. | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. get angry when I am in line to get something and someone cuts in front of me. | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. think that people who act like they're being honest really have something to hide | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. keep my cool. | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. feel angry. | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. get angry if I am trying to concentrate, but someone keeps making noise. | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. get frustrated and feel like hitting someone | 1 | 2 | 3 | 4 | 5 | 6 |
| 8. get angry when I need to get somewhere in a hurry, but I get stuck in traffic. | 1 | 2 | 3 | 4 | 5 | 6 |
| 9. wonder about the hidden reasons if someone does something nice for me. | 1 | 2 | 3 | 4 | 5 | 6 |

Appendix D (Continued)

| | | Strongly Disagree | Disagree | Slightly Disagree | Slightly Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| 10. | control my behavior. | 1 | 2 | 3 | 4 | 5 | 6 |
| 11. | fly off the handle. | 1 | 2 | 3 | 4 | 5 | 6 |
| 12. | get angry when I am singled out for correction, while someone else who is doing the same thing is ignored. | 1 | 2 | 3 | 4 | 5 | 6 |
| 13. | stop myself from losing my temper. | 1 | 2 | 3 | 4 | 5 | 6 |
| 14. | feel like yelling at somebody. | 1 | 2 | 3 | 4 | 5 | 6 |
| 15. | get angry with someone who looks through my things without permission. | 1 | 2 | 3 | 4 | 5 | 6 |
| 16. | feel that other people always seem to get the breaks. | 1 | 2 | 3 | 4 | 5 | 6 |
| 17. | get mad. | 1 | 2 | 3 | 4 | 5 | 6 |
| 18. | get angry when I am accused of something I didn’t do. | 1 | 2 | 3 | 4 | 5 | 6 |
| 19. | try to be tolerant and understanding. | 1 | 2 | 3 | 4 | 5 | 6 |
| 20. | have a fiery temper. | 1 | 2 | 3 | 4 | 5 | 6 |
| 21. | get angry with someone who is always contradicting me. | 1 | 2 | 3 | 4 | 5 | 6 |
| 22. | control my angry feelings. | 1 | 2 | 3 | 4 | 5 | 6 |
| 23. | get burned up. | 1 | 2 | 3 | 4 | 5 | 6 |

Appendix E

Alcohol-Aggression Items from Various Measures

Power and Aggression Subscale

(from the Alcohol Effects Questionnaire (George, Frone, Cooper, Russell, Skinner, & Windle, 1995; Rohsenow, 1983).

**Instructions:** Please respond to the following statements according to your own personal thoughts, feelings and beliefs about alcohol. We are interested in what you think about alcohol, regardless of what other people might think.

| | Agree Strongly | Agree Moderately | Agree Slightly | Disagree Slightly | Disagree Moderately | Disagree Strongly |
|---|---|---|---|---|---|---|
| 1. Drinking makes me feel warm and flushed. | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. I feel powerful when I drink, as if I can really make other people do as I want. | 1 | 2 | 3 | 4 | 5 | 6 |
| 9. If I have had a couple of drinks, it is easier for me to tell someone off. | 1 | 2 | 3 | 4 | 5 | 6 |
| 16. Drinking makes me more aggressive. | 1 | 2 | 3 | 4 | 5 | 6 |
| 32. I'm more likely to get into an argument if I've had some alcohol. | 1 | 2 | 3 | 4 | 5 | 6 |
| 37. After a few drinks it is easier for me to pick a fight. | 1 | 2 | 3 | 4 | 5 | 6 |

Appendix E (Continued)

Risk and Aggression Subscale

(from the Comprehensive Effects of Alcohol scale; Fromme, Stroot, & Kaplan, 1993)

**Instructions:** Please respond to the following statements by circling the number that best completes the following sentence.

| Disagree | Slightly Disagree | Slightly Agree | Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

If I were under the influence from drinking alcohol….

| | Disagree | Slightly Disagree | Slightly Agree | Agree |
|---|---|---|---|---|
| 1. I would take risks. | 1 | 2 | 3 | 4 |
| 2. I would act aggressively. | 1 | 2 | 3 | 4 |
| 3. I would be loud, boisterous, or noisy. | 1 | 2 | 3 | 4 |
| 4. I would act tough. | 1 | 2 | 3 | 4 |
| 5. I would feel dominant. | 1 | 2 | 3 | 4 |

Appendix E (Continued)

Arousal/Aggression Subscale

(from the Alcohol Expectancy Questionnaire; Brown, Goldman, Inn, & Anderson, 1980)

**Instructions:** Read each statement carefully and respond according to your own personal thoughts, feelings 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 circle "Agree" on the answer sheet. If you think the statement is false, or mostly false, then circle "Disagree" on the answer 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.

| | | | |
|---|---|---|---|
| 1. | Agree | Disagree | Drinking makes me feel flushed |
| 2. | Agree | Disagree | After a few drinks, it is easier to pick a fight |
| 3. | Agree | Disagree | I feel powerful when I drink, as if I can really influence others to do as I want |
| 4. | Agree | Disagree | Drinking increases male aggressiveness |
| 5. | Agree | Disagree | At times, drinking is like permission to forget problems |

Appendix E (Continued)

Aggression Subscale

(from the Drinking Expectancy Questionnaire; Young, & Knight, 1988)

Instructions: The following questions ask about the effects that drinking alcohol has on you. There are no right or wrong answers to these items. We would like to know how you feel about them. All that is required is that you circle the appropriate number beside each statement, using the following key:

| Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| 1. I control my temper more easily when drinking alcohol. | 1 | 2 | 3 | 4 | 5 |
| 2. Little things annoy me less when I'm drinking. | 1 | 2 | 3 | 4 | 5 |
| 3. Drinking increases my aggressiveness. | 1 | 2 | 3 | 4 | 5 |

Appendix E (Continued)

Social Subscale

(from the Effects of Drinking Alcohol scale; Leigh & Stacy, 1993)

Instructions: Here are some effects or consequences that some people experience after drinking alcohol. How likely is it that these things happen to *you* when you drink alcohol? Please circle the number that best describes how drinkingalcohol would affect you. (If you do not drink at all, you can still fill this out; just answer it according to what you think would happen to you if you *did* drink.)

