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Investigating South Korean Drinking: Genetics, Personality and Cultural Influences on
Alcohol Expectancy

Thesis submitted by
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in January 2012
for the degree of Doctor of Philosophy
in the School of Arts and Social Sciences
James Cook University

Statement of Contribution

Dr. Kim Kyung Yong acted as an advisor on the translation and categorization of the South Korean alcohol free associations. This led him to become a co-author of Mahoney, Graham, Cottrell and Kim (2011) (Appendix 1). He also advised on the translation of the Alcohol Expectancy Questionnaire, and the Sensitivity to Reward and Punishment Questionnaire (Short Form), and further acted as a translator and interpreter when seeking permission to test Daegu Health College students.

Soonchunhyang University, for whom I work, conducted the genetic testing free at an estimated cost of around \$US 10,000. The work included sample collection and gene identification. Lexicode Language and Communication were employed to translate and certify all relevant documents, including informed consent forms, information sheets, letters of approval and the questionnaires. Compass Rose Horizons were employed to proof read the thesis.

As stated in thesis in various parts, the James Cook University Ethics Committee approved all of the testing procedures. Participants of the genetic testing were also required to sign a South Korean Health and Safety consent form prior to the testing, which was in accordance with South Korean ethical protocol on genetic sampling.

Apart from aid with translation, no one other than myself and the supervisors had input into the contents of the thesis. Dr. Deborah Graham, Dr. David Cottrell and Dr. Kim Kyung Yong contributed to the publication Mahoney, Graham, Cottrell and Kim (2011), of which an edited version appears in Chapter 2. As supervisors of the project, Dr. Graham and Dr. Cottrell advised on several areas of the publication, including the design and general content. Dr. Kim aided mainly in the translation projects and organization of testing (see above).

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Abstract

Long-term, high levels of exposure to ethanol is believed to lead to a hypersensitive mesolimbic dopamine system. This has been, in part, demonstrated through increased neural activity being observed in heavy drinkers' reward pathways following the presentation of alcohol-related stimuli. This anticipatory reaction to alcohol associates is believed to represent an expectation of a drinking event. Alcohol expectancy, as it is known, is said to facilitate both conscious and subconscious cravings for alcohol, where heavy drinkers covertly exposed to alcohol-related stimuli are reported to drink more than those who have not been exposed. Memories are believed to be a catalyst for such responses, with alcohol free-association tests indicating that heavy drinkers have a stronger explicit association between alcohol and positive outcomes than lighter drinkers. This has been shown to extend to an implicit association between alcohol and positive affect words, where heavy drinkers given the word "beer" as the first item of a memory test have been shown to subconsciously recall more positive words like "sociable."

Just as positive expectancy has been shown to be a mediator of heavy drinking, negative alcohol expectancy has been shown to be a predictor of lighter drinking. Reduced neural activity, for example, has been demonstrated among light drinkers upon the presentation of alcohol associates. This suggests that approach and avoidance behavior can be predicted through one's expectations, where those who expect "happy," "sociable," and "exciting" outcomes are more likely to engage in alcohol consumption, and those who expect "bad," "tired," and "sick" outcomes are more likely to avoid alcohol consumption.

Those with the mutant enzyme aldehyde dehydrogenase 2*2 (ALDH2*2) have been shown to exhibit both extreme negative and extreme positive expectancy. While many of those with ALDH2*2 report higher levels of negative expectancy, problem drinkers with

ALDH2*2 have been shown expressing higher levels of tension-reduction expectancy than problem drinkers with the normal gene. ALDH2*2 fails to process acetaldehyde efficiently and causes a buildup that results in immediate negative effects like dizziness, nausea, and tiredness. It appears, however, that there may also be positive after effects, where those who are able to ignore the negative effects and drink at high levels are rewarded with a tension-reduction effect. Overall, however, the negative effects appear to be more influential, as those with ALDH2*2 are reported as significantly less likely to develop lifetime dependence.

Although this mutation is rare in Caucasians, ALDH2*2 has been shown to be prevalent in up to and above one third of East Asian populations. South Korea is one such nation that has high levels of the mutant enzyme, where around 30 – 35% of the population is believed to carry a 2*2 version. Despite ALDH2*2's protective features, however, drinking rates remain high in South Korea, with Organization for Economic Cooperation and Development (OECD) figures placing them sixteenth among developed nations for national alcohol consumption. Given that ALDH2*2 produces negative effects that are likely to cause negative expectancy, and given the relationship negative expectancy has with lighter drinking habits, drinking rates in South Korea would be assumed to be lower. These high drinking rates are made even more outstanding when considering World Health Organization (W.H.O.) data indicates that South Korean females are drinking at lower levels than women in other developed countries are. This tends to indicate that South Korean males (many with ALDH2*2) are drinking at very high levels. Cultural differences in the concept of alcohol intake are put forward as possible mediators of the high level of intake, with Confucianism and the interdependent nature of East Asian societies postulated to be influential. The current research is thus interested in what cognitive mechanisms may mediate this overriding of the negative effects, and how this affects both explicit and implicit alcohol expectancy.

Eight hundred and forty-one Deagu Health College students took part in a three-phase exploration of South Korean alcohol expectancy. The first phase of the testing involved the collection of a list of South Korean alcohol expectancies through a free-association test. The second phase involved genetic testing and the administration of the Alcohol Expectancy Questionnaire and the Sensitivity to Reward and Punishment Questionnaire. The third phase of the testing involved a memory test that was designed to investigate implicit activation of an alcohol memory network.

From the list of South Korean alcohol associates that were collected from the free-association test, the current research was able to not only observe the different kinds of — and strength of — alcohol association among different drinker types, but also gauge the level of negative expectancy of the South Korean sample. The results of the free-association test indicate that biology, language, and culture are likely having an influence on differences observed between the current research and past alcohol-expectancy research. Not only were differences in probability of recall of most associates reported, but there were also differences in the types of words that were being recalled, due likely to differences in language. Furthermore, once the associates were categorized into expectancy octants, the results showed that South Korean heavy drinkers appear to have a more even level of negative expectancy across all drinker types than samples tested in past expectancy research. The results show that negative, negative sedated, and sedated expectancies do not predict drinker level. Gender was also shown to mediate drinks per occasion, where males were revealed to be drinking significantly more.

Results from the second phase of testing involving genetic sampling again showed differences from past expectancy/sensitivity to punishment and sensitivity to reward results. Typically, research has suggested that the BAS (characterized by sensitivity to reward) is a

better predictor of drinks per occasion. The current results, however, suggest that disinhibition and eagerness towards alcohol-related cues — which are vital features of SR in relation in to alcohol — may not be as influential among this population's drinking habits, as sensitivity to reward is not seen predicting South Korean drinks per occasion of any gene type. Sensitivity to punishment is, however, a predictor of drinks per occasion for a South Korean population. This appears to be mediated by those with the mutant ALDH2 (2/1) gene, as SP was not shown to predict the drinks per occasion of those with the normal (1/1) gene. Drinks per occasion also failed to correlate with several positive expectancy categories for those with the mutant (2/1) gene type, and furthermore, higher levels of tension reduction and lower levels of arousal and aggressive expectancies were seen as unique predictors of ALDH2 (2/1) drinks per occasion. Importantly, there was no significant difference in the drinks per occasion of the gene types, indicating that South Koreans with ALDH2*2 are consuming the same number of drinks per occasion as those with widely occurring (1/1) gene. Gender was again shown as a predictor of drinks per occasion, supporting the results from the first phase of the research indicating that males are drinking significantly more than females.

The results from the final stage of the testing indicated that the higher levels of negative expectancy, and lower levels of both arousal/aggressive expectancy and sensitivity to reward found in the first two studies, may be leading to a lower level response threshold to alcohol-related stimuli. Past expectancy research has suggested that heavy drinkers primed with the word –beer” will recall more positive aroused words like –energetic” in a memory test. However, South Koreans primed with the alcohol word –soju” did not increase in their recall of positive South Korean alcohol associates, demonstrating no positive alcohol associate word attention bias in the current South Korean heavy-drinking population.

Overall, the results indicate that there is a different encode / store / retrieve process occurring among the South Korean population in relation to alcohol. Language, culture, and ALDH2*2 are postulated to be influential in these differences. The current results suggest that sensitivity to punishment is a predictor of drinks per occasion among South Koreans, whereas sensitivity to reward is not, and that negative expectancy is at a more even level across all drinker types. The current research postulates that cultural influences like Confucianism may be leading South Korean males who perhaps would normally be in lower drinker categories — i.e., those who are typically more likely to express lower levels of sensitivity to reward and higher levels of negative expectancy — to drink at high levels. Furthermore, the social pressure to drink may also be causing those with the mutant ALDH2*2 to drink at higher levels, facilitated by lower levels of sensitivity to punishment. This may then explain why negative expectancy is high, and why sensitivity to reward is not a predictor of drinks per occasion in the current research, and why sensitivity to punishment is. Despite the influence of culture, ALDH2*2 remains, however, a distinguishing feature of the current results, where heavy drinkers with the mutant (2/1) gene are shown to exhibit higher tension-reduction expectancy and lower sensitivity to punishment than ALDH2 (2/1) lighter drinkers.

The discovery that: heavy drinkers need not have a lower level of negative expectancy; sensitivity to punishment is a predictor of South Korean and ALDH2 (2/1) drinker levels; sensitivity to reward is not a good predictor of drinks per occasion among a South Korean population, and; that South Korean heavy drinkers may have a different reactionary threshold to alcohol primes are all original contributions to knowledge. The current results also lend support to the notion that both environment and biology are influential in the development of drinking habits, where the mutant ALDH2*2 gene, language,

and culture all appear to have differentiated the current results from past expectancy research. The current results underline the need for further expectancy research in other East Asia nations, where differences in language, culture, and biology will be likely to differentiate individual motivations and predictive variables.

Given that research has suggested that South Korean alcohol intervention programs based on Western research have — when compared with Western population success rates — been rather ineffectual, the current research suggests that the current findings may be important in informing future programs. Given that sensitivity to punishment is more influential, and that unique expectancy has been identified among South Koreans, intervention and counseling programs that are targeted at these unique predicting features may help improve therapeutic outcomes.

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Chapter 1

Introduction

Despite being well known for its negative social, physical, and financial consequences, alcohol consumption is an activity that nearly half the world's adult population partakes in (W.H.O., 2011). While it is estimated to be involved in nearly two million deaths globally every year and cost tens of billions of dollars in both health care and reduced productivity (W.H.O., 2004), drinking remains a widely accepted staple of social interaction (Hansen, 1995). Research suggests that more than 60 diseases are linked to alcohol consumption (Rehm et al., 2003); more than 75 million people are affected by alcohol-use disorders (W.H.O., 2011); and alcohol is ranked as the second-largest cause of working years lost to disability (Murray & Lopez, 1996). Despite these adverse outcomes, alcohol-related problems (W.H.O, 2011) and general sales figures continue to increase (OECD, 2011).

The nature of alcohol's reinforcing properties is, therefore, the focus of several areas of alcohol research, where both animal and human studies explore behavioral, cognitive, physiological, electrophysiological, and genetic variables in search of a better understanding of problematic alcohol intake. A fundamental reference for many current problem drinking theories is neurological research indicating that dopamine (DA) and glutamate (GLU) regulation in the mesolimbic dopamine system (MDS) are instrumental in the maintenance of problematic intake (Johnson, 2004; Kupferman, Kandel, & Iversen, 2000; Wrase et al., 2002). Maladapted neurotransmission caused by alcohol use is believed to be directly involved in the almost irresistible drive for drinking being experienced by problem drinkers, as the reward pathway begins to devalue other environmental stimuli in the search for alcohol (Erikson, 2007).

Naturally, those exploring alcohol consumption patterns aim to help those with such problems. Of great interest, therefore, is research indicating that individuals with variants of

the enzyme aldehyde dehydrogenase 2 (ALDH2) are up to seven times less likely to develop alcohol dependence (Quickfall & el-Guebaly, 2006). Research suggests that ALDH2*2 helps protect against lifetime alcohol dependence by causing negative physical effects during intake (Lucza, Stephen, & Wall, 2006). This is due to the high acetaldehyde (ACD) blood levels caused by the inefficient enzyme. However, despite this mutation being prevalent in East Asia, where up to 40% of the population have an ALDH2*2 type (Brennan et al., 2004), overall drinking rates have remained high in many of the region's countries. South Korea, for example, is ranked sixteenth for alcohol consumption by the OECD. (2011). These South Korean drinking rates appear to be largely driven by the male population, with South Korean females drinking at significantly lower rates when compared with women in other developed nations. The W.H.O. (2011) data indicates, therefore, that South Korean males are consuming alcohol at very high rates despite around 30% of this population experiencing unpleasant, protective side effects upon even small amounts of alcohol intake (for review, see Brennan et al., 2004).

Culture has been identified as one possible mediator of these high drinking rates. Cognitive and philosophical differences are said to exist in East Asia that cause measurable differences in not only alcohol consumption patterns (Namkoong et. al, 2003) but also implicit perception (Johnson & Nagoshi, 1990; Masuda & Nisbett, 2001). East Asians and Westerners¹ have been shown to exhibit opposing implicit cognitive styles in relation to their environments (Masuda & Nisbett, 2001), where things such as the notion of affect (Bagozzi, Wong, & Yi, 1999), the notion of self (Becker, 1886), and even the idea of what constitutes

¹ For the purpose of this study, the term "East Asian", as defined by *Encarta*, will refer to a person from China, Taiwan, Mongolia, North Korea, South Korea, or Japan, while the term "Westerner" has been taken from Nisbett (2003) and refers to a person from a country influenced by European culture, including America, Canada, and Australia.

problematic alcohol consumption are all said to differ (Johnson & Nagoshi, 1990; Namkoong et al, 2003).

Another reported mediating factor in East Asian alcohol consumption is alcohol expectancy, where, for example, Taiwanese problematic drinkers with ALDH2*2 (2/1) have been reported as having significantly higher levels of tension-reduction expectancy than problematic drinkers with the widely occurring, effective (1/1) gene type (Hahn et al., 2006). Despite those with the mutant (2/1) gene suffering greater negative effects that should reduce their chances of alcohol dependence, it appears that, paradoxically, some aspects of an ALDH2*2 problem drinker's alcohol consumption experience includes at least some positive effects.

Neurological research somewhat supports these expectancy results, with the direct administration of ACD into areas of the brain synonymous with reward shown to cause greater and longer-lasting DA release than ethanol (EtOH) (Enrico et al., 2009). While metabolism of alcohol occurs largely in the liver, as the blood brain barrier is believed to help exclude ACD from entering the brain, it has been suggested that ACD likely moderates at least some of EtOH's positive effects (Quertemont, Tambour & Tirelli, 2005). This indicates that the high levels of positive tension-reduction expectancy found among problematic drinkers with ALDH2*2 (Hahn et al., 2006) may be due to an ACD-reinforcing effect.

Despite these well-known biological and cultural differences, few studies (e.g. Hahn et al., 2006; Park, Kim, Kim, & Sung, 2007) have explored expectancy outside Western populations, leaving East Asian alcohol-expectancy research relatively nonexistent. This is surprising, given that 30 years of Western research indicates that alcohol expectancy reliably predicts alcohol consumption patterns, where those with high levels of positive expectancy tend to drink more and those with higher negative expectancy tend to be lighter drinkers

(Brown, Goldman, Inn, & Anderson, 1980; Miller, Smith, & Goldman, 1988; Smith, & Goldman, 1994; Goldman, Brown, Christiansen, & Smith, 1991; Rohsenow, 1983).

Furthermore, alcohol expectancy: predicts the current and future drinking patterns of adolescents and children (Christiansen et al., 1989; Cranford, Zucker, Jester, Puttler, & Fitzgerald, 2010; Dunn, & Goldman, 1998; Gunn & Smith, 2010; Park, Kim, Kim, & Sung, 2007; Tapert, et al., 2003); plays a role in activating implicit psychobiological reactions that lead to increased drinking in heavy drinkers (Roehrich & Goldman, 1995); is activated without the conscious awareness of heavy drinkers, demonstrated through implicit attention biases for alcohol associate words (Cox, Brown, & Rowlands, 2003; Feldtkeller, Weinstein, Cox, & Nutt, 2001; Field, & Powel, 2007; Kramer & Goldman 2003; Reodiger, & McDermott, 1995) and involuntarily changes cognitive functioning (Reich, Noll, & Goldman, 2005). This implicit expectancy action appears to be so readily activated among heavy drinkers that even positive effect words generated in alcohol free-association tests (e.g. –happy,” –confident,” –sociable”) have been shown to mediate implicit responses that alter both their behavior (Carter et al., 1998; Roehrich & Goldman, 1995; Stein et al., 2000) and cognition (Cox, Brown, & Rowlands, 2003; Feldtkeller, Weinstein, Cox, & Nutt, 2001; Kramer & Goldman 2003).

Research has also suggested that a lowering of certain positive alcohol expectancies mediates the success of cognitive therapy among alcohol treatment programs patients (Young, Connor, & Feeney, 2011). This is in line with theory suggesting that interrupting positive expectancies can result in a reduction of alcohol seeking behavior and consumption levels (Darkes & Goldman, 1993; Darkes & Goldman, 1998). It’s believed that when expectancies like –assertive” are challenged by therapists through various placebo exercises and information sessions, a change in expectancy will lead to a diminished desire for the drug.

Given the lack of success of some intervention programs in South Korea (Namkoong et al., 2003), the identification of unique South Korean alcohol expectancies may aid those wishing to know more about, and perhaps reduce, the high levels of alcohol consumption.

Like all alcohol-related theories, however, there are limitations. While expectancy challenges have, for example, resulted in significant changes in both positive expectancy and self-reported drinker levels (Darkes & Goldman, 1993; Darkes & Goldman, 1998), long-term follow-ups have indicated that they may not be as effective as some other approaches (Wood, Capone, Laforge, Erickson, & Brand, 2007). It is widely agreed that problematic alcohol consumption is a complex issue, where conducting research from a one-dimensional point of view can ignore the value of theoretical and practical amalgamations. Thus, with knowledge of both the advantages and the limitations of alcohol expectancy theory, new and old theoretical amalgamations are being opened up in an attempt to help build a more encompassing understanding (Boyd, Baliko, Cox, & Travakoli, 2007; Connor, Gudgeon, Young, & Saunders, 2007; Dremen & Cooper, 2000; Gaher & Simons, 2007; Fischer, Anderson, & Smith, 2004; Hendershot et al, 2009; Hendershot et al, 2011).

In regard to the current research, identification of variables that may help explain why the negative effects of the buildup of acetaldehyde are not always effective in discouraging heavy drinking is of interest. Given that stimuli devaluation suggests that aversive states such as bad taste and illness can have a diminishing effect on the rewarding aspects of external stimuli such as alcohol (Samson et al., 2004; Veling, Hooland, & van Kippenburg, 2008), those with ALDH2*2 should be devaluing the positive reinforcing properties of alcohol due to the negative effects being suffered. The high levels, however, of both ALDH2*2 and male consumption in South Korea seem to indicate that such stimuli devaluation may not be occurring among a South Korean male, ALDH2*2 heavy-drinking

population. Therefore, along with the exploration of South Korean alcohol expectancy, the investigation of other variables that may help heavy drinkers with ALDH2*2 “override” (Hahn et al., 2006) the negative effects of the buildup of ACD is of interest to the current research.

Gray’s (1987) theory of approach and avoidance action is one model that has already been explored in relation to alcohol and other drug consumption, and may help provide important information for those exploring ALDH2*2 and drinking. The behavioral inhibition system (BIS) and the behavioral activation system (BAS) form the integral part of the theory, with sensitivity to punishment (SP) and sensitivity to reward (SR) respective components. Research has been conducted in conjunction with drug expectancy theories, and the results have shown that the BAS is a good predictor of alcohol consumption (Kambouropoulos & Staiger, 2001), and that those high in positive marijuana expectancy and SR but low in SP are more likely to be heavy consumers (Simons & Arens, 2007). Whether this relationship extends to an East Asian population where high levels of a biological deterrent exists remains to be seen.

Very little is known about South Korean alcohol memory networks and how they operate in the maintenance of the high levels of alcohol intake in this population. Furthermore, while there has been investigations into alcohol expectancy in populations with ALDH2*2 (McCarthy et al., 2000), including East Asian (Hahn et al., 2006), there has been no research to date amalgamating alcohol expectancy, ALDH2*2, and SP/SR. A review of the literature also suggests that there has been little research conducted on how a population with high levels of ALDH2*2 reacts to the implicit presentation of alcohol-related stimuli. Given that high levels of ACD are likely to affect neurological activity in regions of the brain linked with the expectancy action, the question of how a South Korean sample would react to

the implicit presentation of an alcohol cue is also of interest.

The current research thus aims to expand alcohol-expectancy research into South Korea by exploring alcohol free associations. The current research also aims to identify motivating and personality variables influencing South Korean alcohol consumption by exploring the likely differences in alcohol expectancy and SP/SR of different ALDH2 gene types. Finally, the current research aims to investigate an implicit expectancy action seen in Western samples among a population with high levels of the protective ALDH2*2. While alcohol expectancy theory and SP/SR cannot entirely explain the drinking practices of South Koreans by themselves, the investigation of their co-relationships with ALDH2*2 gene type identification and drinking levels may aid in the establishment of a South Korean drinking model that could help inform not only the alcohol-expectancy research paradigm, but also the wider alcohol research community.

Alcohol Expectancy Theory

Encoding alcohol: Neurotransmission, memory, and expectancy.

Some argue that alcohol consumption provides important life-enhancing experiences, where societies with clearly outlined rules of use maintain low levels of alcohol-related problems (Hanson, 1995). Furthermore, there is evidence to suggest that alcohol consumption is involved in lower levels of heart disease (Agarwal, 2002; Hansen, 1995; Mukamal et al., 2003). Alcohol's positive social and health benefits are countered by several drawbacks, however. Alcohol is, for example, the fourth-highest drug in chance of lifetime dependence after first use (Anthony, Warner, & Kessler, 1994) and is believed to cause 79,000 deaths due to excessive use annually in America alone (Center for Disease Control and Prevention, 2011). Furthermore, interpretations of such alcohol/health studies need to take into account the presence of certain extraneous variables that may mislead. It has been suggested that non-

drinkers partaking in health-related alcohol studies may be avoiding alcohol on medical advice for problems that already lower their life expectancy (Fillmore, Kerr, Stockwell, Chikritzhs, & Bostrom, 2006). However, as alcohol has been a common feature of modern civilization (Hansen, 1995), its level of social acceptance is higher than illegal drugs like marijuana and various stimulants, even though they have been shown to have lower levels of lifetime dependence (Anthony, Warner, & Kessler, 1994).

Alcohol's health and social benefits are not the only issues being debated, with the amount of alcohol in a standard drink also varying from country to country (Dufour, 1999). This has made it difficult to consistently define moderate and heavy consumption, with differences in the concept of drinking and acceptable levels appearing to somewhat differ among varying cultures (Dufour, 1999; Namkoong et al., 2003). Even the term "addiction" itself has been subject to debate, with some believing it to be far too vague and unscientific (Erikson, 2007). More recently, terms such as "drug abuse" and "problematic consumption" are commonly being enlisted. "Chemical dependence" is another such term, as it is believed by some to best represent the process by which areas of the brain suffer maladaptations to high levels of long-term exposure to drugs (Erikson, 2007).

The area of the brain said to be affected by alcohol is not disputed, however (Erikson, 2007). Neurological studies into alcohol consumption report high levels of activity in the MDS in reaction to alcohol cues. Elevated DA, GLU (Johnson, 2004), and blood oxygen level-dependent response (BOLD) (Heinz et al., 2004) have been observed in relation to alcohol in the brain's reward pathway. Research indicates that alcohol-dependant participants shown pictures of alcohol increase in BOLD (Heinz et al., 2004) in several regions of the brain including the mesolimbic dopamine area (Wrase et al., 2002). This response has been shown to be unique to heavy drinkers with lighter drinkers actually showing less neural

activity when exposed to alcohol stimuli than they did to neutral stimuli (Ihssen, Cox, Wiggett, Fadardi, & Linden, 2010). Furthermore, research shows that this area of the brain is involved in regulating homeostatic changes (Contreras et al., 2007; Fileby et al., 2009) that are theorized to be associated with elevated emotional states, such as drug craving (Ihssen, Cox, Wiggett, Fadardi, & Linden, 2011), indicating that neural activity is closely linked with motivation for alcohol consumption. One explanation for this is that high blood alcohol levels suppress the firing of gamma aminobutyric acid (GABA), which subsequently elevates the level of DA in the ventral tegmental area (VTA) and nucleus accumbens (NAcc) (Johnson, 2004). Johnson suggests that due to this VTA GABA suppression, a long-term excessive alcohol user's NAcc overcompensates and becomes GABA and DA hypersensitive in relation to alcohol and related stimuli.

While neurological adaptation theories give information on neurological changes and reactions, they fail to comprehensively describe the psychological cravings and behavioral seek processes that accompany them. In pursuit of a more encompassing description of chemical dependence, Erickson (2007) states that there are four categories that alcohol dependence theories generally fall into. They include the allostasis theory, the pathology of motivation and choice theory, the incentive-sensitization theory, and the learning and memory mechanisms theory. Allostasis theory postulates that with repeated heavy drinking, alcohol goes from being a positive reward to a negative reward, where the body's natural desire for homeostasis results in alcohol intoxication being seen as a "normal" state of existence (Erikson, 2007). The pathology of motivation and choice theory emphasizes changes in GLU functions running from prefrontal cortex to the NAcc, where uncontrollable cravings for alcohol cause diminished enjoyment of other behaviors that ultimately results in uncontrollable drug-seeking behavior (Erikson, 2007). The incentive-sensitization theory also

purports changes in the MDS, but focuses on DA and GLU sensitization, where there is increased pathway activity, and where it appears that GLU excitory synapses grow in length and connectivity (Erikson, 2007). Finally, the learning and memory mechanism theory suggest that differences in neural activity represent in real terms individual adaptations to experience. Here, environmental objects that appear in unison with alcohol consumption become cues for drinking, where the presence of such a cue causes the activation of the neural system, which then results in drug craving and seek behavior (Erikson, 2007).

The learning and memory mechanism theory is well suited to exploration of cultural differences in the understanding of alcohol. As memories are based on experiences, the differences in the general alcohol concept that exist between cultures would be expected to have an effect on alcohol memory network activation. While the other three theories are able to explain problematic consumption on a broad level, the learning and memory mechanisms theory allows for environmental differences to affect perception and behavior.

One theory that explores this relationship between memory and problematic alcohol consumption is alcohol expectancy theory. Research has shown that due to their constant exposure to alcohol, heavy drinkers cast a wide net of alcohol association, where the mere exposure to alcohol expectancy words (“happy,” “confident,” “sociable”) has been seen to cause an increase in consumption (Roehrich & Goldman, 1995). This tends to indicate that memory is involved in the increased DA and GLU being observed in heavy drinkers following the presentation of alcohol associates, where the stored memories of positive alcohol events are connected to, and are represented by, certain positive emotion words.

Alcohol expectancy has been shown to be sensitive to environmental changes, however. Along with research suggesting that environment can affect the concept of alcohol and subsequently one’s drinking rates (McCarthy, Aarons, & Brown, 2002), it is assumed

that the high prevalence of ALDH2*2 in South Korea will also have an influence on expectancies. As research suggests that the nature of these reactions is driven by experience (e.g. the amount of alcohol you drink), the investigation of the unique aspect of the South Korean alcohol understanding is needed. The following section, therefore, is an exploration of expectancy and related theories in an attempt to provide some background on alcohol memory network development and activation.

Expecting Alcohol.

Placebo tests using alcohol have long shown that when an individual believes he or she is drinking alcohol, his or her behavior changes in many and varied ways (Lang, Goeckner, Adesso, & Marlatt, 1975; Marlett, Demming, & Reid, 1973; Marlatt, Kosturn, & Lang, 1975). Although a recent review has questioned the meaning behind many of the changes in behavior being observed in alcohol placebo studies (Testa et al., 2006), these various responses do appear to demonstrate an alcohol expectancy behavioral action. Here, theory suggests that the variations in behavior, despite the absence of actual alcohol consumption, are likely occurring due to innate, heuristic psychobiological functions anticipating the pharmacological effects, with those investigating expectancy theory aiming to provide information on how this action affects drinking behavior.

A 1979 North American national survey of drinking practices first framed these expectations within adjectives (cited in Leigh, 1989). Participants were asked to complete the sentence "alcohol makes me..." from a list of seven words that came to be known as "the seven dwarfs." These were sleepy, dopey, bashful, happy, grumpy, surly, and horny (cited in Leigh, 1989). Currently, theoretical memory network models made up of mostly adjectives generated by participants answering statements like "alcohol makes one..." form an important part of alcohol expectancy theory (Brown, Christiansen, & Goldman, 1987; Reich

& Goldman, 2005). Rudimentary sectioning of alcohol expectancies sees them fall into two categories according to their meaning: 1) positive expectancies, which describe the early euphoric, dis-inhibiting feelings produced by alcohol (e.g. happy, sociable, confident), and 2) negative expectancies, which are associated with the sedating, withdrawal effects (e.g. dizzy, sleepy, angry). However, research has identified eight factorially independent categories within which alcohol expectancies can now be situated: negative/sedating (depressed), negative (sick), negative/arousing (violent), sedating (tired), arousing (alert), positive/sedating (calm), positive (joyous), and positive/arousing (horny) (Goldman & Darkes, 2004).

Different expectancy categories predict different drinking styles.

Alcohol-expectancy researchers are continuously correlating results of the Alcohol Expectancy Questionnaires (e.g. the AEQ [Brown et al. 1980]) with self-reported drinking habits, with results consistently showing that heavy drinkers have higher positive alcohol expectancies than non, light, and moderate drinkers (Brown et al., 1980; Brown, 1985; Rohsenow, 1983; Southwick, Steele, Marlatt, & Lindell, 1981). Alcohol expectancy/demographic survey correlations have shown many and varied sub-group differences, where enhanced social and physical effects are by and large the expectation of heavy, yet non-problematic drinkers (Brown, 1985); high positive alcohol expectancy and avoidance as a stress relief coping mechanism predicts problematic drinking (Cooper et al., 1988); and high-tension reduction alcohol expectancy increase the likelihood that men will use alcohol in stressful situations (Cooper, Russell, Skinner, & Frone, 1992). Notably, research has linked alcohol expectancy with “drinking to cope,” which has been described as the use of alcohol to “escape, avoid, or otherwise regulate unpleasant emotions” (Cooper et al., 1988, p. 218).

Furthermore, Boyd, Baliko, Cox, and Travakoli (2007) reported that when other coping strategies fail, alcohol and other drugs are used by some as a coping mechanism. They use the emotion focused coping theory (Folkman & Lazarus, 1986) to explain why strategies such as drug consumption might be used to gain temporary relief from dysphoric feelings in the absence of the ability to deal directly with the problem. They suggest that there are two main expectancies associated with emotion focused coping: 1) that using alcohol and other drugs will enhance social situations (positive reinforcement) and 2) that alcohol and drug taking will relieve dysphoric feelings produced by a stressful situation (negative reinforcement).

Importantly, Boyd et al.'s (2007) results support this notion. They found that African-American women in rural areas who used alcohol as a strategy to relieve dysphoric feelings reported more stressful life situations, were often in abusive relationships, and commonly had little money to support their families. Their research confirmed that these women held high expectations of both enhanced sociability and relief from stressful situations from drinking alcohol.

Research also suggests that in situations where alcohol is used as a coping strategy, there are three areas that are frequently linked with stress and alcohol use: 1) availability of alternative coping responses, 2) gender, and 3) alcohol expectancies (Cooper et al., 1992). In regard to alternative coping strategies, it is believed that when an individual fails to enact, or indeed have in place sufficient coping strategies to deal with stressful situations, alcohol is used by some as an alternative. For example, Marlatt, Kosturn, and Lang (1975) found males who were provoked and rendered unable to retaliate drank more in an ensuing beer-tasting test than those that were given the opportunity to remonstrate. Furthermore, Lang, Goeckner, Adesso, and Marlatt (1975) conducted a placebo experiment and found that those who

believed they had consumed alcohol remonstrated longer with a protagonist than those who knew they had not drunk. Here it is the expected effects of alcohol being used both as a coping strategy after a stressful incident and also as a tool to help facilitate aggressive behavior during a stressful incident. In both cases, alcohol is used by the participants as a coping strategy to help alleviate stress in some form.

Expectancy and gender.

Although gender differences in the consumption of alcohol have decreased in recent years, there are still differences in the way in which alcohol is consumed at dangerous and problematic levels by men and women (W.H.O., 2011). Research suggests, for example, that males tend to drink more and experience more alcohol-related problems than females (Chartier, Hesselbrock, & Hesselbrock, 2011; Cooper et al., 1992; Cooper et al., 1988; W.H.O., 2011), and that they are more likely to turn to alcohol to combat negative emotions (Cooper et al., 1992; Cooper et al., 1988). Cooper et al. (1992) also found that high-tension reduction alcohol expectancy increased the likelihood that men would use alcohol in stressful situations. However, Cooper et al.'s (1992) results suggest that gender differences are only significant when males have poor coping strategies and high levels of positive stress-relief alcohol expectancies. Cooper et al.'s (1988) results support this, as they found alcohol expectancy to have a moderating relationship with avoidance behavior, stress-coping strategies, and heavy drinking. They reported that those who demonstrated high positive alcohol expectancy, as well as reporting avoidance as a stress-relief coping mechanism, were more likely to report dangerous and problematic drinking levels (Cooper et al., 1988). Overall, however, it has been suggested that differences in male and female drinking levels may be mediated more by men's general greater physical ability to tolerate higher levels (Reich & Goldman, 2005), and as such, gender differences are generally greeted with caution.

Challenging and activating alcohol expectancy.

With the link between high levels of positive expectancy and heavy drinking established, research moved to explore the manipulation of the alcohol expectancy phenomenon. Darkes and Goldman (1993), for example, tested the notion that a change in expectancy could result in a change in drinking behavior. In their research, participants were informed that they were taking part in a modified placebo exercise where only half of the drinks being provided for the group had been spiked with alcohol. The drinks did not differ in appearance or flavor, and the participants were asked to consume one before identifying those, including themselves, affected by alcohol (Darkes & Goldman, 1993). The expectancy challenge also consisted of several alcohol expectancy information sessions conducted over a four-week period. It was postulated that the inability of the participants to correctly identify those that had consumed the alcoholic beverage, combined with their better understanding of cognitive influences on their drinking behavior, would result in a disruption of their positive expectations of alcohol and thus lead to a change in drinking behavior (Darkes & Goldman, 1993). A lowering of both positive alcohol expectancy and self-reported drinking activity was demonstrated at a two-week follow-up, indicating that once individuals become aware of their positive alcohol expectancy's role in their drive for consumption, expectation of the positive effects of alcohol are altered and desirability of the drug somewhat diminished (Darkes & Goldman, 1993). These methods are now used in, and form the basis of, alcohol expectancy challenges.

To help explain this relationship between expectancy and behavior, alcohol expectancy theorists began to shift the focus from a behaviorist perspective to a more cognitive model. One way this has occurred is through the use of existing cognitive frameworks, where, for example, researchers have explained the expectancy action through

Lang's (1985) conceptualization of an alcohol memory network. Here ~~the~~ molecular nodes hold memories of ... previously encountered stimuli that are actively linked to physiological/emotional activation and skeletal muscle patterns" (Rather et al., 1992, p. 180). Accordingly, when a stimulus configuration (e.g. environmental alcohol cue) matches a stored representation (e.g. a previous drinking experience), activation spreads from this portion of the network to the expectancy nodes, and then onwards to affective and motor portions of the network in a fast-linking psychobiological reaction (Rather et al., 1992).

Roehrich and Goldman (1995) explored this theory by presenting participants with different alcohol stimuli, being either positive alcohol expectancy words in a modified stroop task or a video containing a typical public bar scene from the American television series *Cheers*. Participants either watched the video or took part in the stroop task, where they were asked to ignore the actual word presented and simply name the ink color the word was printed in. Immediately following this, the participants were advised to take part in another ~~unrelated~~ beer-tasting test. Relying on the basic premise of primacy theory, which states that affective reactions can be elicited with minimal stimulus input (Kunst-Wilson & Zajonc, 1980), Roehrich and Goldman (1995) predicted that an implicit reaction would take place, resulting in the increased consumption of beer.