When I drink alcohol: ________________________________

| | No Chance | Very Unlikely | Unlikely | Likely | Very Likely | Certain to Happen |
|---|---|---|---|---|---|---|
| 1. I become aggressive. | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. I get into fights. | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. I get mean | 1 | 2 | 3 | 4 | 5 | 6 |

Appendix F

Demographics Questionnaire

Please provide the following background information:

Date of Birth: _____________

Gender: ____ Male

____ Female

Race/Ethnicity: ____ African American

____ Asian American

____ Caucasian

____ Hispanic

____ Latino

____ Native American

____ Other (Please specify:___________________________________)

Household yearly income (home that you were raised in):

| | |
|---|---|
| ____ Less than $10,000 | ____ $40,000 - $79,000 |
| ____ $10,000 – $24,999 | ____ More than $80,000 |
| ____ $25,000 -- $39,999 | ____ I do not know our yearly income. |

## Appendix G

## Positive and Negative Affect Schedule (PANAS)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way *RIGHT NOW, THAT IS, AT THIS VERY MOMENT*. Use the following scale to record your answers:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| very slightly or not at all | a little bit | moderately | quite a bit | extremely |

_____ guilty

_____ scared

_____ hostile

_____ enthusiastic

_____ interested

_____ distressed

_____ excited

_____ upset

_____ strong

_____ nervous

_____ determined

_____ attentive

_____ jittery

_____ active

_____ irritable

_____ alert

_____ ashamed

_____ inspired

_____ proud

_____ afraid

# Appendix H

## PARAFOVEAL VISUAL TASK WORD PAIRS

| Parafoveal (Unattended; On the Computer) | | Type Digits | Auditory (Attended; On the Headphones) | | | | |
|---|---|---|---|---|---|---|---|
| Word (1st of Pair) | Pixel Position (X/Y axis : range in cm) | | Word (2nd of Pair) | Db | Word Begin | Word End | Length of .wav |
| 10 Blank | | | 10 Blank Control (0 "L" words) | | | | |
| | | Odd 27935 | 1. Bird | -1 | 1.01 | 1.80 | 2.002 |
| | | Even 12476 | 2. Cone | -1 | 1.07 | 1.78 | 2.000 |
| | | Odd 71392 | 3. Dream | -1 | 1.02 | 1.83 | 1.999 |
| | | Even 49231 | 4. Math | -1 | 1.05 | 1.65 | 2.000 |
| | | Odd 92758 | 5. Mint | -1 | 1.04 | 1.67 | 2.000 |
| | | Even 25879 | 6. Porch | -1 | 1.09 | 1.67 | 2.000 |
| | | Odd 84167 | 7. Rhyme | -1 | 0.93 | 1.83 | 2.000 |
| | | Even 51683 | 8. Sheep | -1 | 1.05 | 1.74 | 2.002 |
| | | Odd 01589 | 9. Shirt | -1 | 1.03 | 1.70 | 2.002 |
| | | Even 39615 | 10. Well | -1 | 1.09 | 1.70 | 2.000 |
| 10 Practice Words | | | 10 Practice Control (1 "L" word) | | | | |
| 1. Barn | Up (Y87 : 2.6 – 3.4) | Odd 52146 | 1. Calm | -1 | 1.00 | 1.82 | 2.001 |
| 2. Dull | Dn (Y-90 : 2.6 – 3.4) | Even 82651 | 2. Prune | -1 | 1.07 | 1.76 | 2.001 |
| 3. Grace | Lf (X-124 : 6.3 – 2.6) | Odd 32768 | 3. Spice | -1 | 0.84 | 1.82 | 2.000 |
| 4. Grin | Rt (X110 : 2.6 – 5.1) | Even 60492 | 4. Roof | -1 | 1.03 | 1.72 | 2.001 |
| 5. Hall | Up (Y87 : 2.6 – 3.4) | Even 46280 | 5. Lack | -1 | 1.04 | 1.75 | 2.001 |
| 6. Lend | Dn (Y-90 : 2.6 – 3.4) | Odd 74325 | 6. Cough | -1 | 1.10 | 1.77 | 2.000 |
| 7. More | Lf (X-115 : 5.6 – 2.6) | Even 91847 | 7. Pink | -1 | 1.08 | 1.81 | 2.000 |
| 8. Ranch | Rt (X127 : 2.6 – 6.3) | Odd 08573 | 8. Shade | -1 | 0.92 | 1.83 | 2.002 |
| 9. Truth | Up (Y87 : 2.6 – 3.4) | Odd 15904 | 9. View | -1 | 1.08 | 1.78 | 1.999 |
| 10. Yacht | Dn (Y-90 : 2.6 – 3.4) | Even 28469 | 10. Then | -1 | 1.04 | 1.68 | 2.001 |
| 20 NonAgg Words | | | 20 NonAgg Control (1 "L" word) | | | | |
| 1. Air | Lf (X-97 : 4.4 – 2.6) | Odd 62793 | 1. Tent | -1 | 1.12 | 1.64 | 2.002 |
| 2. Bake | Rt (X115 : 2.6 – 5.3) | Even 17428 | 2. Tube | -1 | 1.02 | 1.77 | 2.001 |
| 3. Blank | Up (Y87: 2.6 – 3.4) | Even 90837 | 3. Shine | -1 | 0.99 | 1.80 | 2.000 |
| 4. Chance | Dn (Y-90 : 2.6 – 3.4) | Odd 26180 | 4. Fruit | -1 | 1.03 | 1.65 | 2.001 |
| 5. Chill | Lf (X-113 : 5.5 – 2.6) | Even 83219 | 5. Truck | -1 | 1.07 | 1.74 | 2.002 |
| 6. Crust | Rt (X127 : 2.6 – 6.3) | Odd 50374 | 6. Scarf | -1 | 1.00 | 1.79 | 2.000 |
| 7. Find | Up (Y87 : 2.6 – 3.4) | Odd 38516 | 7. Pump | -1 | 1.04 | 1.62 | 2.001 |
| 8. Five | Dn (Y-90 : 2.6 – 3.4) | Even 47632 | 8. Hip | -1 | 1.07 | 1.65 | 2.001 |
| 9. Flag | Lf (X-108 : 5.3 – 2.6) | Odd 71905 | 9. Mop | -1 | 1.06 | 1.75 | 2.000 |
| 10. Groom | Rt (X132 : 2.6 – 6.2) | Even 08459 | 10. Up | -1 | 1.13 | 1.56 | 2.001 |
| 11. Note | Up (Y87 : 2.6 – 3.4) | Even 81625 | 11. Lamp | -1 | 1.13 | 1.77 | 2.000 |
| 12. Plot | Dn (Y-90 : 2.6 – 3.4) | Odd 24730 | 12. Frog | -1 | 1.17 | 1.71 | 2.000 |
| 13. Rain | Lf (X- 106 : 5 – 2.6) | Even 90238 | 13. Spoon | -1 | 0.98 | 1.86 | 2.001 |
| 14. Scoop | Rt (X128 : 2.6 –6.4) | Odd 17584 | 14. Guide | -1 | 1.03 | 1.76 | 2.000 |
| 15. Scrap | Up (Y87 : 2.6 – 3.4) | Odd 62103 | 15. Teach | -1 | 1.04 | 1.76 | 2.001 |
| 16. Shop | Dn (Y-90 : 2.6 – 3.4) | Even 59472 | 16. Grape | -1 | 1.03 | 1.76 | 2.000 |
| 17. Shrimp | Lf (X-130 : 6.6 – 2.6) | Odd 32941 | 17. Stamp | -1 | 0.99 | 1.83 | 2.000 |
| 18. Space | Rt (X124 : 2.6 – 6.1) | Even 43628 | 18. Desk | -1 | 1.05 | 1.78 | 2.001 |
| 19. Stew | Up (Y87 : 2.6 – 3.4) | Even 71254 | 19. Fresh | -1 | 0.99 | 1.80 | 2.000 |
| 20.Year | Dn (Y-90 : 2.6 – 3.4) | Odd 08396 | 20. Mom | -1 | 1.05 | 1.77 | 2.001 |
| 20 LoAgg Words | | | 20 LoAgg Control (1 "L" word) | | | | |
| 21. Cage | Lf (X-112 : 5.5 – 2.6) | Even 91426 | 21. Reach | -1 | 1.06 | 1.77 | 2.000 |
| 22. Dare | Rt (X116 : 2.6 – 5.5) | Odd 68304 | 22. Cup | -1 | 1.11 | 1.69 | 2.001 |
| 23. Fray | Up (Y87 : 2.6 – 3.4) | Odd 59712 | 23. Blush | -1 | 1.02 | 1.78 | 2.001 |
| 24. Fraud | Dn (Y-90 : 2.6 – 3.4) | Even 27830 | 24. Laugh | -1 | 1.00 | 1.81 | 2.000 |
| 25. Free | Lf (X-111 : 5.4 – 2.6) | Odd 14589 | 25. Plum | -1 | 1.21 | 1.73 | 2.001 |
| 26.Friend | Rt (X129 : 2.6 – 6.5) | Even 73625 | 26. Youth | -1 | 1.06 | 1.80 | 2.001 |
| 27. Ghoul | Up (Y87 : 2.6 – 3.4) | Even 30257 | 27. Scale | -1 | 0.97 | 1.80 | 2.001 |
| 28. Grief | Dn (Y-90 : 2.6 – 3.4) | Odd 47152 | 28. Flunk | -1 | 1.07 | 1.80 | 2.000 |
| 29. Hide | Lf (X-106 : 5 – 2.6) | Even 04863 | 29. Fool | -1 | 1.19 | 1.75 | 2.000 |
| 30. Lie | Rt (X96 : 2.6 - 4) | Odd 83921 | 30. Shrub | -1 | 1.10 | 1.81 | 2.000 |