Both the video tape and the stroop task were reported as having a significant positive influence on a heavy drinker's beer consumption in the beer-tasting tests (Roehrich & Goldman, 1995), with the video showing more robust affect. It is believed the video may have been reinforced by the bar setting of the beer-tasting test, resulting in greater consumption (Roehrich & Goldman, 1995). Nonetheless, the somewhat disguised presentation of alcohol expectancy words was also observed to increase consumption, indicating that heavy drinkers implicitly associate these positive-meaning words (e.g. happy,

confident, horny) with alcohol. Here it has been suggested such subliminal presentation of positive expectancies cues an implicit cognitive recognition of their “fuzzy” association with alcohol (Reich et al., 2004), activating a theoretical “go” signal for a drinking opportunity (Roehrich & Goldman, 1995).

Importantly, Friedman et al. (2007) conducted research that showed that expectancies were capable of not only increasing beer consumption, but also capable of initiating behavior related to the individual’s expected effects. In their research, Friedman et al. presented participants with either an alcohol or neutral prime word before informing them of a possible meeting with a person of the same age but opposite sex at the end of the testing. The meeting itself was hypothesized to induce stress. Before the meeting, participants were asked to complete a computer-based survey on tension reduction that was designed to implicitly cue tension-reduction alcohol expectancy for those who had received the alcohol prime. Following the tension-reduction inducement, participants were given the option of meeting the person in a one-on-one situation or in a group. Those that saw the alcohol cue as well as expressing high levels of tension-reduction expectancy in the priming survey were more likely to engage in a one-on-one exchange with the person of the opposite sex. Friedman et al. suggest that this indicates that the mere induction of tension-reduction alcohol expectancy results in behavior of that nature. Notably, this only occurred for those participants who were given the alcohol cue and shown to be high in tension-reduction alcohol expectancy, with those exhibiting high levels of other expectancy, such as sociability, etc., not as likely to meet one on one.

Friedman et al. (2007) also tested aggression expectancy in the belief that it would facilitate a similar reaction to the aforementioned study. They did so by employing the same procedures as mentioned above, but this time isolating expectancies that alcohol would

facilitate aggression. Here, participants in this study were put in a frustrating situation: at the end of the trial, they were informed that the assistant had made a mistake and had not saved their data. The participants were then told that they would need to complete the task again. At this point, the participant was asked to fill out an incident report where they could vent their anger. A review of the incident reports showed that those who were cued with an alcohol prime and had high aggression expectancies demonstrated greater hostility to the assistant in their report (Friedman et al., 2007). Taken together, these results indicate that expectancy has a similar effect on behavior to that seen in placebo studies, indicating that expectancy plays an important part in alcohol's behavioral affects.

The above-referenced research is only an example of the expectancy paradigm, however. As outlined, early research exploring people's attitude towards alcohol has generally developed into a wider pursuit of an understanding of the activation of implicit cognitions that lead to changes in behavior. To do so, alcohol-expectancy researchers have borrowed from other fields' work — such as Lang's (1985) memory network theory — to help explain how these cognitive “go” signals might be activated. Here it appears obvious that one fundamental element of the implicit activation of alcohol expectancy is heavy drinkers' positive attitude towards alcohol consumption, both consciously and subconsciously. Thus, a functional imperative of the implicit activation of alcohol expectancy is a favorable attitude and more positive feelings towards alcohol. Therefore, a broad understanding of the alcohol expectancy framework requires a review of how affect and attitude influence memory and behavior.

Attitudes and Affect: “Liking” Alcohol

Attribution errors.

Greenwald and Banaji (1995) define attitudes as “favorable and unfavorable

dispositions towards social objects” (p 7). Importantly for expectancy theory, they state that attitudes can be manipulated outside conscious awareness. They indicate that attribution errors can occur when attitudes activated by one object can be subconsciously and mistakenly attributed to another. While it has been argued that attitudes predict our behavior only once the actor is aware of them (Myers, 1990, cited in Greenwald & Banaji, 1995), results suggest that attitudes do not, in fact, have to be in the conscious realm to be influential (Greenwald & Banaji, 1995; Zanjoc, 1980). Past research has found, for example, that pairing well-known national words (e.g. Dutch, German, French) with words that were assumed to illicit an emotional meaning response (e.g. pretty, likable, terrible) resulted in the national words being rated as more or less pleasant in direct relation to the positive or negative meaning of the conditioning word (Staats & Staats, 1958, cited in Zanjoc, 1968). Furthermore, other early results have suggested that subconscious attitudinal differences exist across cultures, where Germans have, for example, recalled the word “reward” at a lower frequency to that of American, French, and Spanish samples (see Zanjoc, 1968).

These results may be due, however, to differences in language and forms of communication, where the usage frequency of particular words is likely to differ. This is supported by research that has suggested the actual amount of exposure to a word can increase its likability (Zanjoc, 1968). While it has been argued that word frequencies might actually reflect real-world values, where words representing the good, positive, more desirable aspects of life are more frequently generated and enlisted, some argue that higher frequency may actually be a result of a perpetual greater exposure to them (Zanjoc, 1968). Here, Zanjoc noted that the higher the reported frequency of a word, the higher its likability rating (Zanjoc, 1968). Similarly, a rating of trees, fruits, vegetables, and flowers produced the same positive correlation with the amount of exposure experienced. Even research presenting

more complex objects, such as faces and Chinese characters, have shown that frequency of exposure positively correlates with likability ratings (Zanjoc, 1968). This is believed to be linked to a survival-instinct mechanism that automatically produces a fearful reaction to new stimuli within an environment. Results have suggested that exposure to the initially feared object without any negative consequences will gradually ease anxiety towards it (Zanjoc, 1968).

Another widely documented attribution error is the halo effect, where individuals have a tendency to use a positive characteristic of an object to overestimate other attributes. That is, the attitude to the second feature (e.g. kindness) can be subconsciously affected by an attitude to the first feature (e.g. attractiveness) (Palmer & Loveland, 2008; Rosenberg & Olshan, 1970). Notably, this attitudinal effect can differ across different populations (e.g. male and female), where those who view the initial attribute (attractiveness) more favorably (males) show greater halo effect towards the second attribute (kindness). Collectively, research suggests that likability of an object can be influenced implicitly and be present without conscious thought, where the resulting affective response influences people's actions outside their awareness.

Such attribution errors and exposure phenomenon are important to alcohol expectancy theory, as research has suggested that children's attitudes towards drinking tend to mirror that of their parents (Park, Kim, Kim, & Sung, 2007). As results indicate that those with more positive attitudes towards alcohol tend to consume at higher levels, it is likely that the children of parents with high positive expectancy generally have higher levels of exposure to alcohol than their lower-expectancy counterparts. Zanjoc (1968) may be inclined to argue here that the higher levels of exposure to alcohol would be in itself capable of explaining why a heavier drinker's child would have a more positive attitude towards alcohol

consumption. Furthermore, results of longitudinal studies have indicated that children with high levels of positive expectancy are then more likely to become heavy drinkers themselves (Christiansen et al., 1989; Cranford, Zucker, Jester, Puttler, & Fitzgerald, 2010; Gunn & Smith, 2010; Park, Kim, Kim, & Sung, 2007), suggesting that early exposure and attitudes towards alcohol may have a direct influence on future drinking behavior. This indicates that high levels of exposure to alcohol at a young age may lead children to *feel* more positive about the concept of drinking, making it more likely they “like” alcohol and participate in drinking when given the opportunity.

Affective responses.

Without a positive emotive response, it seems unlikely alcohol would be so widely consumed at problematic levels given the well-documented harm it can cause. Notably, theory suggests that emotion is, in fact, the very first reaction of an organism to an environmental stimulus, and that for “lower order” organisms it is often the only reflex they have (Zajonc, 1980). This is the basis of Zajonc’s argument that little cognitive encoding or analysis is required in an automatic affective response, stating that feelings and thoughts are not always mutually exclusive; that feelings enter into cognitive equations just as cognitions enter into emotional sequences; and in fact, “hot cognitions” — those that have a strong emotional element — are often largely free of cognition. Zajonc suggests that while feelings are constantly a part of cognitive activity, feelings are themselves capable of being generated without any thought, illuminated by the situation where fear can be evident without having any knowledge of the object being feared (Zajonc, 1980). This indicates that those who engage in heavy alcohol consumption may be having positive emotional responses to alcohol before they are even able to consciously “think” about it, and helps explain why their behavior has been reported changing outside their conscious awareness.

Zanjoc (1980) also suggests that when trying to recall things such as names, places, and sights, etc., the affective element of the experience is often the first aspect to emerge, thus aiding cognitive recall. This is particularly relevant for alcohol expectancy, as memories are believed to be driving the alcohol expectancy action, suggesting that affect is likely providing motivation for alcohol consumption. Zanjoc also notably argues that more often than not we choose something because we “like” it, or avoid something because we don’t like it, and that cognitions are more likely to be used after the decision is made to justify the action — to the point where “objective” decision making is considered by many as a difficult task (Zanjoc, 1968).

Importantly for alcohol expectancy theory, Stacy (1995) has suggested that affect and experiences are somewhat encoded together as co-memories, stating “word and picture association responses reflect co-occurrence of features of the experience” (p.184). Stacy states that in relation to drug consumption, the positive aspects of drug taking are stored in long-term memory with other events and experiences encountered during repeated use. Stacy’s results are in line with the notion that if verbal and non-verbal events are encoded with repeated drug use, then parallel patterns of association occur (Erikson, 2007). Stacy’s research suggests that these co-encoded stimuli are often manifested in both picture and word-association tests. That is, when presented with otherwise ambiguous pictures or words, those that have partaken in repeated drug consumption appear to have memory network structures that more frequently lead them to interpret the stimuli as drug related. Stacy postulates that reactions to positive alcohol expectancy words reflect an activation of motivation for alcohol consumption, supporting the notion that the expectation of an event is linked to an affective response. This kind of affective expectancy reaction theory can also be found within conventional learning models, where one of the most important aspects of a

conditioned response function is the affective element (Bolles, 1970).

Bolles (1970) postulates that when a creature finds itself placed in unfamiliar surroundings, it must contend with new environmental stimuli that will present new challenges. Bolles suggests that in this case the organism tends to learn relations between two stimuli: environmental cues and events (S) and their consequences, including affective reactions (S*). Bolles also suggests that an S* often results in a response (R). Here, Bolles states that the term “expectancy” represents stored information in memory, and that in cases where animals are learning new information, they are in fact simply “expecting” a certain outcome or event based on past experiences. This expectation action is said to often rely on emotive states, where certain environmental configurations lead to an emotional expectation.

Interestingly, Hopfield and Tank (1986) have suggested that neural “circuits” become in some way accustomed to performing certain actions in relation to an event, and that the more often a neural circuit performs this action, the easier and more likely the action becomes. Stacy (1995) links this with memory being encoded and activated parallel across various experiences and situations, and suggests that this somewhat automatic circuit function is not unlike that of an expectancy process. Stacy notes the similarities between this and Bolles’s (1970) S-S*/S*-R theory, where the probability of a response will increase with the strength of S-S* and S*-R relationship; that these expectancies are synthesized, and; when activated, one recalls not only an outcome but also a memory of behavior. Therefore, high levels of exposure to an environmental object or event increase the strength and accessibility of related memories, and subsequently the probability of the associated behavior. Importantly, if the behavior is enlisted and repeated with a positive affective response (S*), then this not only increases the behavior’s probability of occurrence but also increases motivation for the particular outcome or behavior.

Notably, alcohol expectancy theory does not tie itself to any particular cognitive theory, but rather borrows from a broad range of research and models. Here, those exploring alcohol expectancy appear to believe that explaining how alcohol shapes cognition and behavior is beyond the scope of expectancy theory alone. There is, however, a general agreement that one's concept of and/or experiences with alcohol resides within interconnected memory networks, which serve to inform an individual on approach and avoidance behavior.

Alcohol Memory Networks and Context

Greenwald & Banaji (1995) state that the "signature of implicit cognition is that traces of past experiences affect some performance, even though the influential earlier experience is not remembered in the usual sense" (p 4). While it remains clear the more specific the prime the larger the effect (Reohrich & Goldman, 1995), the link between the implicit presentation of alcohol expectancy words and at least two different subconscious cognitive (Reich, Noll, & Goldman, 2005) and behavioral (Reohrich & Goldman, 1995) responses shows that heavy drinkers have hypersensitive alcohol-related memory networks that lead them to behave in certain ways based on past behavior, often unregulated.

Importantly, Nelson et al. (1998) infer that the implicit comprehension of an event can be significantly manipulated by environmental cues that lead to the activation of certain related information. They have suggested that there is a comprehensive memory process taking place where associates are activated in unison when primed. Nelson et al. postulate that retrieving information is not only effected by conscious processing, but also by implicit activation of related knowledge. It is commonly known, for example, that participants presented with the word "milk" will respond faster if the word presented prior to it was "cow." Nelson et al. suggest that everyday experiences affect the representation of concepts,

where higher levels of experience lead to greater association strength of certain concepts and connections. In relation to alcohol, for example, increased drinking experience increases one's ability to retrieve alcohol-related memories (Stacy, Leigh, & Weingardt, 1994), where continued cycles of retrieval and encoding leads to strengthened association and ultimately easier access. Therefore, associations for cues that are related to this behavior also increase in their ability to invoke memories. It has been suggested that self-perpetuating or "snowballing" implicit processing rules result in an encoding bias for a particular stimulus (Stacy, Leigh, & Weingardt, 1994; Lewicki, Hill, & Sasaki, 1989). While it is also postulated that inaccurate encoding biases and associations can be halted and/or reversed by evidence to the contrary (Lewicki, Hill, & Sasaki, 1989), in the case of alcohol and other drugs, the strong physical reinforcing properties seem to make it difficult to challenge. Stacy, Leigh, and Weingardt (1993) suggest that psychopharmacological effects, in fact, work in conjunction with such encoding biases to maintain problem behavior, where complementary yet separate functions operate to increase memory-association strength with increased drinking activity. They state that different people have different levels of susceptibility to the pharmacological effects, but that ultimately an increase in drinking activity results in an increase in accessibility of that behavioral outcome when the behavior is thought about and/or considered (Stacy, Leigh, & Weingardt, 1993).

Importantly, researchers have agreed that heavy drinkers can be considered somewhat "superior" in their drinking ability to non, light, and moderate drinkers. This is noteworthy when considering research shows that experts in certain fields have greater "relatedness" or interconnection of concepts in their particular area than novices (Schvaneveldt et al., 1985). This leads researchers to postulate that heavy drinkers prioritize, emphasize, and process information related to alcohol faster than non, light, and moderate

drinkers (Rather & Goldman, 1994). Rather and Goldman believe that the results of their cluster analysis indicate that the expectation of the arousing aspects of alcohol — aided by pharmacological effects — may, in fact, facilitate an overrating of the positive effects that insulates from the reality of the sedating and punishing withdrawal element. This indicates that this ability to process alcohol-related stimuli faster likely centers around positive information.

The notion that a heavy drinker's alcohol expectancy networks are alone hypersensitive to alcohol-related stimuli has not been without query, however, as while Carter et al. (1998) lend support to the notion that drinking behavior can be affected through the presentation of semantic cues, their results were not discriminative in regard to drinker type. They reported that alcohol primes, in fact, increased the alcohol consumption of all drinker levels. They have suggested that the environment of the Roehrich and Goldman (1995) study (barroom setting) may have played a greater role than first thought. Furthermore, while Carter et al. (1998) agree that exposure to positive alcohol expectancies acts as an implicit signal for alcohol consumption, their results also suggest that activation of negative expectancy may inhibit the activation process of positive expectancy, resulting in lower consumption levels. Carter et al.'s (1998) expectancy model suggests that when negative expectancies are activated, they are, in fact, capable of disrupting the effectiveness of the positive, which then leads to a lower rate of consumption for all drinker levels.

In somewhat of a response to these results, Stein et al. (2000) conducted research testing the effect of implicit primes on alcohol consumption, acknowledging that the increase in alcohol consumption observed in the Roehrich and Goldman (1995) study may have been due to an alteration of mood rather than an activation of alcohol expectancy. Even though there is evidence to suggest separating cognition from affect is difficult, Stein et al. argued

that their testing methods explored the ~~primary~~ mood influence and the ~~primary~~ cognitive influence by comparing the affect of classical music — previously found to induce positive mood — and alternatively positive alcohol expectancy on beer consumption. The results confirmed that the implicit presentation of alcohol expectancy words increased heavy drinkers' beer consumption, while the presentation of classical music did not. They note that the mood of those presented with music positively increased, whereas the mood of those presented with alcohol expectancies actually decreased. Even though research has suggested that inducement of a depressed mood appears to activate alcohol related memories (Kelly, Masterman & Young, 2011), it appears that an alcohol expectancy process occurs largely separately from mood.

Given that research has demonstrated a link between language and an alcohol-expectancy action, the methods used to create and update the alcohol-expectancy wordlists (e.g. extensive interviews, likert scale measures, and free-association tests) are of great importance to alcohol-expectancy research. As outlined above, memory network functions are vital in the process of anticipating an upcoming event, and thus gaining access to information contained in these structures is vital in activation and, perhaps more importantly, disrupting the subconscious alcohol-related cognitive phenomenon known as alcohol expectancy.

Accessing Alcohol Memory Structures: Free Association

It is widely held that responses generated in free-association tests represent strength of memory association, where long-term memory retrieval is the cognitive process being employed (Stacy, 1995). An association test is typically characterized by a participant being presented a word (cue or prime) before being asked to spontaneously report things they associate with (free association) that particular word (e.g. cow [prime] = milk [free

association]) (Stacy, 1995). Using large population bases, association norms are established where certain concepts (cow) are believed to be strongly associated with others (milk). These association norms have been shown to have great predictive powers, and as such are referenced in a large number of publications as indicating word-association strength (Stacy, 1995).

Importantly for alcohol expectancy theory, Nelson and McEvoy (2000) have refined a method of free association that requires the participant to provide more than one associate to the given prime (Nelson and McEvoy, 2000). Individual experience with alcohol is not only various but dynamic (Reich & Goldman, 2005), and thus cognitive tests that allow the participant to elaborate on his or her alcohol association widens the associative scope. Nelson and McEvoy's results indicate that participants add, on average, twelve new words to an associate list when the test requires them to respond with more than one associate. While these words have been shown to be weaker members of the associate memory set list, they are reported by a sufficient number of participants to be considered legitimate associates none the less (Nelson & McEvoy, 2000). They state that this free-association test method produces data that is more reflective of association *strength*, as opposed to the *probability* of recall. Here, Nelson and McEvoy (2000) argue that when discussing free-association test data, it is not always accurate to assume that the least-stated word is the weakest in association. They believe that while a conventional free-association test is often able to identify the strongest associates, it is limited in its ability to identify words that are genuinely associated but not necessarily the strongest. This is important for alcohol expectancy theory, where it is believed that even words with low recall probabilities hold valuable meaning and strong psychobiological connections to experience and possible motivation (Reich & Goldman, 2005). By providing more than one associate to the prime "alcohol makes one...", alcohol-

expectancy researchers are able to compile a list of alcohol associates that is broad in its representation of memories of the alcohol experience.