# Appendix H (Continued)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 31. Like | Up (Y87 : 2.6 – 3.4) | Odd 34785 | 31. Need | -1 | 1.00 | 1.82 | 2.001 |
| 32. Make | Dn (Y-90 : 2.6 – 3.4) | Even 71452 | 32. Crave | -1 | 1.19 | 1.80 | 2.000 |
| 33. March | Lf (X-125 : 6.3 – 2.6) | Odd 23501 | 33. Shed | -1 | 1.00 | 1.80 | 2.001 |
| 34. Mask | Rt (X116 : 2.6 – 5.5) | Even 19238 | 34. Chew | -1 | 1.04 | 1.76 | 2.001 |
| 35. Pat | Up (Y87 : 2.6 – 3.4) | Even 58614 | 35. Few | -1 | 1.09 | 1.80 | 2.000 |
| 36. Take | Dn (Y-90 : 2.6 – 3.4) | Odd 48327 | 36. Age | -1 | 1.13 | 1.68 | 2.000 |
| 37. Tight | Lf (X-117 : 5.8 – 2.6) | Even 60439 | 37. Scroll | -1 | 0.92 | 1.85 | 2.000 |
| 38. Toil | Rt (X108 : 2.6 – 4.9) | Odd 89106 | 38. Beach | -1 | 1.02 | 1.65 | 2.000 |
| 39. Trap | Up (Y87 : 2.6 – 3.4) | Odd 05983 | 39. Cheese | -1 | 1.02 | 1.76 | 2.000 |
| 40. Urge | Dn (Y-90 : 2.6 – 3.4) | Even 92840 | 40. Great | -1 | 1.15 | 1.66 | 2.000 |
| 20 AmbAgg | | | 20 AmbAgg Control (0 "L" words) | | | | |
| 41. Bang | Lf (X-114 : 5.4 – 2.6) | Odd 62793 | 41. Key | -1 | 1.11 | 1.67 | 2.000 |
| 42. Beat | Rt (X114 : 2.6 – 5.1) | Even 17428 | 42. Frost | -1 | 0.93 | 1.86 | 2.000 |
| 43. Bruise | Up (Y87 : 2.6 – 3.4) | Even 90837 | 43. Have | -1 | 1.03 | 1.81 | 2.001 |
| 44. Chop | Dn (Y-90 : 2.6 – 3.4) | Odd 26180 | 44. Film | -1 | 1.04 | 1.70 | 2.000 |
| 45. Curse | Lf (X-125 : 6.2 – 2.6) | Even 83219 | 45. Food | -1 | 1.01 | 1.83 | 1.999 |
| 46. Cut | Rt (X108 : 2.6 – 4.8) | Odd 50374 | 46. Feel | -1 | 1.04 | 1.77 | 2.000 |
| 47. Grab | Up (Y87 : 2.6 – 3.4) | Odd 38516 | 47. Boat | -1 | 1.10 | 1.78 | 2.000 |
| 48. Guard | Dn (Y-90 : 2.6 – 3.4) | Even 47632 | 48. Yawn | -1 | 0.99 | 1.83 | 2.000 |
| 49. Hit | Lf (X-98 : 4.3 – 2.6) | Odd 71905 | 49. Spell | -1 | 1.02 | 1.80 | 2.001 |
| 50. Lash | Rt (X114 : 2.6 – 5.3) | Even 08459 | 50. Scrub | -1 | 1.01 | 1.80 | 2.000 |
| 51. Mad | Up (Y87 : 2.6 – 3.4) | Even 81625 | 51. Hint | -1 | 1.11 | 1.67 | 2.001 |
| 52. Mob | Dn (Y-90 : 2.6 – 3.4) | Odd 24730 | 52. Guess | -1 | 1.05 | 1.66 | 2.001 |
| 53. Punch | Lf (X-126 : 6.3 – 2.6) | Even 90238 | 53. Store | -1 | 1.10 | 1.71 | 2.001 |
| 54. Push | Rt (X116 : 2.6 – 5.5) | Odd 17584 | 54. Room | -1 | 1.11 | 1.79 | 2.003 |
| 55. Rude | Up (Y87 : 2.6 – 3.4) | Odd 62103 | 55. Mist | -1 | 1.06 | 1.67 | 2.000 |
| 56. Stern | Dn (Y-90 : 2.6 – 3.4) | Even 59472 | 56. Brave | -1 | 1.18 | 1.79 | 2.001 |
| 57. Strike | Lf (X-126 : 6.3 – 2.6) | Odd 32941 | 57. Broom | -1 | 1.14 | 1.76 | 2.001 |
| 58. Tank | Rt (X116 : 2.6 – 5.5) | Even 43628 | 58. Share | -1 | 1.09 | 1.81 | 2.000 |
| 59. Tough | Up (Y87 : 2.6 – 3.4) | Even 71254 | 59. Feed | -1 | 1.03 | 1.72 | 2.001 |
| 60. Whip | Dn (Y-90 : 2.6 – 3.4) | Odd 08396 | 60. Rose | -1 | 1.09 | 1.74 | 2.001 |
| 20 HiAgg Words | | | 20 HiAgg Control Words (1 "L" word) | | | | |
| 61. Brawl | Lf (X-127 : 6.3 – 2.6) | Even 91426 | 61. Stream | -1 | 1.00 | 1.80 | 2.001 |
| 62. Feud | Rt (X114 : 2.6 – 5.4) | Odd 68304 | 62. Stock | -1 | 1.00 | 1.80 | 2.000 |
| 63. Fight | Up (Y87 : 2.6 – 3.4) | Odd 59712 | 63. Tape | -1 | 1.10 | 1.63 | 2.001 |
| 64. Fist | Dn (Y-90 : 2.6 – 3.4) | Even 27830 | 64. Care | -1 | 1.22 | 1.67 | 2.001 |
| 65. Force | Lf (X-124 : 6.2 – 2.6) | Odd 14589 | 65. Chair | -1 | 1.13 | 1.72 | 2.001 |
| 66. Gun | Rt (X110 : 2.6 – 4.9) | Even 73625 | 66. Mud | -1 | 1.15 | 1.75 | 2.000 |
| 67. Harm | Up (Y87 : 2.6 – 3.4) | Even 30257 | 67. Moon | -1 | 1.07 | 1.65 | 2.000 |
| 68. Hurt | Dn (Y-90 : 2.6 – 3.4) | Odd 47152 | 68. Shell | -1 | 1.08 | 1.78 | 2.001 |
| 69. Kill | Lf (X-104 : 4.7 – 2.6) | Even 83921 | 69. Shape | -1 | 0.97 | 1.86 | 2.001 |
| 70. Rage | Rt (X116 : 2.6 – 5.5) | Odd 04863 | 70. Pouch | -1 | 1.22 | 1.75 | 2.001 |
| 71. Rape | Up (Y87 : 2.6 – 3.4) | Odd 34785 | 71. Wheat | -1 | 1.18 | 1.68 | 2.001 |
| 72. Scold | Dn (Y-90 : 2.6 – 3.4) | Even 71452 | 72. Race | -1 | 1.11 | 1.74 | 2.000 |
| 73. Scream | Lf (X-136 : 7 – 2.6) | Odd 23501 | 73. Lake | -1 | 1.14 | 1.75 | 2.000 |
| 74. Shoot | Rt (X128 : 2.6 – 6.3) | Even 19238 | 74. Book | -1 | 1.05 | 1.75 | 2.001 |
| 75. Shot | Up (Y87 : 2.6 – 3.4) | Even 58614 | 75. Touch | -1 | 1.17 | 1.66 | 2.001 |
| 76. Shout | Dn (Y-90 : 2.6 – 3.4) | Odd 48327 | 76. Cute | -1 | 1.21 | 1.71 | 2.001 |
| 77.Shove | Lf (X-124 : 6.2 – 2.6) | Even 60439 | 77. Green | -1 | 1.16 | 1.77 | 2.000 |
| 78. Spank | Rt (X125 : 2.6 – 6.1) | Odd 89106 | 78. Horse | -1 | 1.12 | 1.80 | 2.000 |
| 79. Stab | Up (Y87 : 2.6 – 3.4) | Odd 05983 | 79. Park | -1 | 1.14 | 1.72 | 2.000 |
| 80. Yell | Dn (Y-90 : 2.6 – 3.4) | Even 92840 | 80. Gum | -1 | 1.22 | 1.70 | 2.001 |
| 10 Random Blanks | | | 10 Control Words (1 "L" word) | | | | |
| | | Odd 27935 | 1. Cake | -1 | 1.21 | 1.69 | 2.000 |
| | | Even 12476 | 2. Dusk | -1 | 1.12 | 1.72 | 2.001 |
| | | Odd 71392 | 3. List | -1 | 1.11 | 1.80 | 2.001 |
| | | Even 49231 | 4. Play | -1 | 1.13 | 1.80 | 2.001 |
| | | Odd 92758 | 5. Short | -1 | 1.10 | 1.74 | 2.000 |
| | | Even 25879 | 6. Show | -1 | 1.14 | 1.81 | 2.001 |
| | | Odd 84167 | 7. Spin | -1 | 0.95 | 1.84 | 2.001 |
| | | Even 51683 | 8. Train | -1 | 1.14 | 1.85 | 2.000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Odd 01589 | 9. Turn | -2 | 1.19 | 1.78 | 2.000 |
| | | Even 39615 | 10. Your | -1 | 1.07 | 1.83 | 2.000 |
| 10 Final Practice Words | | | 10 Final Practice Control Words (3 "L" words) | | | | |
| 1. Card | Lf (X-115 : 5.5 – 2.6) | Odd 52146 | 1. Heart | -1 | 1.18 | 1.79 | 2.001 |
| 2. Dig | Rt (X100 : 2.6 – 4.3) | Even 82651 | 2. Lean | -1 | 1.16 | 1.77 | 2.000 |
| 3. Dough | Up (Y87 : 2.6 – 3.4) | Odd 32768 | 3. Gloss | -1 | 1.14 | 1.82 | 2.000 |
| 4. Droop | Dn (Y-90 : 2.6 – 3.4) | Even 60492 | 4. Last | -1 | 1.08 | 1.81 | 2.001 |
| 5. Kind | Lf (X-108 : 4 – 2.6) | Even 46280 | 5. Lunch | -1 | 1.13 | 1.82 | 1.999 |
| 6. News | Rt (X119 : 2.6 – 5.7) | Odd 74325 | 6. Mile | -1 | 1.13 | 1.73 | 2.001 |
| 7. North | Up (Y87 : 2.6 – 3.4) | Even 91847 | 7. Wait | -1 | 1.12 | 1.85 | 2.001 |
| 8. Please | Dn (Y-90 : 2.6 – 3.4) | Odd 08573 | 8. Street | -1 | 1.15 | 1.84 | 2.000 |
| 9. Proud | Lf (X-127 : 6.3 – 2.6) | Odd 15904 | 9. Vast | -1 | 1.04 | 1.82 | 2.001 |
| 10. Taste | Rt (X124 : 2.6 – 5.9) | Even 28469 | 10. Shoe | -1 | 1.15 | 1.82 | 2.000 |
| Total Parafoveal Words = 100 | | | Total Auditory Words = 120; Total "L" words = 8 | | | | |