In a bid to provide an up-to-date alcohol associate list, Reich and Goldman (2005) conducted an alcohol-related free-association test based on methods used by Nelson and McEvoy (2000). They stated that past alcohol associate testing methods, such as extensive interviews and likert scales, may not have provided a direct enough connection with implicit meanings. While the previously applied multidimensional scaling method was seen to be a useful and reliable method of mapping expectancies, Reich and Goldman (2005) stated that pursuing a wide range of cognitive methods is important in maintaining external validity and currency, reporting that free association may, in fact, be the best way to access specific memories regarding alcohol (Reich & Goldman, 2005).

When combining the data from all the drinker categories, the three most common responses were ~~sick~~," ~~happy~~," and ~~relaxed~~," with ~~sick~~" holding the highest probability among all drinker types. Non drinkers recalled the word ~~sick~~" at a probability of .11, and across all drinker types it's probability was .07 (Reich & Goldman, 2005). One of the major differences discovered between the free-association tests and the MDS was that negative expectancies, such as ~~sick~~," played a greater role (Reich & Goldman, 2005). The findings also showed that ~~happy~~" was less likely to be generated by non drinkers but increased in likelihood as drinking frequency increased. In fact, expectancies that are defined as positive, arousing, or both were observed increasing with drinking frequency, as has been reported in previous MDS research. Their results were also in line with previous alcohol-expectancy research in that alcohol can be considered a large set/weak primary group, where the list of associates is large and the most frequent responses have a low frequency in relation to other word categories (Nelson & McEvoy, 2000). In regards to a large set list, when asked to

complete the sentence “alcohol makes me...,” (Reich & Goldman, 2005), participants are said to vary greatly in responses. Reich and Goldman reported that drinker type categories (heavy, moderate, light, and non) were generating 40 to 60 associates each.

Taken as a whole, research and subsequent theory suggests that alcohol expectancy is formed at an early age; is influenced by parents’ attitude and other environmental influences; predicts the future drinking patterns of children; is a reliable indicator of adult drinker levels; is, when challenged, capable of decreasing alcohol consumption; is, when activated, capable of increasing alcohol consumption; and is, when activated, capable of causing several measurable changes in cognition. Thus, it can be said that the culmination of alcohol-expectancy research over a 30-year period has demonstrated that the expected effects of alcohol play a role in drinking behavior. As a result, alcohol researchers from various theoretical backgrounds are exploring expectancy in conjunction with other variables in an attempt to expand on the current alcohol-consumption framework. Importantly for the current research, one of those variables more recently being investigated is the genetic mutation ALDH2*2.

South Korean Alcohol Expectancy: A Completely Different Drinking Experience

If it is true that we choose things because we like them, avoid things because we don’t like them, and then use cognition to justify our resulting behavior (Zanjoc, 1968), alcohol-consumption levels could be described in simple terms: the more you like alcohol, the more you drink it. While light and non-drinkers tend to relate more closely with the negative effects of withdrawal, it is assumed that all drinker types (heavy, moderate, light) experience the initial positive effects unabated before they then experience the discouraging negative effects later on. This is not the case for individuals with ALDH2*2, however, whose experience of the early exhilarating sensations are tainted by immediate discouraging

physical effects. MDS models suggest that negative expectancy nodes are located further down the memory activation chain for heavy drinkers (Rather et al., 1992) and higher up the chain for lighter drinkers. This tends to suggest that the immediate negative effects being experienced by those with ALDH2*2 should result in negative expectancies being located perhaps even higher up this theoretical activation chain (Rather et al., 1992) than those with the normal wild (1/1) gene. Such negativity would then — given negative expectancy's negative relationship with drinking levels — theoretically result in lower levels of national South Korean alcohol consumption, as up to 30% of the population have ALDH2*2 (Brennan et al., 2004). Given their relatively high level of alcohol consumption — particularly among males (W.H.O., 2011) — this appears not to be the case.

Furthermore, while on the surface it may appear that those with ALDH2*2 should have similar alcohol expectancies to that of non- and lighter drinkers, it must be highlighted that they are having a completely different consumption experience — both positively and negatively. The negative effects, for example, suffered by those with the mutant gene are unique, with facial flushing, asthma, and dizziness (all known side effects for those with ALDH2*2) not common side effects for those with the affective ALDH2 (1/1) enzyme. Paradoxically, those with ALDH2*2 report higher levels of positive tension-reduction expectancy (Hahn et al., 2006), perhaps due to ACD's proposed addictive properties (Enrico et al., 2009). Again, this is likely to produce a very different encode / store / retrieve process that will manifest in different alcohol expectancies. Thus, it is likely that results from a South Korean alcohol free-association investigation would include expectations and descriptions for these unique reactions to alcohol that may not appear in previous research. Even assuming that these expectancies have been reported, their general levels and recall probability are likely to differ, where, for example, tension-reduction expectancy is likely to be higher (Hahn

et al., 2006) , and where the recall of words like “sick” are likely to be more probable.

Furthermore, it is widely accepted across cognitive theories of memory that repetitive exposure to stimuli and habitual behaviors leads to higher portability of recall in word-association tests. It has been suggested, however, that the unique elements of any given experience can lead to different perceptions of the relationship between certain adjoining features co-occurring in unison with any given concept (Stacy et al., 1997). If this is the case, then differences in cues or prime words that have been shown to affect certain behaviors may vary among populations with different languages and cultures. This is important for the current research given that a free-association test is believed to provide a glimpse into subconscious beliefs.

What is more, it has been suggested that association norms are somewhat overrated in their ability to represent an individual’s association (Stacy et al., 1997). Thus, extending Western alcohol free associations to an entirely different cultural population reduces generalizability and external validity. Considering the high level of ALDH2*2, the notion that memory sets will be affected by individual variations in experiences is particularly relevant to this South Korean population.

Conclusion

In one of the very few alcohol-expectancy studies conducted among a South Korean population, Park, Kim, Kim, and Sung (2007) found that the alcohol expectancy of homeless children in South Korea is similar in nature to those of their Western counterparts. Their research suggests young homeless South Koreans’ expectancy is in line with their social learning, where parents’ drinking behavior correlates with their own expectancy and their ultimate drinking levels (Park, Kim, Kim, & Sung, 2007). They suggest that alcohol expectancies need to be taken more seriously in South Korea, as they are important in

predicting future drinking patterns among this demographic (Park, Kim, Kim, & Sung, 2007). They also noted that to this point, intervention programs have been largely ineffective with young people in South Korea, and it could be argued that a better understanding of South Korean adolescents' expectancy could lead to better-informed interventions (Park, Kim, Kim, & Sung, 2007). As expectancy gives an insight into both individual and group alcohol experience, knowing how alcohol affects those in South Korea may help in trying to lower levels of dangerous consumption.

Importantly, Gaher and Simons (2007) conducted alcohol-expectancy research that focused on both the positive and negative alcohol expectancies of heavy drinkers. They argue that the focus on positive expectancy has resulted in limited knowledge of the negative. Notably, their results indicate that there are two types of heavy drinker that can be distinguished by negative expectancy: 1) those who stop when the consequences are perceived as high and 2) those who continue to drink despite the possibility of more serious negative outcomes. Gaher and Simons postulate that some heavy drinkers restrict themselves and/or abstain from drinking when they believe that drinking will negatively affect other aspects of their lives, meaning that those who ignore the negative consequences report drinking at even higher levels. They postulate that while positive expectancy has a powerful influence on drinking outcomes, there are occasions where a certain type of heavy drinker perceives heavy consumption as problematic, at which point negative expectancies appear more influential.

Recent free-association tests have also suggested that negative expectancies are more prevalent than first expected (Reich & Goldman, 2005). With this in mind, it would be assumed that negative expectancies should play a more prominent role in Asian communities who have high rates of ALDH2*2, as the buildup of ACD results in many negative physical

effects. While heavy drinkers with ALDH2*2 have exposure to high amounts of ACD, moderate, light, and non-drinkers do not, and it would be expected that this would result in higher negative expectancies due to ACD's proven protective nature.

For the current research, a thorough investigation of South Korean alcohol expectancies would require a reliable set of Korean free associations. Rather et al. (1992) reported that participants, when given 30 seconds to name as many alcohol associates as they could, generated over 800 words associated with alcohol, from which they devised their list of 132. They note that while many of the 800 words were similar in meaning, they believed that each of the final 132 words held unique meaning and significance, regardless of their probability of recall (Rather et al., 1992). It is expected that if South Koreans were similar to their Western counterparts and generated over 100 responses, the likelihood of identifying words that held unique South Korean meaning would be high. Furthermore, Nelson and McEvoy's (2000) research showed that even small adjustments in already well-established free-association tests resulted in several new and previously unassociated words being discovered. Considering that there is no set of South Korean alcohol expectancies, the possibility of unearthing words that have important connections to the South Korean experience with alcohol is hypothesized to be high.

Therefore, the current research will involve conducting an alcohol free-association test. The free-association test is important for three reasons: 1) it will establish a genuine set of South Korean alcohol expectancies from which the current research can translate a version of the current AEQ (Brown et al., 1980), 2) it will help establish an understanding of the level of negative expectancy that cannot be gauged by the AEQ, and 3) it will provide a list of expectancy words for use in both the current research and other future research wishing to conduct implicit alcohol tests among the South Korean population. It appears that perhaps the

extensive amount of alcohol-expectancy research that has been conducted over the past 30 years has allowed those exploring alcohol expectancy outside North American boundaries to take for granted the importance of the foundation tests that have formed the basis of expectancy research in that region. That is, without the results of alcohol free-association tests, AEQ questionnaires would have been developed using subjective content, and implicit tests would have been conducted without the knowledge that the vital content of those tests — the alcohol expectancy words — had come from the memory networks of the populations they are testing. Therefore, the free-association test not only provides important information on negative expectancy, but also allows the current research greater external validity when translating the AEQ, and when conducting implicit alcohol memory network testing.

Chapter 2

Study 1: South Korean Alcohol Free Associations: Negative Expectancy Does Not Predict Drinks Per Occasion

Note: The research reported in this chapter formed the basis for the publication Mahoney, Graham, Cottrell, & Kim (2011), which is presented in Appendix 1.

The latest World Health Organization (W.H.O.) global alcohol consumption figures (2011) estimate that South Koreans drink nearly 15 liters of pure alcohol a year for every person over the age of 15, which is nearly five liters more than the Australian average. This is reflected in the male alcohol dependence rate, which is 13% for South Korea and 6% for Australia (W.H.O., 2011). The high rate of South Korean alcohol consumption appears to be largely driven by the male population, where, for example, males drink around 18 liters a year compared with 1 liter for females, and where in rural areas, lifetime alcohol dependence rates have been shown to be 22% for males but only around 1% for females (W.H.O., 2004). It has been suggested that Confucianism may affect such large consumption rates and gender differences, where people report feeling pressured to partake in social binge drinking, but where females are often discouraged from partaking (Yun & Park, 2008).

This high level of alcohol consumption among South Korean males is somewhat surprising given that research suggests Asians tend to report lower levels of alcohol consumption (Oei & Jardim, 2007; Ohare, 1995; Substance Abuse and Mental Health Administration, 2007). A comparison between Asian university exchange students and Australian university students indicates, for example, that Asians have a higher level of negative alcohol expectancy that mediates their lower level of alcohol consumption (Oei & Jardim, 2007). Given that high levels of negative alcohol expectancy has been shown to negatively correlate with alcohol consumption (Jones & McMahon, 1994), the notion that an

East Asian population like South Korea may have both high levels of alcohol consumption and high levels of negative expectancy is interesting.

Free-association tests have formed the basis of a great deal of alcohol-expectancy research, where, for example, the Alcohol Expectancy Questionnaire (Brown, Christiansen, & Goldman, 1987) was constructed using responses from an alcohol free-association exercise. Expectancy researchers encourage both the updating of these alcohol associate lists and the exploration of expectancy among different populations, as it is acknowledged that expectancy can vary among different groups (Reich & Goldman, 2005). Given that South Korea has its own language, a large population with ALDH2*2, and different cultural values (e.g. a strong belief in Confucianism), the gathering of a set of South Korean alcohol associates would not only give information to those wishing to understand potential alcohol expectancy differences that may exist among different populations, but also help inform those in South Korea attempting to lower the high levels of alcohol consumption among males.

Method

Participants.

The participants, 257 Daegu Health College students (150 Female), were recruited from their English language classes, where the testing took place. The average age was 20.3 years (SD = 2.8). Participants originated from various parts of South Korea, but mainly from the Daegu region. Participants were from four different departments: nursing, radiology, technology, dental hygiene, and pathology. South Korean education enrollment records in 2009 suggest that 2.7 million South Koreans attended university or college, which was the second highest per-capita higher education attendance rate in the world that year (Korean National Statistics Office, 2009). Furthermore, Deagu is the third-biggest city in South Korea, with around 2.5 million people (Korean National Statistics Office, 2009). Therefore, their

level of education is equivalent to that of a great deal of their peers, and the sample resides in a rather populous area of the country, indicating that the sample may be considered a reasonable representation of the young South Korean community.

Measures.

Alcohol free-association test.

The free-association test was based on Reich and Goldman's (Reich & Goldman, 2005) (see Appendix 2 & 3) and was designed to generate spontaneous responses to the statement —alcohol makes me..." The test sheet contained the following instruction in Korea:

Please complete the following statement without hesitation with whatever comes to mind.

Alcohol makes me...

The test contained five blank lines, giving the participants five chances to respond to the prime in Korean.

Demographic survey.

The demographic survey included four questions of interest embedded among 11 other general health and lifestyle questions (e.g. Do you smoke?), two of which were related to alcohol consumption (see Appendix 4 & 5) Self-reported alcohol consumption has been shown to be a reliable form of alcohol-consumption assessment (Del Boca & Darkes, 2003), and was therefore used in the current research. One of the alcohol consumption questions pertained to the number of times per month alcohol was consumed, and the other referred to the amount of alcohol that was typically consumed per occasion. To gain further information about the drinks consumed per occasion, the participants were encouraged through an example to list the type of drink they consumed and how much they typically consumed in

one occasion. This information enabled the calculation of reported standard drinks per occasion. A standard drink was set in accordance with UK guidelines of 10 mls of pure alcohol (International Centre for Alcohol Policies, 1998). The drinker categories were partitioned in accordance with their drinks per occasion to allow for general comparisons between the Reich and Goldman (Reich & Goldman, 2005) study and the current results.

Procedure.

The testing occurred at the end of each group's English language class. The participants completed the free-association test followed by the demographic survey in November 2009. The survey was administered second so as to avoid any unwanted alcohol priming. The participants were given a maximum of two minutes to complete the free-association test and were given at least three minutes to complete the survey. The testing took place in a classroom setting where there were no implicit alcohol cues (e.g. alcohol advertising or objects that could be directly associated with alcohol). A Korean translator was used to explain all of the details and requirements, and the entire test was conducted in Korean. The participants were informed that if they felt like leaving they could do so at any time, but once they had handed in their forms, their consent was implied (for consent forms, see Appendix 6 and 7). It was made clear that their names and student numbers were not required, and thus their results would remain anonymous. The students were also informed of the importance of independence, and were told that the data from participants who talked during the testing period or who were found observing the responses of others would be removed from the research.

Results.

The mean number of standard drinks per occasion for females was 5.96 (SD = 4.53) and 8.58 (SD = 6.34) for males. As some categories contained fewer than 10 participants (2

and 6 drinks per occasion), the individual drinks per occasion categories were collapsed as follows: non-drinkers, 1–3 drinks, 4–6 drinks, 7–9 drinks, and > 9 drinks per occasion.

Analysis of multiple responses.

Allowing for more than one response has been shown to lead to chaining, where the participant begins responding to his or her previous *responses* rather than the prime. For example, when given the prime “~~e~~ow,” a typical first response might be “~~m~~ilk.” The participant may then begin, however, to associate with “~~m~~ilk” rather than “~~e~~ow”. Here, they may start giving response such as “~~e~~hocolate”, “~~s~~trawberry”, or “~~b~~anana” (as in “~~e~~hocolate milk”). This could potentially provide problems for the current study, which allowed for up to five responses, as alcohol has been shown to be a large set/weak primary category, where there are a large number of various responses given by participants that have very little interconnection with each other. Therefore, if it can be demonstrated that chaining is not occurring, then increased numbers of expectancies can be gathered to increase the accuracy of the list. Gathering as many expectancies as possible is important, as Reich and Goldman (Reich & Goldman, 2005) have noted that even alcohol free associations with low probability hold unique value for individual participants.

There are two ways that chaining can be identified (Reich & Goldman, 2005; McEvoy & Nelson, 1982). Firstly, by conducting a between-subjects analysis correlating the frequency at which first responses are given with the frequency of their appearance in the remaining four responses, and secondly, by assessing the evenness of the set sizes. In regard to the first process, “~~h~~appy”, for example, had its frequency of first response among the population calculated. This was then compared with its frequency as a second, third, fourth and fifth response. If there is a high correlation between its frequency of responses when given as the first with their frequency when given second, third, fourth and fifth, then it is

believed to indicate that the response was given to the prime rather than the responses following it (Reich & Goldman, 2005; McEvoy & Nelson, 1982). When taken together, the between subjects bivariate correlation between the first responses and responses 2–5 was large ($r = 0.73$, $n = 40$, $p < .01$), indicating no evidence of chaining. Set size identification is the second method of chaining identification, which refers to the investigation of the total number of individual responses given across the entire population within a given set. As participants are given 5 “chances” to respond, there are 5 sets within which responses can be given. If the number of total responses is even across the 5 sets across the entire sample, then it is argued that the responses have been given to the prime rather than the other responses. The entire set sizes across responses 1 to 5 were 40, 44, 40, 42, and 44, respectively. This indicates that responses were given to the prime rather than a previous response.

Data refinement, probability, and octant categorization.

The mean number of responses given by each participant was 4.6 (SD = 1.0). A similar process was employed to Reich and Goldman’s study (Reich & Goldman, 2005) to reduce responses to their simplest form. This involved removing the subject (e.g. me) and other parts of speech (in, with, at, etc.) to arrive at the adjective, verb, or noun that was believed to be the core response. Reich and Goldman used a group of students to perform this refinement task, as they were the same age as the population being tested and were assumed to have a better understanding of the responses than the researchers themselves. The current investigation also employed this procedure, but included a native South Korean speaker fluent in English to help with the translation and consensus process. Two research assistants were given the raw data and asked to process the original Korean responses first in Korean, and then in English. Once this process was completed, the translation was assessed by the South Korean translator, and whenever any differences in interpretation were identified, these

were discussed and finally agreed upon by all three parties. They reached agreement in all cases.

To calculate the probability of a response, the frequency of the response across all five response categories (response 1, response 2 ... response 5) was calculated and then divided by the average responses (4.6). This gives the likelihood of particular words being recalled when a participant is primed with “alcohol makes me” (for a table of the top 30 associate probabilities, see Appendix 8).

The next stage required expectancy categorization. The original intention was to categorize responses into one of the eight expectancy octants (Goldman & Darkes, 2004). However, less than 15% of the translated South Korean responses could be assigned to these categories on the basis of the English words that were placed into the octants by Reich and Goldman. Therefore, two volunteer students were employed to manually place the majority of South Korean expectancies into the octant categories. Again, any queries or disagreements were resolved by consensus (see Appendix 9).

Alcohol Associate Recall Analysis

The most frequent response across all drinker types was “feel good” (probability =.12), with “dizzy” second (.09), and “sleepy” and “dopey” both third (.05). As the number of drinks per occasion increased, the probability of recalling “feel good” also increased, while the probability of recalling “dizzy” decreased. The probability of recalling “sleepy” and “dopey” was relatively consistent over consumption levels (see Figure 1).

Predicting Drinking Patterns

Before performing a linear regression analysis, three expectancy categories (aroused, negative aroused, and positive sedated) were removed due to the low probability (<.01) of these responses. Therefore, a regression analysis was performed on six independent variables,

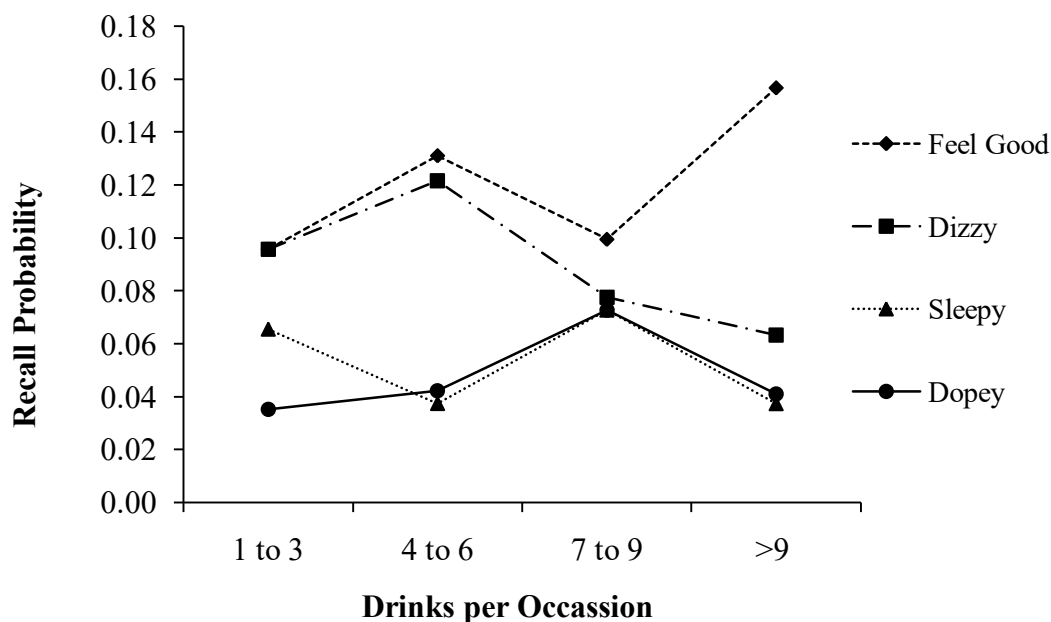


Figure 1. Recall probability of the four highest Korean alcohol associates.

being the remaining five expectancy categories — positive, positive aroused, sedated, negative sedated, and negative — along with gender, with drinks per occasion as the dependent variable. The results showed that there are three predictors of drinks per occasion: positive expectancy, gender, and positive aroused expectancy. These predictors accounted for almost 14% of the variance (see Table 1).

The results indicate that responses categorized as positive and positive aroused are more likely to be given as drinker level increases. Gender was also seen as predicting drinker level, with the negative b statistic indicating that males are drinking more than females. Plots of the positive and positive sedated expectancy categories are presented for both males and females (see Figure 2). Given the importance to the results, negative and negative

sedated are also presented (see Figure 3) to illustrate the trends of the negative expectancy categories among the South Korean population.

Table 1.

Linear regression analysis model of expectancy categories and gender predicting drinks per occasion.

Predictors	B	t-Statistic	SE
Gender	- 0.494	-3.347*	0.147
Positive Aroused	0.356	2.774*	0.128
Positive	0.345	3.893*	0.089
Sedated	-0.049	-0.316	0.154
Negative Sedated	0.020	0.262	0.076
Negative	0.038	0.404	0.095

Final Model adjusted $R^2 = .13.8^*$, $F(6, 251) = 7.853$

Note. Males entered as 1, Females entered as 2.

* $p < .01$

Discussion

The current results differ from previous expectancy research in several areas. Most notably, the data indicates differences in alcohol associates with high probability of recall, and in alcohol expectancy category prediction of alcohol intake levels. The current research postulates that differences in language, culture, and biology are likely to affect the way in which alcohol experiences are co-encoded. The prevalence and even appearance of words

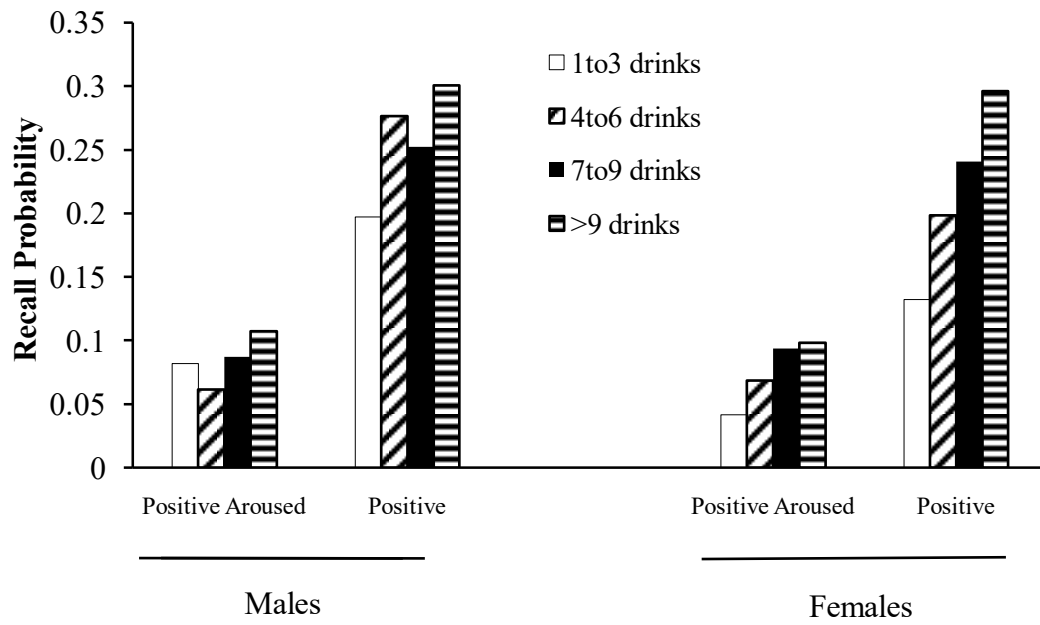


Figure 2. Recall probability of “Positive Aroused” and “Positive” words by alcohol consumed per drinking occasion.

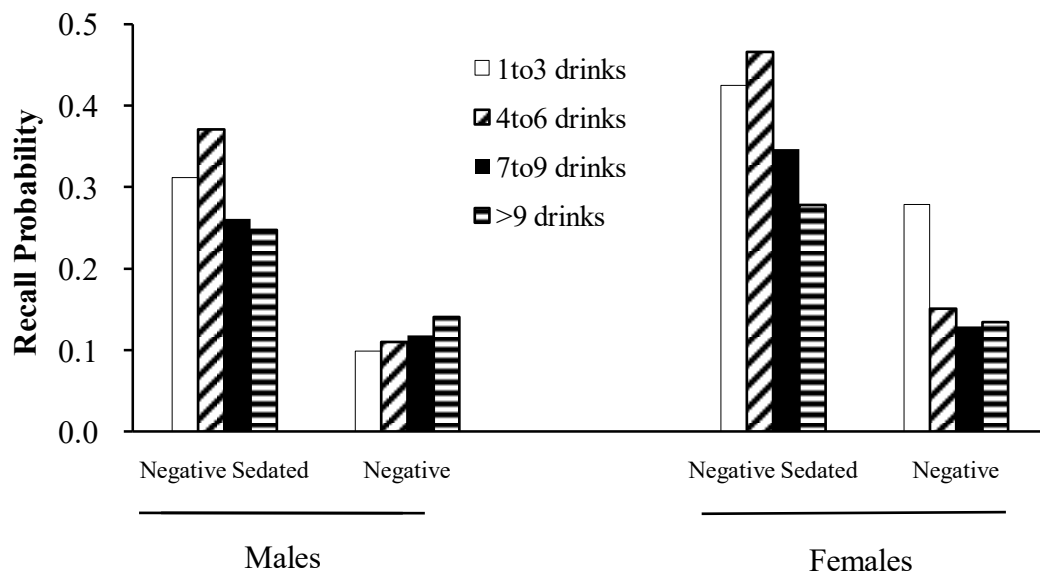


Figure 3. Recall probability of negative expectancy words by alcohol consumed per drinking occasion.

strong in association, such as ~~-dizzy,~~ ~~-tasteless,~~ and ~~-stomachache,~~ appear to represent unique aspects of the South Korean alcohol concept not found in previously explored populations. The current results also suggest that female drinking rates may be increasing, as while there was a significant difference in drinks per occasion, this difference did not reflect previous figures that have shown that males drink 18 times the level of females (W.H.O., 2004).

Associate Recall

The meaning of associates highest in recall probability appears to indicate differences in experience. The current research reports words like ~~-feel good~~ and ~~-dizzy~~ as strong associates, whereas previous alcohol-expectancy research has tended to report words like ~~-happy~~ and ~~-sick~~ as high in association (Brown, Goldman, Inn, & Anderson, 1987; Reich & Goldman, 2005; Miller, Smith, & Goldman, 1990; Goldman, Brown, Christiansen, & Smith, 1991). Although ~~-dizzy~~ and ~~-sick~~ are both negative in connotation, they are dimensionalized in different negative expectancy octants: sick is considered negative while dizzy is considered negative sedated. It is also worth noting that one of the negative effects experienced by those with ALDH2*2 during drinking is dizziness. Interestingly, eight of the top ten South Korean associates were classified as negative or negative sedating. Past expectancy research has tended to indicate that the positive alcohol expectancies are more prevalent than negative, but our results would support more recent research indicating that negative expectancies are higher in association than originally thought (Reich & Goldman, 2005).

When breaking down alcohol associates by drinks per occasion, the results of the current study are in some ways consistent with existing alcohol associate and expectancy norms, where, for example, the current study observed the trend of increased recall of the

strongest positive associate with increased self-reported drinks per occasion. However, whilst recall for the associate “dizzy” tended to decrease with increased drinks per occasion, “sleepy” and “dopey” remained steady or even appeared to increase over increasing consumption. Therefore, whilst positive association does tend to increase with drinks per occasion, it appears that negative association is at a steadier level across all drinker types when compared with past alcohol expectancy studies.

Predicting alcohol consumption from alcohol expectancy

One of the major findings of the current study is that the expectancy categories negative, negative sedated, and sedated were not significant predictors of drinks per occasion. Whilst results are in line with previous research (Reich & Goldman, 2005; Goldman & Darkes, 2004) in that gender and the expectancy categories positive and positive aroused predicted drinks per occasion, the failure of the negative, negative sedated, and sedated expectancy categories to predict drinking behaviour indicates a difference in the drinking experience and likely motivation for drinking. This may account for the smaller predictive power of the current regression model, which accounted for only 14 % of the variance, while Reich and Goldman found that five expectancy categories and gender significantly predicted drinking and accounted for around 25% of the variance. Past expectancy research has reported that negative expectancy responses are more likely to be generated by those in lighter drinker categories. This was not the case in the current study with higher levels of negative expectancy not predicting lower levels of consumption.

Results regarding male and female consumption were also notable, with gender being identified as a significant predictor of drinker level. However, the difference in drinks per occasion of males and females was not as pronounced as W.H.O. data suggests (2011). Whilst female drinks per occasion were significantly lower than that of their male

counterparts, the current results tend to support statistics that have put an overall increase in South Korean national alcohol sales down to an increase in women's drinking (Korean National Statistics Office, 2009).

Conclusion

Overall, the results suggest that there are some unique aspects to South Korean alcohol free associations and expectancy, where negative expectancy is at an even level across all drinker types, lending support to the belief that even though negative expectancy has been shown to be influential in alcohol avoidance (Hendershot, et al., 2009; Jones & McMahon, 1994), positive expectancy is a more powerful influence over drinker levels than negative. The results indicate that negative expectancy, whilst reported at more even levels across drinker levels, appears to have less of an influence on a South Korean population's consumption level and that rather positive expectancy is more influential, particularly for males. These results then raise the question as to how those with higher levels of negative expectancy are able to maintain heavy drinking. Given that past research has shown that negative expectancy correlates with lower levels of alcohol consumption, variables that may influence the high levels of intake among those with high expectancy is of interest.

Chapter 3

South Korean Drinking Practices, ALDH2*2, and Cultural Differences

East Asian Alcohol Consumption

Recent research indicates that there are several defining features of Asian drinking patterns (Mahoney, Graham, Cottrell, & Kim, 2011; Oei & Jardim, 2007). Although South Korea has been shown to maintain high per capita drinking levels, Asians have been generally reported as drinking less than Caucasians, more likely to be non-drinkers, and less likely overall to be problem drinkers (O'Hare, 1995; Oei & Jardim, 2007; W.H.O., 2011; Wolff, 1972). Oei and Jardim have reported, for example, that Asian university students in Australia (the majority of whom were not permanent residents of Australia) have a higher level of negative expectancy, which is believed to influence their lower levels of alcohol consumption when compared with Caucasian counterparts.

There have, however, been fluctuations in alcohol consumption levels throughout East Asian history (Lee, 1987). Despite the East Asian region's current, comparatively lower levels of alcohol intake, the latter half of the twentieth century saw a general upward trend. Here China, Taiwan, and South Korea all experienced an eight to tenfold increase in drinking rates (for review, see Johnson & Nagoshi, 1990). Johnson and Nagoshi argue that this kind of spike indicates that culture and/or other circumstances (e.g. economic) are heavily influential. They cite research, for example, stating that Asian-Americans tend to exhibit drinking styles more akin to Americans than Asians living in Asia. Here, Hawaiians with Japanese ancestry have reported consuming alcohol at similar levels to their Caucasian counterparts (Lee, 1987), with Asian Americans overall not drinking significantly less than other minority groups in America (So & Wong, 2006). Therefore, it is believed that environment is highly influential on East Asian drinking levels and that ALDH2*2 is not the only mediator of intake.

Interestingly, a series of case studies concerning first- and second-generation Korean Americans suggests that, in areas of America where South Korean culture is thriving (e.g. Los Angeles), alcoholism rates of South Koreans are higher (Yun and Park 2008). They report that South Koreans living in Los Angeles are almost three times more likely to be alcohol dependent than those living in areas with fewer South Korean expatriates, like St. Louis. Yun and Park's case studies suggest that some expatriate South Koreans continue their heavy drinking patterns — those they were often trying to escape from when moving to America — through the existence of strong South Korean communities. Here, games like *Jan-Do-Li-Ki*, where a glass of alcohol is passed and refilled from guest to guest, are believed to encourage dangerous levels of intake (Yun & Park, 2008). Therefore, unlike other East Asian nations, it appears that Korean Americans already drink at high levels and are actually drinking more when they are exposed to their *own* culture (Yun & Park, 2008).

Yun and Park (2008) indicate that South Korean alcohol consumption patterns are being heavily influenced by the strict observance of Confucian rules, where, for example, it is believed that women should not drink. They suggest that this sort of hierarchical culture leads to subservient alcohol-related behavior. They identify two Confucian rules that commonly guide such beliefs: 1) *Samgang*, where the emperor guides the subjects, the father guides the son, and the husband guides the wife; and 2) *Samjong*, where daughters obey their father, married women obey their husband, and widows obey their oldest son (Kim, 1979, cited in Yun & Park, 2008). The national South Korean drinking rates lend support to the assertion that Confucianism is still influential in modern-day South Korea, with women drinking at very low levels when compared with other developed nations (W.H.O., 2011).

Confucianism is not exclusive to South Korea, however, with East Asians in general tending to have a more group-orientated social construct, based on such philosophies (Nisbett,

2003). The Japanese and American ideas of success and failure, for example, are said to reflect such East Asian/Western differences (Heine et al., 2001). Heine et al. tested this by exploring possible cultural differences in the desire for improvement. In their study, the participants believed that they were partaking in an emotional intelligence test. After the testing period had finished, however, the participants were given the answer sheet to check their responses. Following this, the participants encountered a contrived situation of a software malfunction for the next test. To keep them busy while the research assistant tried to fix the problem, the participants were offered a different version of the initial emotional intelligence test. Of those who performed poorly on their first test, Japanese participants appeared to show greater interest in the practice test sheet than their North American counterparts. This is believed to demonstrate a greater desire for improvement. One reason put forward by Heine et al. (2001) for this is the Japanese notion of *yokonarabi*, which when roughly translated into English means that it is better to have the group lined up together than one or two ahead or behind. This philosophy fits well with the Confucian notion of the group, and suggests that perhaps when applied to drinking alcohol, East Asians may be more inclined to try to ~~keep up~~ "keep up" with others in the group more so than Westerners.

ALDH2*2 and South Korean Alcohol Consumption

Genetics are believed to play an important role in alcohol consumption, with the Collaborative Study on the Genetics of Alcoholism indicating that there are several genetic markers that may help identify problematic alcohol consumption (COGA). In this ongoing study, patients from intervention program centers are recruited to take part in a wide-ranging investigation of the genetic variables associated with alcoholism. Along with genetic analysis of the participants and their families, interviews, questionnaires, physicals and neurological (electrophysiological) tests are conducted to compile a comprehensive log of hereditary data

(Bierut, Saccone, Rice, Goate, Fround, et al., 2002). Although a low level of response phenotype has been identified, where, for example, twin studies have shown that a high tolerance to alcohol is both genetic and predicts alcohol dependence, very few studies have been able to identify a consistent gene for alcoholism (Erikson, 2007).