## DICHOTIC LISTENING TASK WORD PAIRS

| Unattended Channel of Headphones | | | | Attended Channel of Headphones | | | | Length of .wav | Type Digits |
|---|---|---|---|---|---|---|---|---|---|
| Word (1st of Pair) | Db | Word Begin | Word End | Word (2nd of Pair) | Db | Word Begin | Word End | | |
| 10 Blank | | | | 10 Blank Control (1 "L" words) | | | | | |
| | | | | 1. Cough | -1 | 1.18 | 1.69 | 2.000 | Odd 27935 |
| | | | | 2. Less | -1 | 1.20 | 1.75 | 2.000 | Even 12476 |
| | | | | 3. Good | -1 | 1.10 | 1.70 | 2.001 | Odd 71392 |
| | | | | 4. Math | -1 | 1.18 | 1.77 | 2.002 | Even 49231 |
| | | | | 5. News | -1 | 1.06 | 1.78 | 2.001 | Odd 92758 |
| | | | | 6. Please | -1 | 1.06 | 1.77 | 1.999 | Even 25879 |
| | | | | 7. Rhyme | -1 | 1.06 | 1.75 | 2.002 | Odd 84167 |
| | | | | 8. Soft | -1 | 1.11 | 1.80 | 2.002 | Even 51683 |
| | | | | 9. Stray | -1 | 1.08 | 1.80 | 2.000 | Odd 01589 |
| | | | | 10. Taste | -1 | 1.19 | 1.72 | 2.002 | Even 39615 |
| 10 Practice | | | | 10 Practice Control (1 "L" words) | | | | | |
| 1. Barn | -19 | 1.03 | 1.84 | 1. Bird | -1 | 1.03 | 1.71 | 2.000 | Odd 52146 |
| 2. Kind | -19 | 1.06 | 1.88 | 2. Calm | -1 | 1.06 | 1.84 | 2.000 | Even 82651 |
| 3. Dull | -19 | 1.19 | 1.78 | 3. Dig | -1 | 1.20 | 1.78 | 2.000 | Odd 32768 |
| 4. Grin | -19 | 1.14 | 1.66 | 4. Grace | -1 | 1.14 | 1.74 | 2.000 | Even 60492 |
| 5. Heart | -19 | 1.12 | 1.77 | 5. Hall | -1 | 1.14 | 1.84 | 1.999 | Even 46280 |
| 6. Last | -19 | 1.10 | 1.84 | 6. Lunch | -1 | 1.10 | 1.73 | 2.000 | Odd 74325 |
| 7. Spin | -19 | 1.00 | 1.88 | 7. Spice | -1 | 1.04 | 1.89 | 2.001 | Even 91847 |
| 8. Shade | -19 | 1.05 | 1.87 | 8. Short | -1 | 1.07 | 1.74 | 2.000 | Odd 08573 |
| 9. Train | -19 | 1.08 | 1.83 | 9. Truth | -1 | 1.08 | 1.71 | 2.001 | Odd 15904 |
| 10. View | -19 | 1.06 | 1.80 | 10. Vast | -1 | 1.03 | 1.81 | 2.001 | Even 28469 |
| 20 NonAgg Words | | | | 20 NonAgg Control (0 "L" words) | | | | | |
| 1. Air | -19 | 1.12 | 1.77 | 1. Age | -1 | 1.12 | 1.79 | 2.000 | Odd 62793 |
| 2. Bake | -19 | 1.16 | 1.66 | 2. Beach | -1 | 1.16 | 1.73 | 1.999 | Even 17428 |
| 3. Blank | -19 | 1.20 | 1.78 | 3. Blush | -1 | 1.20 | 1.79 | 2.001 | Even 90837 |
| 4. Chance | -19 | 1.16 | 1.80 | 4. Chew | -1 | 1.19 | 1.73 | 2.000 | Odd 26180 |
| 5. Chill | -19 | 1.04 | 1.77 | 5. Cheese | -1 | 1.04 | 1.81 | 2.001 | Even 83219 |
| 6. Crust | -19 | 1.13 | 1.76 | 6. Crave | -1 | 1.13 | 1.80 | 2.002 | Odd 50374 |
| 7. Find | -19 | 1.00 | 1.85 | 7. Few | -1 | 1.00 | 1.63 | 2.000 | Odd 38516 |
| 8. Five | -19 | 1.03 | 1.83 | 8. Fool | -1 | 1.03 | 1.70 | 2.001 | Even 47632 |
| 9. Flag | -19 | 1.00 | 1.87 | 9. Flunk | -1 | 1.00 | 1.87 | 1.999 | Odd 71905 |
| 10. Groom | -19 | 1.11 | 1.66 | 10. Great | -1 | 1.12 | 1.82 | 2.000 | Even 08459 |
| 11. Note | -19 | 1.15 | 1.76 | 11. Need | -1 | 1.15 | 1.84 | 2.000 | Even 81625 |
| 12. Plot | -19 | 1.19 | 1.76 | 12. Plum | -1 | 1.19 | 1.77 | 2.001 | Odd 24730 |
| 13. Rain | -19 | 1.16 | 1.83 | 13. Reach | -1 | 1.19 | 1.80 | 2.001 | Even 90238 |
| 14. Scoop | -19 | 1.03 | 1.71 | 14. Scale | -1 | 1.03 | 1.85 | 2.001 | Odd 17584 |
| 15. Scrap | -19 | 1.03 | 1.80 | 15. Scroll | -1 | 1.03 | 1.80 | 2.000 | Odd 62103 |
| 16. Shop | -19 | 1.10 | 1.85 | 16. Shed | -1 | 1.13 | 1.80 | 1.999 | Even 59472 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 17. Shrimp | -19 | 1.05 | 1.85 | 17. Shrub | -1 | 1.07 | 1.85 | 2.000 | Odd 32941 |
| 18. Space | -19 | 1.01 | 1.85 | 18. Spoon | -1 | 1.01 | 1.76 | 2.000 | Even 43628 |
| 19. Stew | -19 | 1.19 | 1.82 | 19. Stamp | -1 | 1.18 | 1.79 | 2.001 | Even 71254 |
| 20. Year | -19 | 1.12 | 1.81 | 20. Youth | -1 | 1.18 | 1.73 | 2.002 | Odd 08396 |
| 20 LoAgg Words | | | | 20 LoAgg Control (2 "L" words) | | | | | |
| 21. Cage | -19 | 1.08 | 1.84 | 21. Cup | -1 | 1.14 | 1.53 | 2.000 | Even 91426 |
| 22. Dare | -19 | 1.14 | 1.85 | 22. Desk | -1 | 1.14 | 1.81 | 2.000 | Odd 68304 |
| 23. Fraud | -19 | 1.02 | 1.88 | 23. Fresh | -1 | 1.05 | 1.83 | 2.000 | Odd 59712 |
| 24. Fray | -19 | 1.10 | 1.81 | 24. Frost | -1 | 1.10 | 1.88 | 2.000 | Even 27830 |
| 25. Free | -19 | 0.99 | 1.78 | 25. Frog | -1 | 1.02 | 1.88 | 1.999 | Odd 14589 |
| 26. Friend | -19 | 1.05 | 1.85 | 26. Fruit | -1 | 1.08 | 1.68 | 2.002 | Even 73625 |
| 27. Ghoul | -19 | 1.00 | 1.89 | 27. Guide | -1 | 1.00 | 1.89 | 2.000 | Even 30257 |
| 28. Grief | -19 | 1.26 | 1.75 | 28. Grape | -1 | 1.27 | 1.71 | 1.999 | Odd 47152 |
| 29. Hide | -19 | 0.97 | 1.89 | 29. Hip | -1 | 1.09 | 1.64 | 1.999 | Even 04863 |
| 30. Lie | -19 | 1.16 | 1.80 | 30. Laugh | -1 | 1.16 | 1.80 | 2.002 | Odd 83921 |
| 31. Like | -19 | 1.10 | 1.77 | 31. Lamp | -1 | 1.12 | 1.79 | 1.998 | Odd 34785 |
| 32. Make | -19 | 1.16 | 1.73 | 32. Mist | -1 | 1.17 | 1.75 | 1.999 | Even 71452 |
| 33. March | -19 | 1.10 | 1.78 | 33. Mop | -1 | 1.10 | 1.79 | 2.002 | Odd 23501 |
| 34. Mask | -19 | 1.16 | 1.78 | 34. Mom | -1 | 1.08 | 1.69 | 1.999 | Even 19238 |
| 35. Pat | -19 | 1.17 | 1.73 | 35. Pump | -1 | 1.20 | 1.73 | 2.001 | Even 58614 |
| 36. Take | -19 | 1.20 | 1.65 | 36. Tent | -1 | 1.20 | 1.68 | 1.999 | Odd 48327 |
| 37. Tight | -19 | 1.20 | 1.67 | 37. Teach | -1 | 1.20 | 1.72 | 2.002 | Even 60439 |
| 38. Toil | -19 | 1.20 | 1.74 | 38. Tube | -1 | 1.20 | 1.79 | 2.000 | Odd 89106 |
| 39. Trap | -19 | 1.22 | 1.79 | 39. Truck | -1 | 1.22 | 1.71 | 2.000 | Odd 05983 |
| 40. Urge | -19 | 1.19 | 1.78 | 40. Up | -1 | 1.20 | 1.61 | 1.999 | Even 92840 |
| 20 AmbAgg Words | | | | 20 AmbAgg Control (1 "L" word) | | | | | |
| 41. Bang | -19 | 1.10 | 1.85 | 41. Boat | -1 | 1.10 | 1.68 | 2.002 | Odd 62793 |
| 42. Beat | -19 | 1.16 | 1.76 | 42. Book | -1 | 1.17 | 1.72 | 2.002 | Even 17428 |
| 43. Bruise | -19 | 1.16 | 1.77 | 43. Brave | -1 | 1.15 | 1.80 | 2.000 | Even 90837 |
| 44. Chop | -19 | 1.10 | 1.79 | 44. Chair | -1 | 1.13 | 1.80 | 2.001 | Odd 26180 |
| 45. Curse | -19 | 1.20 | 1.79 | 45. Cute | -1 | 1.20 | 1.68 | 2.000 | Even 83219 |
| 46. Cut | -19 | 1.19 | 1.64 | 46. Care | -1 | 1.19 | 1.75 | 2.001 | Odd 50374 |
| 47. Grab | -19 | 1.12 | 1.80 | 47. Green | -1 | 1.15 | 1.78 | 2.002 | Odd 38516 |
| 48. Guard | -19 | 1.19 | 1.86 | 48. Gum | -1 | 1.19 | 1.74 | 2.002 | Even 47632 |
| 49. Hit | -19 | 1.20 | 1.69 | 49. Horse | -1 | 1.20 | 1.78 | 1.999 | Odd 71905 |
| 50. Lash | -19 | 1.07 | 1.85 | 50. Lake | -1 | 1.13 | 1.61 | 2.000 | Even 08459 |
| 51. Mad | -19 | 1.01 | 1.87 | 51. Moon | -1 | 1.00 | 1.81 | 2.001 | Even 81625 |
| 52. Mob | -19 | 1.08 | 1.81 | 52. Mud | -1 | 1.10 | 1.70 | 2.001 | Odd 24730 |
| 53. Punch | -19 | 1.13 | 1.81 | 53. Park | -1 | 1.13 | 1.70 | 2.000 | Even 90238 |
| 54. Push | -19 | 1.11 | 1.64 | 54. Pouch | -1 | 1.10 | 1.81 | 2.001 | Odd 17584 |
| 55. Rude | -19 | 1.12 | 1.78 | 55. Race | -1 | 1.12 | 1.80 | 2.000 | Odd 62103 |
| 56. Stern | -19 | 1.01 | 1.88 | 56. Stock | -1 | 1.05 | 1.72 | 2.000 | Even 59472 |
| 57. Strike | -19 | 1.12 | 1.79 | 57. Stream | -1 | 1.15 | 1.83 | 2.002 | Odd 32941 |
| 58. Tank | -19 | 1.20 | 1.74 | 58. Touch | -1 | 1.21 | 1.71 | 2.000 | Even 43628 |
| 59. Tough | -19 | 1.23 | 1.73 | 59. Tape | -1 | 1.23 | 1.70 | 2.000 | Even 71254 |