According to Ball (2007), the presence of the genetic mutation ALDH2*2 is, however, a consistently reliable indicator of *lower* levels of alcoholism. A collection of research suggests that this enzyme fail to process a toxic byproduct of EtOH (ACD) as fast as individuals with the wild, naturally occurring ALDH2 (Muramatsu et al., 1995; Lee et al., 1997; Ramchandani, 2001; for review, see Brennan et al., 2004). This results in a buildup of ACD, which causes several adverse side-effects. Whilst the most noticeable reaction is a flushed, red face, other negative effects include stomach irritability, cardiovascular disturbance, nausea, drowsiness, and headaches (Agarwal & Goedde, 1992). These unpleasant outcomes are so discouraging that alcohol abstinence medication like Antabuse is designed to mimic ALDH2*2's reduced effectiveness.

In regard to process, alcohol is ingested orally and then absorbed through the stomach lining, where it is then metabolized in the liver. Here, alcohol dehydrogenase (ADH) first turns EtOH into ACD (Edenburg, 2007; Quickfall & el-Guebaly, 2006), before ALDH2 then oxidizes ACD into acetate. However, individuals who have a form of the mutant allele ALDH2*2 remain unable to break down the ACD effectively, with both the heterozygous (2/1) and homozygous (2/2) mutations less effective (Crabb et al., 1989, cited in Thomasson et al., 1991)². These two ALDH2 enzymes break down ACD at different rates

² The term ALDH2*2 encompasses both the ALDH2 (2/1) and ALDH2 (1/1) mutation, while the term –wild” describes the naturally occurring, more common ALDH (1/1) gene.

to each other, where those with the least efficient homozygous allele are virtually incapable of problematic alcohol consumption due to the severe negative effects. This difference in break-down efficiency is somewhat illuminated in problem drinking rates. Those with the ALDH2 (2/1) allelic combination are four times less likely to have alcohol dependence than those with ALDH2 (1/1), and those with ALDH2 (2/2) are six to seven times less likely to have alcohol dependence than those with ALDH2 (1/1) (for review, see Quickfall & el-Guebaly, 2006). While there is also research suggesting that ADH mutations are capable of having an effect on the likelihood of problem consumption, there are conflicting reports suggesting otherwise (for review, see Ball, 2007). Ultimately, ALDH2*2 remains the only consistent and reliable genetic predictor of alcohol dependence rates (Ball, 2007).

Interestingly, however, research has also shown that while those with ALDH2*2 are having a more intense alcohol experience than those with the wild (1/1) type, it may not necessarily be completely negative (Wall, et al., 1992). Wall et al. have shown that upon the ingestion of small amounts of alcohol, those with ALDH2 (2/1) actually reported a more positive experience. This is in line with research suggesting that injecting ACD into the ventral tegmental area of the brain creates DA release that is stronger and longer lasting than that of ethanol (Enrico et al., 2009). As stated previously, ACD is said to be largely prevented from entering the brain by the blood brain barrier (Melis et al., 2009). However, an enzyme found in every organ of nearly all oxygen-processing organisms — catalase — is, in fact, capable of processing ACD (Chelikani, Fita, & Loewen, 2009). From this it has been suggested that there may be, while in small proportions, some amount of ACD being processed in the brain. However, Enrico et al. suggest that injecting ACD directly into the ventral tegmental area in no way replicates the complex interaction occurring when alcohol is taken orally. Although the above research provides evidence to suggest that ACD likely

mediates EtOH's reinforcing properties, there still remain questions as to how high levels of acetaldehyde may participate in encouraging alcohol consumption.

However, the notion that ACD has reinforcing properties helps illuminate how countries like South Korea can have both a high prevalence of ALDH2*2 (Godde et al., 1992) and high levels of national alcohol intake (W.H.O., 2011). As stated, international alcohol consumption figures place South Korea particularly high for an Asian nation. Even when not including the estimated unrecorded alcohol consumption of 5 liters (W.H.O., 2011), the OECD have reported their recorded alcohol intake at an average of 9.3 liters a year per person over the age of 15 (OECD, 2011). Here it's worth emphasizing that males are consuming the vast majority at around 18 liters (W.H.O., 2004). Importantly, however, Cho et al. (2008) suggest that increasing social power among women appears to be leading to changes in their drinking patterns. While women's economic and political status are still lower than that of women in other developed countries, Lee (2007) states that a 2.4% increase in alcohol sales in 2006 can be largely attributed to an increase in women's consumption.

Notably, a World Health Organization (2011) report indicates that South Korea's high alcohol consumption levels are resulting in high alcoholism rates, particularly among men (W.H.O., 2004). A 2001 National Health and Nutrition survey reported, for example, that the rate of alcohol dependence in South Korea was 12.8% for males and 3.7% for females (W.H.O., 2004). Furthermore, a 2001 urban household survey of 3134 Koreans applied DSM-III criteria to self-reported drinker levels and found that 8.8 % of the Korean population in the metropolitan Seoul area experienced lifetime alcohol dependence, with the gender split being 17.2 % males and 1% of females (W.H.O., 2004). This gender difference is exacerbated in rural areas (Min, Noh, Shin, Ahn, & Kim, 2008), where the total lifetime prevalence is 11.7%, and the gender split is 22.4% male and only 0.7% female (W.H.O.,

2004). The W.H.O. (2004) report also states that 86% of the population aged 20-29 in 2001 were drinkers, up from 78% in 1999. This trend is set to continue, as 68% of students between the ages of 12-16 report drinking on a monthly basis, while 28% report drinking weekly (W.H.O., 2004).

Importantly, research suggests that some intervention programs for problem drinkers are less effectual in South Korea. Namkoong et al. (2003) reported, for example, that Acamprosate (a drug used to stabilize the chemical imbalance thought to be caused by problematic alcohol consumption) is significantly less effective on South Korean alcoholics when compared with European samples. They suggest that this may be due to the fact that there is a different definition of "alcoholic" in South Korea, where their sample was said to be more representative of acute alcohol dependence (Namkoong et al., 2003). They postulated that this may have been influenced by the general belief in South Korea that heavy drinking is a symbol of strength and manliness. Namkoong et al. suggest that South Koreans only consider a heavy drinker to be an alcoholic when it is obvious that their physical, financial, and social status have been adversely affected.

Environment, Language, and the East Asian Dislike of Debate

The notion that social settings and culture can affect drinking behavior is relevant to the current research, as environment has been shown mediating alcohol expectancy and consumption levels not only in children as previously outlined, but also in adults (McCarthy, Aarons, & Brown, 2002). Research has suggested that when treatment program patients receive improved educational resources and are provided with a more diverse peer group, reduction in both positive expectancy and consumption occurs (McCarthy, Aarons, & Brown, 2002). Such changes in their social environment are believed to sharpen participants' focus on future outcomes through a different social learning context and a range of different

reinforcers from which changed drinking behavior is more achievable. The exploration of the effects of cultural change on drinking practices is important to those exploring East Asian alcohol expectancy. Differences in customs and communication styles may help explain why the high levels of negative expectancy found among South Korean heavy drinkers does not necessarily reduce their alcohol intake, as seen in study 1 (Mahoney, Graham, Cottrell, & Kim, 2011).

Importantly, East Asians are said to engage in shorter forms of communication, where group harmony and the desire for consensus are more common than in Western cultures (Becker, 1986). This is believed to have been influenced by the early transition of messages between communities, where Chinese symbols were placed on tortoiseshell pieces and thus had to be short in length (Becker, 1986). One line, therefore, was restricted to four symbols, and is still today the standard size of a line of Chinese dialogue (e.g. long time, no see) (Becker, 1986). This is believed to have contributed to the dislike of elongated, richer sentences. For example, East Asian languages more often have an absence of such things as plurals and tenses (Becker, 1986).

Those studying East Asian culture have noted that East Asian languages are often viewed as more a form of art than a vehicle for debate (Becker, 1986). Thousands of Chinese symbols have, over the years, been superseded with many different meanings, which has led to great confusion and even greater reliance on context. This multiple meaning is said to be so confusing that listening to people read Chinese, for example, is at times almost unintelligible (Becker, 1986). Things such as East Asian poetry and comedy have benefited greatly from this, as turns of phrase are more easily enlisted (Becker, 1986). Furthermore, this superimposing of different meanings onto the same symbols has proved particularly difficult for the Japanese, who have, over time, adopted several Chinese

characters. The problem lies in the fact that the Chinese use different tones to distinguish the meaning of words with the same phoneme. This might not have been an issue were the Japanese interpreters not linguistically tone deaf (Becker, 1986). Thus, adopting symbols with various meanings that can only be distinguished by tone has created confusion. This is again particularly problematic when reading aloud to others, where Japanese speakers often need to write or physically describe the word to distinguish the meaning (Becker, 1986). This combination of smaller dialogue and occasionally confusing vocabulary is said to have contributed to somewhat shorter and sometimes awkward forms of public communication (Becker, 1986).

It has also been observed that in Chinese social gatherings, the general communication style focuses on shared experience, where singing, dancing, chanting, and group consensus via repetition of sentiment are sought (Becker, 1986). Becker (1986) states that language in East Asian cultures is used less as a means of sharing ideas, stories, or concepts and rather more as a means of organizing. A common greeting in Korean, for example, *shiksa hasgesayo* (have you eaten?), is not focused on how one is (how are you?), but rather on what one has or hasn't done. Here, if one has not eaten, then a meal may be arranged. A lack of desire for rich discourse is also said to exist, with non-verbal forms of communication common, and where people of East Asian countries are said to share a common "gut feel" in certain communicative situations and see no need to express it in words. This "sixth sense" may seem supernatural to Westerners, but is an everyday, mundane occurrence for East Asians (Becker, 1986).

Importantly, in recent years Japan, Korea, and China have all at different stages developed world-leading economies. This is known to have required the adoption of Western-style politics, government structures, media, and communication systems (Becker,

1986). It seems, however, that there has been little change to the acceptance of public debate, where the tolerance of argument has failed to reach the levels of those in the West. Although there was a period of time in China when logical debate was adopted and engaged in, those who did so were loathed and criticized for compiling complicated and intricate layers of arguments that made it impossible to respond to (Becker, 1986). Debate is, however, seen as an important part of Western culture. It is believed that one of the critical characteristics that set Greek society (and Western cultures influenced by it) apart from the East was the idea of the “self” at the center of social power and personal happiness, where external influences such as government and “divine interventions” (god) are seen as working in conjunction with individual choice (Nisbett et al., 2001). Furthermore, laws set down by governments were believed to actually have been established by the people, as they were developed and passed by their local representatives (Nisbett et al., 2001). In early Greek society, everything and everyone was open to critique, from the marketplace to the king’s hall, where debating was not only seen as a right, but an important skill second only in importance to fighting ability (Nisbett et al., 2001). This Greek form of independence did not evolve in China, however, where the legal system, for instance, operated with complete authority given to the decision makers.

Generally, the early Chinese were well known for not being very open to other countries’ ideas, inventions, or even natural wonders (Nisbett, 2003). The Chinese were more advanced technologically than the ancient Greeks, which may have contributed to the dismissing of notions from other philosophies concerning not only logic and law, but also medicine and other sciences (Nisbett et al., 2001). Here, the early advances of the Chinese in cutting-edge level of technology is said to have more likely come about from their functional practicality, rather than any form of scientific investigations (Nakamura, 1985, cited in

Nisbett et al., 2001).

Further compounding the lack of desire for debate is the general inability for East Asians to comprehend how Western people publicly disagree on political issues but remain friendly on a personal level (Cromer, 1993, cited in Nisbett et al., 2001). East Asians perceive such questioning of a person's beliefs, particularly in public, as an insult, where one risks establishing lifelong enemies when engaging in such behavior (Cromer, 1993, cited in Nisbett et al., 2001). Thus, finding the middle ground is considered the more attractive proposition to disagreement (Ji, Peng & Nisbett, 2000).

Early ecological divergences are put forward as an explanation for these differences, where, for example, an East Asian community's success and vitality depended on unwavering cooperation (Nisbett, 2003). Historically, East Asians relied on the cultivation of rice, which required labor-intensive work, including irrigation, harvesting, and milling (Nisbett, 2003). Communities were truly interdependent, where little experimentation was enlisted, as a failure of crops would very likely result in starvation (Becker, 1986). There was also very little travelling done, as the planting and harvesting season were never ending. Such consistency of life is believed to have led to a great deal of respect given to the elderly and the most experienced members of the community. This was especially the case when facing natural disasters that threatened the crop or the group at large (Becker, 1986). It's believed that this seed of respect has contributed to the hierarchical systems that exist in Eastern Asian countries today, where age and social status are observed strictly. This extends not just to family, but to all aspects of society, where individuals are made to feel a part of a much broader community, and where the ultimate end goal is social harmony.

This lack of desire for public debate may be particularly true in South Korean culture. Research has shown that when recalling a story heard the previous day, Korean children are

not only significantly less descriptive than American students, they are also less descriptive than Chinese students (Han, Leichtman, & Wang, 1998). Han, Leichtman, and Wang have suggested that Korean children may be less inclined to draw attention to themselves in ways that Western children do, as Confucianism dictates that children are subservient to their parents (Han, Leichtman, & Wang, 1998). It was hypothesized by Han, Leichtman, and Wang that this would be also true for the Chinese students, with the authors noting their surprise at the results. They postulate that China's one-child policy, which was adopted in the late 1970s, may have produced a more open environment for Chinese children. This development may provide them with a more "Western-like" upbringing, which may not be as available to South Korean children (Han, Leichtman, & Wang, 1998).

As research suggests that these differences in culture may have an effect on drinking habits (Namkoong et al., 2003; Yun & Park, 2008), such theory has implications for the current study. If it is undesirable to challenge a senior's opinion in public, then those with ALDH2*2 may be feeling compelled to drink despite the negative effects of the buildup of ACD. Given though that not all South Koreans are heavy drinkers, defining cognitive factors that distinguish those who are more likely to adhere to these Confucius rules and participate in heavy drinking may help explain the high levels of South Korean alcohol consumption.

Integrating Expectancy: Psychological Variables That May Influence South Korean Drinking

One area of research that may be able to provide some important information for those investigating alcohol expectancy and ALDH2*2 is the notion of stimulus devaluation. Drug devaluation, for example, occurs when motivation for consumption is diminished through induced aversive states in direct association with the stimuli, such as unfavorable odors and illness (Samson et al., 2004). Research suggests that in the presence of aversive

condition, such as a bad taste, the reinforcement contingency of the response becomes devalued (Williams, Ploog, & Bell, 1995). Behavioral theories suggest that rewarding stimuli generally tend to illicit approach behavior (Veling, Hooland, & van Kippenburg, 2008), whereby research participants are more likely to display approach actions when the stimuli in question produces positive affect in some way (Custer & Aarts, 2005). Importantly for the current research, the general belief in relation to behavior is that approaching negative stimuli is much harder than approaching positive (Chen & Bargh, 1999).

As human beings are capable of finding reward in a range of normally neutral environmental events, the role of stimuli devaluation appears to be more complex than avoiding “bad” stimuli and approaching “good” stimuli. When the situation presents, doing something that we do not like, and not doing something that we like, becomes acceptable (Veling, Hooland, & van Kippenburg, 2008). It is assumed that when encountering stimuli, an organism often prioritizes the assessment of its affective value (Anderson & Phelps, 2001; de Gelder, 2006; Zanjoc, 1980). Importantly for those studying alcohol consumption, this initial assessment is followed by an evaluation of the immediate situation to ensure that other factors are consistent with the positively desired outcomes (de Gelder, 2006). In the case of alcohol consumption, alcohol stimuli (walking past a bar) may be encountered by a heavy drinker, but perhaps the circumstances (9:00 am on the way to work) may discourage such behavior. Therefore, the approach action for humans is more complicated and is often determined by situational constraints or social requirements, where valence alone is often not enough to determine a behavioral outcome (Veling, Hooland, & van Kippenburg, 2008).

Veling, Hooland, and van Kippenburg (2008) investigated the theorized cognitive motor functions that mediate these conflicts using go/no go tasks. They postulated that such response conflicts cause negative affect to be tagged to the formally positively viewed stimuli.

Spread across three separate experiments, the research involved presenting positive, neutral, and negative pictures to participants on a computer screen that were followed by specific go (hit the space bar) or don't go (don't hit the space bar) instructions (Veling, Hooland, & van Kippenburg, 2008). Following the test, the participants were asked to rate their feelings towards pictures (including the ones they had been exposed to) on a nine-point scale (Veling, Hooland, & van Kippenburg, 2008). The results showed that the positive stimuli assigned to the avoid task were devalued, with the authors identifying the valence of the stimuli as the moderator of the devaluation. Ultimately, their research indicated that being instructed to not respond to a positively viewed stimulus can devalue affect towards it (Veling, Hooland, & van Kippenburg, 2008).

Furthermore, in their research, Veling and Aarts (2009) induced thirst in half of their sample using a particular candy (previously shown to do so) before presenting the entire sample with subliminal pictures of water bottles in a go/no go task. Using the same methods as above, participants were presented with a series of pictures, ten of which had been superimposed with a 30-millisecond flash of a water bottle, before being instructed to hit the space bar or refrain. The control group was presented with ten "go" signals for the subliminal water bottle picture and the experimental group was presented with ten "no go" signals for the same stimuli. The participants were then asked to estimate the size of the bottle of water that they had been unknowingly exposed to, along with another new picture of a glass of water. The results showed that those who were presented with the combination of thirst-inducing candy and a "no go" response rated the picture of the bottle of water as smaller than those who were instructed to respond. This occurred despite their greater level of thirst (Veling & Aarts, 2009).

This phenomenon has been tested in relation to alcohol, with research showing that

heavy social drinkers who have been trained to attend to alcohol-related stimuli will drink more in an ensuing beer-tasting test than heavy social drinkers that have been trained to turn their attention away from alcohol-related stimuli (Field & Eastwood, 2005). Field and Eastwood conducted research that required participants to attend to alcohol-related stimuli 100% of the test time or 0% of the test time. Following the test, participants were asked to rate their alcohol cravings, and were then advised to participate in a beer-tasting test. Those who attended to the alcohol-related stimuli drank around 20% more than did those who had not paid attention to the alcohol-related stimuli.