| 60. Whip | -19 | 1.28 | 1.68 | 60. Wheat | -1 | 1.29 | 1.72 | 1.999 | Odd 08396 |
| 20 HiAgg Words | | | | 20 HiAgg Control (0 "L" words) | | | | | |
| 61. Brawl | -19 | 1.20 | 1.80 | 61. Broom | -1 | 1.20 | 1.77 | 1.999 | Even 91426 |
| 62. Feud | -19 | 1.07 | 1.79 | 62. Film | -1 | 1.08 | 1.80 | 1.999 | Odd 68304 |
| 63. Fight | -19 | 1.15 | 1.70 | 63. Feed | -1 | 1.13 | 1.80 | 2.000 | Odd 59712 |
| 64. Fist | -19 | 1.20 | 1.79 | 64. Feel | -1 | 1.20 | 1.76 | 2.000 | Even 27830 |
| 65. Force | -19 | 1.08 | 1.70 | 65. Food | -1 | 1.08 | 1.84 | 1.999 | Odd 14589 |
| 66. Gun | -19 | 1.11 | 1.81 | 66. Guess | -1 | 1.12 | 1.75 | 2.000 | Even 73625 |
| 67. Harm | -19 | 1.02 | 1.88 | 67. Hint | -1 | 1.02 | 1.64 | 2.001 | Even 30257 |
| 68. Hurt | -19 | 1.18 | 1.74 | 68. Have | -1 | 1.18 | 1.80 | 2.001 | Odd 47152 |
| 69. Kill | -19 | 1.11 | 1.77 | 69. Key | -1 | 1.11 | 1.84 | 2.002 | Even 04863 |
| 70. Rage | -19 | 1.12 | 1.79 | 70. Room | -1 | 1.12 | 1.68 | 2.001 | Odd 83921 |
| 71. Rape | -19 | 1.12 | 1.63 | 71. Rose | -1 | 1.11 | 1.81 | 2.002 | Odd 34785 |
| 72. Scold | -19 | 1.00 | 1.81 | 72. Scarf | -1 | 1.00 | 1.74 | 1.999 | Even 71452 |
| 73. Scream | -19 | 1.03 | 1.80 | 73. Scrub | -1 | 1.03 | 1.83 | 2.000 | Odd 23501 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 74. Shoot | -19 | 1.06 | 1.60 | 74. Shine | -1 | 1.06 | 1.80 | 2.002 | Even 19238 |
| 75. Shot | -19 | 1.11 | 1.74 | 75. Share | -1 | 1.10 | 1.81 | 1.999 | Even 58614 |
| 76. Shout | -19 | 1.00 | 1.75 | 76. Shell | -1 | 1.01 | 1.81 | 2.001 | Odd 48327 |
| 77. Shove | -19 | 1.10 | 1.78 | 77. Shape | -1 | 1.05 | 1.80 | 2.000 | Even 60439 |
| 78. Spank | -19 | 1.05 | 1.85 | 78. Spell | -1 | 1.06 | 1.81 | 2.000 | Odd 89106 |
| 79. Stab | -19 | 1.01 | 1.88 | 79. Store | -1 | 1.02 | 1.79 | 2.000 | Odd 05983 |
| 80. Yell | -19 | 1.13 | 1.79 | 80. Yawn | -1 | 1.12 | 1.80 | 1.999 | Even 92840 |
| 10 Blank | | | | 10 Blank Control (0 “L” words) | | | | | |
| | | | | 1. Cake | -1 | 1.20 | 1.70 | 1.999 | Odd 27935 |
| | | | | 2. Dusk | -1 | 1.12 | 1.72 | 2.001 | Even 12476 |
| | | | | 3. Mint | -1 | 1.17 | 1.74 | 2.001 | Odd 71392 |
| | | | | 4. Play | -1 | 1.19 | 1.77 | 2.000 | Even 49231 |
| | | | | 5. Porch | -1 | 1.11 | 1.80 | 2.000 | Odd 92758 |
| | | | | 6. Read | -1 | 1.14 | 1.76 | 1.999 | Even 25879 |
| | | | | 7. Slurp | -1 | 1.15 | 1.81 | 2.001 | Odd 84167 |
| | | | | 8. Snore | -1 | 1.05 | 1.79 | 2.000 | Even 51683 |
| | | | | 9. Street | -1 | 1.13 | 1.78 | 2.003 | Odd 01589 |
| | | | | 10. Thumb | -2 | 1.18 | 1.77 | 2.000 | Even 39615 |
| 10 Practice Words | | | | 10 Practice Control (2 “L” words) | | | | | |
| 1. Card | -19 | 1.10 | 1.85 | 1. Cone | -1 | 1.10 | 1.70 | 2.000 | Odd 52146 |
| 2. Dream | -19 | 1.22 | 1.78 | 2. Droop | -1 | 1.22 | 1.70 | 1.999 | Even 82651 |
| 3. Lack | -19 | 1.16 | 1.71 | 3. Lean | -1 | 1.16 | 1.76 | 2.001 | Odd 32768 |
| 4. Lend | -19 | 1.20 | 1.77 | 4. List | -1 | 1.20 | 1.77 | 2.001 | Even 60492 |
| 5. More | -19 | 1.19 | 1.75 | 5. Mile | -1 | 1.19 | 1.75 | 2.000 | Even 46280 |
| 6. Proud | -19 | 1.17 | 1.80 | 6. Prune | -1 | 1.18 | 1.80 | 2.002 | Odd 74325 |
| 7. Shoe | -19 | 1.06 | 1.80 | 7. Shirt | -1 | 1.06 | 1.78 | 2.000 | Even 91847 |
| 8. Show | -19 | 1.15 | 1.76 | 8. Sheep | -1 | 1.15 | 1.75 | 2.001 | Odd 08573 |
| 9. Wait | -19 | 1.20 | 1.78 | 9. Well | -1 | 1.20 | 1.77 | 2.001 | Odd 15904 |
| 10. Yacht | -19 | 1.18 | 1.80 | 10. Your | -1 | 1.19 | 1.81 | 1.999 | Even 28469 |
| Total Unattended Words = 100 | | | | Total Attended Words = 120; Total “L” Words = 7 | | | | | |

*Note.* NonAgg = NonAggressive Words; LoAgg = Low Aggressive Words; AmbAgg = Ambiguously Aggressive Words; HiAgg = High Aggressive Words. Words obtained from Nelson, McEvoy, & Schreiber’s (1999) normed database of words and their associated links.

Appendix I

Recognition Task

**Instructions:** Some of the following words were presented to you on the computer task that you just completed. Please check off any words that you think you heard.

| | | | | | |
|---|---|---|---|---|---|
| _____ | mop | [LoA Control] | _____ | shine | [HiA Control] |
| _____ | shop | [NonA] | _____ | bench | [New] |
| _____ | film | [AmbA Control] | _____ | grab | [AmbA] |
| _____ | arm | [New] | _____ | bend | [New] |
| _____ | beach | [NonA Control] | _____ | cute | [AmbA Control] |
| _____ | shout | [HiA] | _____ | hate | [New] |
| _____ | play | [BL Control] | _____ | kind | [New] |
| _____ | pump | [NonA Control] | _____ | shave | [New] |
| _____ | touch | [AmbA Control] | _____ | up | [LoA Control] |
| _____ | give | [New] | _____ | trick | [New] |
| _____ | patch | [New] | _____ | harsh | [New] |
| _____ | crave | [NonA Control] | _____ | broom | [HiA Control] |
| _____ | march | [LoA] | _____ | last | [New] |
| _____ | fun | [New] | _____ | gun | [HiA] |
| _____ | take | [LoA] | _____ | screen | [New] |
| _____ | find | [NonA] | _____ | rude | [AmbA] |
| _____ | ram | [New] | _____ | please | [New] |
| _____ | mean | [New] | _____ | laugh | [LoA Control] |
| _____ | hard | HiA Control] | _____ | maim | [New] |
| _____ | feast | [New] | _____ | gum | [AmbA Control] |

Also, please list any words you think you heard that are not on the above list.

__________ __________ __________ __________ __________

__________ __________ __________ __________ __________

What do you think the purpose of this experiment was?