What is more, Houben, Havermans, and Wiers (2010) have also shown that levels of alcohol consumption can be reduced when alcohol-related stimuli are paired with negative affect pictures. In their experiment, 166 university students participated in a computer-based test that required them to view certain stimuli paired with either emotional face images (happy/sad) or pictures (shown to produce affective responses) (Lang et al., 2005, cited in Houben, Havermans, & Wiers, 2010). Their results indicated that when an alcohol stimulus was paired with negative affective pictures, beer consumption significantly decreased. This effect was not shown, however, for negative emotional faces. One reason put forward for this result is that experiential motives, which are better accessed via emotional images, are more influential on alcohol consumption than negative social feedback (Houben, Havermans, & Wiers, 2010).

Given the national South Korean drinking rates, it seems implausible that males with the widely occurring ALDH 2 (1/1) gene (those who do not suffer any negative affects) would be capable of generating such high national figures by themselves. This suggests that those with ALDH2*2 are likely contributing to the heavy drinker rates in some capacity. If this is the case, then the question remains as to why stimuli devaluation appears to be less influential

for heavy drinking males with ALDH2*2. Not only are they experiencing illness upon the consumption of alcohol, which alone would be considered enough to have them devalue it, they are also often likely to be in the presence of others with ALDH2*2 who are also experiencing illness. Stimuli devaluation research would tend to suggest that such a negative environment alone, where 30% of the drinking population is experiencing negative effects, should implicitly aid in the devaluation of alcohol.

An explanation for ALDH2*2 heavy drinking may in part lie with research conducted on cognitive dissonance. Wilson, Lindsey, and Schooler (2000) suggest that in certain cases attitudes are malleable, where one object can have more than one attitude attributed to it, creating cognitive discord. Their model suggests that repression and censorship are common causes of a dual attitude, where the somewhat “forced” creation of an explicit attitude that differs from an implicit attitude can create a cognitive conflict. They also state that the implicit attitude is often the formative one, and although habitual reinforcement of new attitudes can alter them, usually the implicit attitude remains and eventually “wins out” to become the dominant opinion (Wilson, Lindsey, & Schooler, 2000). Wilson, Lindsey, and Schooler also suggest that the behavioral outcome will depend on whether the attitude and/or behavior is implicit or explicit. Here they suggest that when not given the opportunity to access an explicit attitude, the behavioral outcome is more likely to reflect the implicit attitude. Furthermore, they state that implicit attitudes can be activated to alter behavior involuntarily.

Given that the current research is investigating mediating factors of South Korea’s alcohol intake despite the prevalence of ALDH2*2, the idea that cognitive dissonance may lead to altered opinion and behavior is important. As ACD is known to cause negative effects upon alcohol intake that protect against lifetime dependence, a psychological drink/don’t

drink conflict (pressure to drink caused by strong dislike of debate/Confucianist culture, but countered by discouraging negative effects of ACD) may be experienced by those with less-effective enzymes. That is, at certain life stages those with ALDH2*2 may be experiencing a dual opinion towards alcohol that, at a later stage, reverts to the original, implicit opinion. Given that ACD is known to be a protective agent against alcoholism, in many cases it would be assumed that the implicit attitude would be negative. The results of study 1 may also support this notion, with free association identified as being a good self-report method for gaining access to implicit memory structures (Reich & Goldman, 2005). This may then help explain why those with ALDH2*2 could drink at high levels but be able to maintain lower levels of lifetime alcohol dependence.

Sensitivity to punishment/reward and decision making.

It has been suggested that cognitive measures alone are not effective in predicting problematic drug use (Jones, Corbin & Fromme, 2001). It is believed that personality trait and temperament are also mediating factors of heavy drug consumption (Gullo, Dawe, Kambouropoulos, Staiger, & Jackson, 2010). Disinhibition, for example, has been linked to several cognitive disorders, including hysteria, child hyperactivity, and alcoholism (Avlia, 2001). Avlia states that Gray's (1987) personality model of approach and avoidance behavior is one of the most influential on disinhibition in existence. Here, two separate nervous systems (Elliot & Thrash, 2002) — the BIS (related to anxiety) and BAS (related to impulsivity) (Caver & White, 1994) — work to regulate the search for and responses to external stimuli, where the BIS operates responses based on experiences of punishing outcomes and initiates negative affect, while the BAS regulates responses formed by rewarding outcomes of environmental events through the activation of positive affect (Elliot & Thrash, 2002).

According to the theory, both the BIS and the BAS function in two separate modes (Avlia, 2001). The first mode — the checking mode — represents the emotive functions that help one search out the possibility of punishing and rewarding environmental events. The second mode is the control mode, which is initiated when presented with punishing or rewarding cues. The BIS and BAS are said to function separately when in checking mode, but are in a more concurrent state during the control mode. This indicates that individual tendencies influence the emphasis placed on either reward or punishment when these systems are running together in control mode. That is, individuals who have a tendency to have a hypersensitive control BAS are likely to exhibit lower levels of BIS. Furthermore, individual traits displayed in control mode are believed to reflect the tendencies of the checking mode, where those who have high BIS in control mode are also likely to be hyper-alert in seeking punishing events in checking mode (Avlia, 2001).

Elliot and Thrash (2002) have stated that personality trait theories like Gray's have always maintained a biological element. Neurologically, the BIS and the BAS are linked to different pathways. The BIS is said to be related to activity occurring in the septohippocampal system and the brain stem monoaminergic afferents that project to the frontal lobe (Caver & White, 1994). Information regarding the BAS is a little vaguer in its described location, but is believed to be related to the MDS (Caver & White, 1994). Caver and White state that given Gray's personality model is based on animal behavior and the effect of drugs on these systems, it is a relevant way to explore the link between brain function and human behavior.

Furthermore, Gray's (1987) theory of approach and avoidance behavior supports research suggesting that sensitivity to drug cues is, in part, regulated by levels of impulsivity (Powell et al., 1992). A hyper BAS is said to be somewhat responsible for a heavy drinker's

overeager reaction to cues related to their drug, with research suggesting that the BAS is a good predictor of positive affect in response to reward cues (Carver & White, 1994). Gray argues that alcohol cues serve as conditioned stimuli, and that, ultimately, those with a hypersensitive BAS are more likely to respond when encountering objects related to alcohol.

As the reward pathway of the brain (MDS) is synonymous with problematic drug consumption, research suggesting that the BAS and BIS appear to be affected by brain damage and reduced frontal lobe function is not surprising (Al-Adawi, Powell, & Greenwood, 1998). Al-Adawi, Powell, and Greenwood employed the card-arranging reward responsivity objective test (CARROT) among brain-damaged participants in an attempt to explore the BIS and the BAS in relation to neural damage. The results showed that levels of BIS and BAS correlated with markers of clinical motivation deficiencies. This is supported by research indicating that motivation increases among motivation-deficient brain-damaged patients upon administration of the known dopamine-inducing bromocriptine (Adawi & Powell, 1997).

What is more, the ventromedial prefrontal (VMF) cortex is believed to be involved in decision making (Bechara, Tranel, Damasio, & Damasio, 1996). Bechara, Damasio, Damasio, and Lee (1999) employed a gambling task to test whether amygdala damage would affect certain choice outcomes. They were interested in how the amygdala and the VMF operated in relation to rewarding and punishing situations. Their results suggest that damage to the amygdala results in loss of sensitivity to punishing situation (e.g. the loss of money). This is important as it gives a biological reference to areas involved in decision making related to sensitivity to punishment and reward, and somewhat neurologically integrates the BIS and BAS with neurological pathways. Furthermore, it supports Gray's assertion that elevated neural activity is associated with approach and avoidance behavior.

In regards to drug consumption, research has suggested that the BAS is a good

predictor of alcohol-intake levels (Kambouropoulos & Staiger, 2001). Research also suggests that even though there is a significant relationship between SR and problematic consumption, SP is not an effective predictor (Simons & Arens, 2007). This has led researchers to hypothesize that sensitivity to punishment and reward are not, in fact, directly associated with consumption levels but rather are mediated by drug expectancies (Simons & Arens, 2007). Simons & Arens's study of marijuana consumption reported that those who held high positive marijuana expectancies and were high in SR and low in SP were more likely to engage in heavy and dangerous intake. From these results, it appears that those who prioritize the rewarding aspects of drugs over the punishing side effects have a tendency to consume more, with drug expectancy a large mediating factor. This also indicates that those who are high in SR and low in SP but fail to have high alcohol expectancies are less likely to be heavy drinkers, making positive expectancy the vital element of this problematic consumption model.

Conclusion

Researchers postulate that attitudes are general dispositions towards social objects (Greenwald & Banaji, 1995). As different cultures are dictated by differences in perception of one's role in the social experience (Nisbett, 2003), one might expect that social objects will take on a different meaning when placed in a different population and/or culture. Therefore, if attitudes need not be in the conscious realm to be influential, then it can be assumed that differences towards social objects across different cultures exist not only on the surface but also implicitly. Research is showing this to be true (Bagozzi et al., 1989; Nisbett et al. 2001; Masuda & Nisbett (2001), where East Asian cultures tend to approach external stimuli from a holistic, group first perspective, and where Western populations tend to view their environment in a more analytical, individualistic way (Ji, Peng & Nisbett, 2000). Thus, when

considering the belief that the positive effects of alcohol consumption are co-encoded with the peripheral experiences associated with drinking (Stacy, 1995), the circumstances, events, environments, and social contexts in which alcohol is consumed become very important to alcohol expectancy. Variation in environmental patterns such as the physical environment itself (e.g. building type, music, etc.), the language, the traditional practices (e.g. shots of soju vs. bottles of beer), and even the food being served with alcohol may have an impact on alcohol experience. Therefore, it could be reasonably assumed that affect and the resultant memories will differ in at least some of these cases where the circumstances, events, environments, and social contexts are different — particularly across language groups.

Although alcohol expectancy have been identified as “an appealing endophenotype for addressing biological influences on alcohol related cognitions” (Hendershot et al., 2011, p. 92), there has been a limited amount of work published on how expectancy and ALDH2*2 mediate each other in regard to heavy drinking. In one study that has explored this relationship, Hahn et al. (2006), using a Taiwanese population, looked at alcohol-dependant out patients’ ALDH2 gene types and their alcohol expectancies. As stated earlier, contrary to expectations, alcoholics who were found to have the mutant and less-efficient allele ALDH2 (2/1) actually reported higher levels of positive alcohol expectancy than alcoholics that had the effective ALDH2 (1/1). While there is still controversy to the actual role of ACD in alcohol’s addictive nature, a review suggests that it at least modulates some of alcohol’s effects (Quertemont & Didone, 2006). It seems, then, that those unable to as effectively break down ACD, but able to prioritize the positive effects or simply ignore the negative effects, are actually experiencing even greater reinforcement and thus reporting even higher positive tension-reduction expectancy than alcoholics with the functioning ALDH2 (1/1) gene. It may also be possible that positive expectancies actually initiate the higher tolerance to the

negative effects. As previously stated, those high in SR and low in SP and *low* in positive marijuana expectancies are *not* as likely to partake in problem consumption (Simons & Arens, 2007). That is, only high levels of SR and low SP, in combination with *high* levels of positive expectancies, predict problematic consumption.

In a study exploring the expectancy/ALDH2*2 relationship, McCarthy et al. (2001) found a gender difference in the way that ALDH2*2 mediated alcohol expectancies. It was found that women with the mutant gene, but not men, reported lower tension-reduction and sexuality expectancies, and in turn recorded lower levels of drinking. This indicates that men with the mutant ALDH2 (2/1) gene had the same level of tension-reduction expectancy as their functioning ALDH2 (1/1) gene counterparts.

Furthermore, Herndershot et al., (2009) have shown that Asian Americans with the mutant ALDH2*2 gene report higher levels of global negative expectancies than those with the wild (1/1) gene type. Their research suggests that the high levels of negative expectancy found in their ALDH2*2 populations are influencing their lower levels of consumption. While this finding sits well with the notion that negative expectancy influences lower levels of drinking, study 1 indicates that this may vary across different cultures. Given that Asian Americans have been shown to demonstrate drinking behavior more akin to Americans than Asians living in Asia, the current research suggests that the “drinking culture” is likely to differ among Asians depending on the country, or more importantly, the culture they live in.

Thus, in light of: the results of study 1; the known effects of culture on alcohol expectancies; the known differences between Eastern and Western cultures, and; the Hahn et al. (2006) and McCarthy et al. (2001) findings, it seems that South Korea provides an ideal population with which to test expectancy and SP/SR among different ALDH2*2 gene types. Therefore, the research includes genetic sampling, with translated versions of both the AEQ

(Brown et al., 1980) and SPSRQ (short form) (Cooper & Gomez, 2008) being used to gauge the expectancy and BIS/BAS of different ALDH2 types. While there has been research conducted using an alcohol expectancy questionnaire among a South Korean population, there has been no integration of SP/SR or ALDH2*2. Current alcohol-expectancy research generally pursues a wider understanding of psychobiological variables affecting alcohol consumption levels. Therefore, the second phase of the study brings South Korean alcohol-expectancy research up to date with the pursuit of such goals. Through the translation of the AEQ using vital content from the free-association test conducted in study 1 (Mahoney, Graham, Cottrell, & Kim, 2011), the current research is able to confidently test expectancy in conjunction with SP/SR and ALDH2*2 across more than 450 participants. This makes the study one of the largest ALDH2*2/expectancy studies conducted — certainly one of the largest in South Korea. As research suggests that biology and environment work together to influence alcohol related behavior (Hendershot, et al., 2011), the results of the second phase of the testing will not only provide important, current, and robust information on variables influencing the high levels of South Korean alcohol consumption, but also inform those wishing to know more about how biology, learning and personality affect drinking.

Chapter 4

Study 2: Sensitivity to Punishment Predicting South Korean Drinker Level

Expectancy research clearly suggests that, when it comes to making decisions about drinking, those with negative expectations appear to be driven by the negative effects of the withdrawal period, whereas those with positive expectancies tend to prioritize and be informed by the early onset of the positive effects (Reich & Goldman, 2005). Study 1 suggests that this relationship may not be true across different cultures. As stated, the ALDH2*2 mutation occurs in around one in three South Koreans (Brennan et al., 2004), and yet the nation maintains high levels of both alcohol consumption and alcohol dependence. As results indicate that only heavy drinkers with ALDH2*2 exhibit higher levels of tension-reduction expectancy (Mahoney, Graham, Cottrell, & Kim, 2011; McCarthy et al., 2000), how those with the mutation push past the well documented negative effects to experience this reinforcing outcome is important.

Gray's (1987) theory of motivation may help answer some of these questions. Notably, advances in measures of the BAS and BIS have led to the development of the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ) short form (Copper & Gomez, 2008). This psychometric tool is believed to measure the fundamental aspects of both the BIS and the BAS through assessment of SP and SR. The SPSRQ short form and earlier versions of it have allowed researchers to correlate drinking practices with approach and avoidance personality traits (Kambouropoulos & Staiger, 2001; Simons & Arens, 2007). Importantly, research has shown that those high in sensitivity to reward are more likely to respond to alcohol-related cues (Carver & White, 1994).

O'Connor & Colder (2005) have suggested, however, that other etiological factors need to be explored in relation to SP/SR to help identify better predictors of problem

consumption. Therefore, the aim of the current research was to investigate SP/SR in conjunction with alcohol expectancy and ALDH2*2 gene type. The current research postulates that heavy drinkers with the heterozygous ALDH2 (2/1) will need to be lower in sensitivity to punishment to allow them to withstand the high levels of acetaldehyde. Based on past research, it is also further predicted that ALDH2 (2/1) heavy drinkers will also exhibit higher levels of tension-reduction expectancy than ALDH2 (2/1) lighter drinkers. Importantly, while results has shown that ALDH2*2 mediates the drinking levels of Asian Americans and East Asians studying in America (Hendershot et al., 2009; Hendershot et al., 2011; McCarthy et al., 2000), there has been little research conducted in an East Asian country.

It is also important to note that the current research is also interested in the expectancies and personality variables of those with the normally functioning ALDH2 (1/1) gene type. As past research has suggested that environmental differences can cause divergences in alcohol expectancy, and given that cultural differences have been shown to exist at both a conscious and subconscious level (Nisbett, 2003), the current research hypothesizes that differences in expectancy may not necessarily be limited to being influenced by ALDH2*2 gene type. Although the current research will not be directly testing cultural differences, we can compare the results from this study with the extensive list of past expectancy research using Western populations. By comparing the current results with past research, it may be possible to illuminate differences in motivation for alcohol consumption that are in existence. Therefore, the discussion of the genetic testing results will not be limited to those with ALDH2*2, but will also include those with the more common wild (1/1) allelic combination, where it is hypothesized that cultural differences identified in Chapter 2 may manifest themselves in AEQ and SRSPQ results.

Method

Participants

The 466 participants (53.5% female) were recruited from Daegu Health College and originated from various parts of South Korea. The average age of the group was 20.8 (SD = 2.8). Participants were from four different departments: nursing, radiologic technology, dental hygiene, and pathology.

Measures.

Demographic survey.

The demographic survey was designed for the current research (see Appendix 4 & 5). Along with their gender and age, the subjects were encouraged via an example to list how much they drank of a particular drink in any given sitting. The type of drink was then used to estimate the typical alcohol volume in order to calculate their reported standard drinks per occasion. Standard drinks were calculated using UK standards of 10 mls of alcohol (International Center for Alcohol Policies, 1998). Drinks per occasion was used because this measure is said to be a better indicator of dangerous alcohol-related incidents, such as drink driving. Given that deaths from drink driving are more than twice that of the Australian level (W.H.O., 2011), the current research wishes to explore expectancies and other variables driving these figures.

Korean Alcohol Expectancy Questionnaire (AEQ).

The AEQ (Brown et al., 1980) consists of 120 questions, with 90 items that are scored (see Appendix 10). In their review of alcohol expectancy, Goldman, Brown, Christiansen, and Smith (1991) stated that the development of the Alcohol Expectancy Questionnaire items relied on words generated in previous free-association tests. Furthermore, it has been suggested that the subject's "own words" are important, and that relying on generating words

from other –secondary sources,” like field experts, other questionnaires, or investigative teams reduces external validity (Goldman, Greenbaum, & Darkes, 1997). To this end, the Korean words generated by the statement –alcohol makes me...” in the alcohol free-association test (Mahoney, Graham, Cottrell, & Kim, 2011) were used as a guide by those translating the AEQ. This helped to ensure that, where possible, the vital content that appears in the Korean AEQ was generated by the population being tested. Back translation was used, which required a translator to translate the English version into Korean. Next, a different translator translated the Korean version back into English (see Appendix 11). The two English versions (the original and the back translated) were then compared. A committee consisting of two senior psychology professors, the author, and a Korean professor fluent in English gathered to assess differences in the two questionnaires before resubmission to an independent translator for final approval (see Appendix 12).