________________________________________________________________________

________________________________________________________________________

Did this experiment remind you of any other experiments that you have participated in?

______ No, it did not remind me of any other experiments.

______ Yes, and the experiment was about ____________________________________

and it reminded me because ________________________________________

Appendix J

Calculation of Standard Ethanol Consumption (SEC) units using part of the Comprehensive Drinker Profile (Marlatt & Miller, 1986)

**Steady Pattern Chart**

If the client drinks at least once per week complete the Steady Pattern Chart, then complete Q/F data summary. (If client does not drink at least once per week, proceed to the Episodic Pattern Chart.) For each time period enter the type of beverage, % alcohol, amount consumed, and approximate time span during which it was consumed.

| | Morning | Afternoon | Evening | Total for Day |
|---|---|---|---|---|
| Mon | | | | ______ Total SECs Monday |
| Tues | | | | ______ Total SECs Tuesday |
| Wed | | | | ______ Total SECs Wednesday |
| Thur | | | | ______ Total SECs Thursday |
| Fri | | | | ______ Total SECs Friday |

| | | | | |
|---|---|---|---|---|
| Sat | | | | ________<br>Total SECs<br>Saturday |
| Sun | | | | ________<br>Total SECs<br>Sunday |

Formula for calculating SECs: # oz. X % alcohol x 2 = SECs

A. TOTAL SECs per week ____________

B. TOTAL drinking (nonabstinent days) reported: ____________

C. AVERAGE SECs per drinking day (A/B): ____________

D. ESTIMATED Peak BAC for week: ____________

**Quantity/Frequency Summary Data** (Steady Drinking Pattern *Only*)

Total SECs per week from table: [ ] SECs per week

Multiply by 13 weeks X 13

------------

Total SEC's in past 3 months: = [ ] SECs (From Steady Pattern Chart *Only*)

Appendix J (Continued)

**Episodic Pattern Chart** (Periodic and Combination Patterns Only; For Steady Drinkers, skip to Pattern History.)

| Type and Amount of Beverage Consumed: | Number of Episodes in past 3 months: | Multiply Quantity (SECs per episode) by Frequency (episodes per 3 months) for each episode type: |
|---|---|---|
| *Total SECs per episode: ___________<br>*Hours: ______<br>*Peak BAC: ______ mg % | X ___________<br>episodes per 3 mo | = ________________<br>SECs per 3 months |
| *Total SECs per episode: ___________<br>*Hours: ______<br>*Peak BAC: ______ mg % | X ___________<br>episodes per 3 mo | = ________________<br>SECs per 3 months |
| *Total SECs per episode: ___________<br>*Hours: ______<br>*Peak BAC: ______ mg % | X ___________<br>episodes per 3 mo | = ________________<br>SECs per 3 months |
| For COMBINATION PATTERN DRINKERS, subtract from this total the number of SECs already accounted for in the Steady Pattern Chart and record here only SECs in excess of the steady drinking pattern. No drink should be counted on both charts. For PERIODIC DRINKERS, however, record all drinks here (since for these drinkers the Steady Pattern Chart is left blank). | | ________________<br>Grand Total SECs 3 mo. from all episodic drinking |

**Total Q/F**

Add the Total SECs from the
Quantity/Frequency Summary Data section ____________
to the Grand Total SECs
from the Episodic Pattern Chart + ____________

for Total Q/F SECs for past 3 mos = ____________

**Pattern History**

What is the largest amount of alcohol that you have ever drunk in one day?

| Beverage | Amount |
|---|---|
| ____________________ | ______________________ |
| ____________________ | ______________________ |
| ____________________ | ______________________ |
| ____________________ | ______________________ |
| ____________________ | ______________________ |

Over ____________ Hours

Total SECs: ______________ Estimated Peak BAC: ____________ mg%

## Appendix K

## Debriefing Statement for Phase I

You were asked to respond to statements regarding personality characteristics and expectations you may hold about a variety of behaviors. Research indicates that some of our personality characteristics (such as being more or less aggressive) may be related to the expectations we hold about certain behaviors (such as drinking). Today you filled out some measures that may support or refute this research.

Thank you very much for participating. If you have questions or concerns please contact Dr. James Epps at (813) 974-0388 or Michelle LeVasseur at (813) 974-1520.

Appendix L

Debriefing Statement for Phase II

Today you completed a computer task designed to measure the interference of aggression stimuli (and for some, alcohol stimuli) on attention. Research suggests that those who are higher on certain personality characteristics may show more attentional interference to certain types of information (in this case, some aggression-related stimuli) that are presented on headphones (auditorily) or on a computer monitor (visually). During Phase I (several weeks ago), we measured your expectancies (with a variety of questionnaires) about how you would behave after drinking alcohol or how aggressive you consider yourself typically to be. We then asked for volunteers to participate in another study (Phase II) that was supposed to be unrelated to Phase I. The time delay and the deception were both necessary so that you would not be more reactive to alcohol and aggression stimuli simply because you had recently been asked many questions about those constructs. The decisions you made on the computer task (odd vs. even numbers) provided us with a measure of reaction time. Reaction times gave us an indication of whether aggressive words interfered with your ability to attend to the computer task more than nonaggressive words.

Thank you very much for participating. Please do not discuss this experiment with other students until they have completed the experiment. If you have questions or concerns, contact Dr. James Epps at (813) 974-0388 or Michelle LeVasseur at (813) 974-1520. If you would like to learn more about these topics please refer to the following references:


1. Bargh, J. A., Bond, R. N., Lombardi, W. J., & Tota, M. E. (1986). The additive nature of chronic and temporary sources of construct accessibility. *Journal of Personality & Social Psychology, 50*(5), 869-878.
2. Bargh, J. A., & Chartrand, T. L. (2000). The mind in the middle: A practical guide to priming and automaticity research. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology.* (pp. 253-285). New York City: Cambridge University Press.
3. Chermack, S. T. & Taylor, S. P. (1995). Alcohol and human physical aggression: Pharmacological versus expectancy effects. *Journal of Studies on Alcohol, 56*(4), 449-456.

About the Author

Michelle Edington LeVasseur received her Associate in Arts at Pasco Hernando Community College in 1993. She was designated Honor Graduate with Highest Honors and was awarded a transfer scholarship. She attended the University of South Florida, participated in the Department of Psychology Honors Program, and received her Bachelor's Degree in 1996. After working in the mental health field for three years, she was accepted into the University of South Florida's doctoral program in Clinical Psychology.

Since entering the doctoral program in August of 2000, Ms. LeVasseur has co-authored a published journal article and developed a manualized treatment intervention for teenaged girls with histories of emotional problems, substance abuse, and violence. She authored a chapter in a similar manual for women, and co-authored two poster presentations.

In her spare time, Ms. LeVasseur likes to reconnect with significant others, including her two children, sail her 34' catamaran, drink martinis, garden, and read.