The questionnaire consists of six expectancy categories: 1) global positive alcohol expectancies ($\alpha = 0.950$), 2) improved sexual expectancies ($\alpha = 0.887$), 3) improved social and physical effects ($\alpha = 0.769$), 4) positive social and assertive expectancies ($\alpha = 0.894$), 5) relaxation and tension reduction expectancies ($\alpha = 0.819$), and 6) expectancies of arousal and aggression ($\alpha = 0.270$) (Brown et al., 1980). As indicated, the reliability coefficient of the sixth category has been shown to be statistically unsatisfactory, but is included due to its discriminative utility in past research (Brown et al., 1980). The participants were asked to rate the short statements about alcohol and its effects by agreeing (scoring 2) or disagreeing (scoring 1), with the total summed to form scale scores.

Sensitivity to punishment and reward questionnaire (SPSRQ).

A short version of Torrubia et al.s’ (2001) SPSRQ was translated for the purpose of this study using the back translation method. Cogswell et al. (2007) identified nine items

within the Torrubia et al. (2001) version that were problematic, and further testing conducted by Cooper and Gomez (2008) has reduced the questionnaire from 48 items to 24, with 14 items measuring SP and 10 items measuring SR (see Appendix 13). The revised questionnaire has been shown to measure SP with good fit, using item response theory (IRT) analysis: minimum fit function (X^2) (54, $n = 327$) = 75.94, $p < .01$; root mean square of error (RMSEA) = .035, comparative fit index (CFI) = 0.98; and standardized root square mean residual (SRMR) 0.063. It has also been shown to measure SR with acceptable fit: X^2 (27, $n = 327$) = 69.99, $p < .001$; RMSEA = .070, CFI = .090; SRMR = 0.091 (Cooper et al., 2008). The shortened version of the SPSRQ (SPSRQ-S) consists of 24 questions where yes or no responses are required, with the total summed to form scale scores. The same back translation method was used (see Appendix 14) to translate the AEQ and the SPSRQ, with past research showing that this translation technique can produce a valid psychometric tool (Lardi, Billieux, d'Acremont, & Ven der Linden, 2008) (see Appendix 15).

Procedure.

Consent for the testing was acquired from Daegu health College before the testing took place (see Appendix 16 & 17). All of the testing procedures were also in accordance with JCU ethics procedures (see Appendix 18). The testing took place in a classroom setting devoid of implicit alcohol cues (e.g. alcohol advertising) and occurred at the end of each group's first English language class. A Korean translator explained all of the details and requirements. The students were informed by the translator that if they felt like leaving they could do so at any time. They were asked to fill out a consent form and were given an information sheet regarding the research (see Appendix 19 & 20). It was also made clear that no names or student numbers were required with the test results remaining anonymous. The students were informed of the importance of independence and were told that participants

who spoke during the testing period or who were found observing others would have their tests removed from the study. During the surveying period, participants were required to go to a nearby bathroom and rinse their mouths (in groups of five) while the remainder of the group attended to their surveys. The students were then asked to administer the buccal swab themselves (see *ALDH2*2* genotyping section, following). The subjects were given a random number to apply to their genetic sample, the demographic survey, and both tests so that the data could be matched.

ALDH2*2 genotyping.

The participants had their buccal swab taken in the 14th week of semester one (June) 2010, directly after the surveying and testing period. Testing took place in a classroom setting in accordance with South Korean government health and safety regulations, and was conducted in the presence of the Soonchunhyung biogenetic team. Each participant had his or her own pre-sanitized individual swab, so there was no need for sanitizing of instruments. The buccal swabs allowed the participants to simply swab their mouth for 30 seconds before slipping the swab tip into an individual container. The container was fitted with an airtight lid that was sealed by the participant. The container was marked with the participant's random id number for data matching. Buccal swabs can be stored at room temperature, and therefore no refrigeration of the samples was required.

DNA extraction (As performed by the Soonchunhyang Genetics research team).

BuccalAmp™ DNA Extraction Kits (WI, USA) were used according to the manufacturer's instructions. The end of the Catch-All™ Sample Collection Swab is placed in the tube containing QuickExtract DNA Extraction Solution and rotated a minimum of five times. The swab brush is then pressed against the side of the tube and rotated while removing it from the tube to ensure most of the liquid remains. After screwing the cap on the tube

tightly, vortexing occurred for ten seconds, followed by incubation at 65°C for 1 minute, before vortexing again for fifteen seconds, incubating 98°C for two minutes before finally vortexing again for fifteen seconds. The quantity and quality of DNA in the tube are measured by NanoDrop (USA).

Real-time PCR to differentiate wild type and mutant type.

The ALDH2 wild type and mutant type were differentiated by real-time PCR using Cycleave Human ALDH2 Typing Probe/Primer Set (Takara, Japan) and Cycleave PCR Core Kit (Takara, Japan). A negative control reaction was carried out simultaneously using sterilized distilled water instead of a sample. The positive control reaction using the supplied ALDH2 positive control was used to verify that the processes had been adhered to correctly.

The following reaction mixture is prepared in a reaction tube on ice: 10X Cycleave PCR Buffer 2.5ul, Mg²⁺ solution (25mM) 3ul, dNTP mixture (2.5 mM each) 3ul, ALDH2 PCR Primer Mix 1ul, Takara Ex Taq HS (5 units/ul) 0.25ul, Tli RNase H II (200 units/ul) 0.5ul, template DNA 1-13ul containing 20-60ng and adjust total volume of 25ul by adding dH₂O. The reaction was duplicated per sample. The real-time PCR condition was as follows: initial denaturation at 95°C for ten seconds, followed by 45 cycles of 95° for five seconds, 55°C for fifteen seconds, and 72°C for fifteen seconds, and the amplified curve was evaluated as mutant, wild and heterozygous respectively.

Results

The participants averaged 8 (SD = 5.13) standard drinks per occasion, with males averaging 9.73 (SD = 5.6) and females 6.5 (SD = 4.14). In regard to ALDH2 type, genetic testing revealed that there were 324 participants with wild type (1/1), 128 heterozygous (2/1), and 8 homozygous (2/2). Those with ALDH2 (1/1) averaged 8.3 (SD = 5.0) drinks per occasion, ALDH2 (2/1) 7.5 (SD = 5.3) and ALDH2 (2/2) 5.9 (SD = 5.9).

A four-step regression analysis was conducted, with drinks per occasion as the independent variable. In regard to the dependent variables, as both the first study and W.H.O. research has shown that males drink far more than females, gender was controlled for by being entered first. This was followed by ALDH2*2 type second, which was hypothesized to be contributing to the high levels of negative expectancy found in the first study. The expectancy categories were entered third, before SP/SR fourth, as past research had shown that SP/SR only predict drinks per occasion when moderated by alcohol expectancy. The results showed that gender, ALDH2*2 type, positive global expectancy, and SP are predictors of South Korean drinks per occasion. The negative B statistic for gender indicates that males drink more than females. The negative B statistic for ALDH2*2 indicates that the less effective the enzyme is in breaking down ethanol, the fewer drinks per occasion is consumed. The negative SP B statistic indicates that the higher the SP, the lower the level of drinks per occasion. The final model accounted for around 17% of the variance, $F(10, 448) = 10.164$, $p < .001$ (see Table 2).

An independent sample t-test indicated, however, that there was no significant difference in drinks per occasion between ALDH2 (1/1) and ALDH2 (2/1), $t(450) = 1.425$, ns. ALDH2 (2/2) was not assessed as there were only eight participants with that particular enzyme. Following a Bonferroni's adjustment, t-tests revealed that there were no significant difference between ALDH2 (1/1) and ALDH2 (2/1) in regard to means of any alcohol expectancy categories or SP/SR (see Table 3). ALDH2 (2/2) was not assessed due to there being only eight participants with the homozygous enzyme.

ALDH2 (1/1)

Pearson's correlations were performed (see Table 4) across drinks per occasion, expectancy categories, and SP/SR. The results show significant positive correlations between

drinks per occasion and all six expectancy categories. The results also show a significant Table 2.

*Linear regression analysis model of gender, ALDH2*2 type, expectancy categories and SP/SR predicting drinks per occasion.*

Step	Predictors	B	R ²	SE
1	Gender	-3.224	0.098**	0.457
2	ALDH2*2	-1.073	0.109*	0.455
3	Global pos exp	0.162	0.168*	0.078
4	SP	-0.162	0.185*	0.071

Final Model Adjusted $R^2 = .167^{**}$, $F(10, 448) = 10.164$

Note. Predictors in each step include the factor from the preceding step. Gender is coded 1 for male and 2 for female. ALDH2*2 is coded 1 for (1/1), 2 for (2/1), and 3 for (2/2).

* $p < .005$ ** $p < .001$

positive correlation between drinks per occasion and SR. There was, however, no correlation between drinks per occasion and SP. Most of these differences are small, however, and must be treated with caution, given that correlations are sensitive to large population sizes.

A three-step regression analysis was performed with drinks per occasion as the dependant variable, while the independent variables were entered as follows: gender first, all six expectancy categories second, and SP/SR third. The results indicated gender as the main predictor of drinks per occasion mediated by global positive expectancies, with the model

Table 3.

Table of means for alcohol expectancy categories and SP/SR

Variable		N	Mean	Std Deviation	Std Mean Error
1 Drinks per occasion	ALDH2 (1/1)	324	8.25	5.02	0.28
	ALDH2 (2/1)	127	7.49	5.32	0.47
2 Global positive exp	ALDH2 (1/1)	324	11.40	5.76	0.32
	ALDH2 (2/1)	127	10.18	5.12	0.46
3 Sexual enhancement exp	ALDH2 (1/1)	324	1.12	1.73	0.10
	ALDH2 (2/1)	127	1.05	1.42	0.13
4 Physical and social exp	ALDH2 (1/1)	324	5.85	2.01	0.11
	ALDH2 (2/1)	127	5.28	1.97	0.18
5 Positive social assertive exp	ALDH2 (1/1)	324	6.68	2.85	0.16
	ALDH2 (2/1)	127	6.14	2.91	0.26
6 Relaxation exp	ALDH2 (1/1)	324	5.14	2.11	0.12
	ALDH2 (2/1)	127	4.74	1.98	0.18
7 Arousal and aggressive exp	ALDH2 (1/1)	324	2.48	1.21	0.07
	ALDH2 (2/1)	127	2.59	1.10	0.10
8 Sensitivity to punishment	ALDH2 (1/1)	324	8.09	3.21	0.18
	ALDH2 (2/1)	127	7.94	3.34	0.30
9 Sensitivity to reward	ALDH2 (1/1)	324	5.74	1.83	0.10
	ALDH2 (2/1)	127	5.64	1.87	0.17

No significant difference, $p < .005$ (Bonferroni Adjustment)

Table 4.

Correlation matrix of variables for ALDH2 (1/1)

Variable	1	2	3	4	5	6	7	8
1 Drinks per occasion	-							
2 Global positive exp	.24**	-						
3 Sexual enhancement exp	.28**	.60**	-					
4 Physical and social exp	.02	.60**	.30**	-				
5 Positive social assertive exp	.14*	.76**	.49**	.55**	-			
6 Relaxation exp	.16**	.71**	.37**	.48**	.52**	-		
7 Arousal and aggressive exp	.05	.57**	.36**	.34**	.52**	.40**	-	
8 Sensitivity to punishment	.04	.10	-.01	.02	.15**	.07	.14**	-
9 Sensitivity to reward	-.11**	.32*	.29**	.25**	.28**	.25**	.30**	-.14*

* $p < .005$ ** $p < .001$

accounting for around 16% of the variance, $F(7, 316) = 9.982, p < .001$. The negative B statistic indicated that males report more drinks per occasion than females, mediated by global positive expectancy (see Table 5).

ALDH2 (2/1)

Pearson's correlation indicated that three of the six expectancy categories have significant negative correlations with drinks per occasion, with positive social expectancies and arousal/aggressive expectancies not significantly correlating (see Table 6). Tension reduction expectancy was significantly positively correlated. SP showed a significant negative relationship with drinks per occasion, while SR showed a significant positive correlation with drinks per occasion. Again, the correlations are relatively small and may have been influenced by the large population sizes.

Table 5.

Linear regression analysis of ALDH2 (1/1) expectancy categories, SP/SR, and gender predicting drinks per occasion.

Step	Predictors	B	R ²	SE
1	Gender	-3.185	0.099**	0.046
2	Global pos exp	0.247	0.181*	0.529

Final Model Adjusted R² = .163**, F(7, 316) = 9.982

Note. Predictors in each step includes the factor from the preceding step. Gender is coded 1 for male and 2 for female.

Table 6.

Correlation matrix of variables for ALDH2 (2/1)

Variable	1	2	3	4	5	6	7	8
1 Drinks per occasion	-							
2 Global positive exp	-.12*	-						
3 Sexual enhancement exp	-.23**	.40**	-					
4 Physical and social exp	-.01*	.64**	.37**	-				
5 Positive social assertive exp	-.02	.75**	.41**	.65**	-			
6 Relaxation exp	.14*	.63**	.40**	.56**	.51**	-		
7 Arousal and aggressive exp	-.06	.54**	.26**	.34**	.47**	.46**	-	
8 Sensitivity to punishment	.01	.05	-.17	.05	.16**	.11	.11**	-
9 Sensitivity to reward	-.18*	.34**	.40**	.24**	.23**	.22**	.29**	-.27**

* $p < .005$

** $p < .001$

A three-step regression analysis was performed (IV and DV input, as described in the ADLH2 (1/1) section), indicating gender, relaxation expectancies as the main affect of drinks per occasion, with gender, SP, and arousal and aggression expectations as moderators. The final model accounted for 26% of the variance, $F(9, 177) = 5.956, p < .001$ (see Table 7). A negative B statistic for SP indicated that lower levels of sensitivity to punishment predicted drinks per occasion.

Table 7.

*Linear regression analysis for ALDH2 (2/1) by expectancy categories, ALDH2*2 and gender predicting drinks per occasion*

Step	Predictors	B	R^2	SE
1	Gender	-3.440	0.133**	0.104
2	Tension red exp	0.827	0.277*	0.291
	Arousal & aggress exp	-1.364	0.287*	0.458
3	SP	-0.264	0.314*	0.133

Final Model Adjusted $R^2 = .261^{**}$, $F(9, 117) = 5.956$

Note. Predictors in each step include the factor from the preceding step. Gender is coded 1 for male and 2 for female.

* $p < .005$ ** $p < .001$

Discussion

The current research aimed to explore the factors contributing to the high rate of alcohol consumption in South Korea despite the existence of the naturally occurring biological deterrent ALDH2*2. Overall, gender, ALDH2*2, global positive expectancy, and SP all predict drinks per occasion for the current South Korean sample. It must be mentioned that even though ALDH2*2 did predict drinks per occasion, the R^2 increase is small at .01. Given that a t-test indicated that there was no significant difference in the drinks per occasion, the mean difference of .76 drinks per occasion between the (1/1) and (2/1) gene type can be considered small. In regard to SP predicting drinks per occasion, this is in contrast to past SP/SR research which has suggested that SR, and not SP, is a better predictor heavy drinking (Kambouropoulos & Staiger, 2001). Again, the R^2 increase is small, and as is latter discussed, it appears that the SP predicting power is moderated by those with the ALDH2 (2/1) gene type. It can be stated, however, that gender and global positive expectancies are strong predictors of drinks per occasion among the current South Korean population, where men with higher levels of global (general) positive alcohol expectancy are more likely to drink at high levels.

In regard to the different gene types, while t-tests indicate there was no significant difference between the drinks per occasion, expectancy or SP/SR of the wild (1/1) or the heterogeneous (2/1) gene type, there are different alcohol expectancy and SP/SR categories predicting their respective alcohol consumption levels. Sensitivity to punishment, for example, predicts alcohol consumption of those with ALDH2 (2/1), but not for those with ALDH2 (1/1). Tension-reduction expectancy was also shown to predict drinks per occasion for those with ALDH2 (2/1) but not the wild (1/1) gene type, which somewhat supports past research (Hahn et al. 2006). In regard to ALHD2 (1/1), the results are largely in line with

previous research that suggests higher levels of positive expectancy correlate with higher levels of alcohol intake (Brown, Goldman, Inn, & Anderson, 1980; Cranford, Zucker, Jester, Puttler, & Fitzgerald, 2010; Goldman, Brown, Christiansen, & Smith, 1991; Gunn & Smith, 2010; Miller, Smith, & Goldman, 1988; Park, Kim, Kim, & Sung, 2007; Reich & Goldman, 2005). There are, however, differences with past research, where SR is not predicting the drinks per occasion of either gene type. This could be due to socio-cultural pressures (Becker, 1986; Nisbett, 2003; Yun & Park, 2008) forcing normally lighter South Korean drinkers to drink at higher levels. This would theoretically place those who are typically not as sensitive to reward in higher drinker categories.

Importantly, even when taking those experiencing the buildup of acetaldehyde out of consideration, there appears to be a difference in the personality trait/drinker type relationships between the current wild (1/1) gene types and past research samples (Kambouropoulos & Staiger, 2001, Simons & Arens, 2007). This implies that cultural variables may also differentiate South Koreans in regards to motivation for alcohol consumption.

ALDH2 (1/1)

The current research indicates that global expectancy — that is, the expectation that alcohol will change a wide variety of experiences in a positive way (Brown et al., 1980) — is the strongest predictor of South Korean ALDH2 (1/1) drinks per occasion. This finding is in line with a long list of research suggesting that positive expectancy correlates with increased alcohol consumption. Although the results indicate a positive correlation with all expectancy categories, global expectancy was the only predictive expectancy category.

The absence of other expectancy categories (e.g social assertiveness) predicting drinker levels could be another indication that the interdependent nature of South Korean

culture is encouraging lighter drinkers to drink at abnormally high levels. Past research suggests, for example, that heavy drinkers usually report higher levels of tension reduction expectancy (Cooper et al., 1998). This suggests that lighter drinkers have lower levels of tension reduction expectancy. Therefore, if these lighter drinkers are being convinced to drink at greater levels, then the predictive power of an expectancy category like tension reduction expectancy may become weaker.

Furthermore, while SR was shown to have a small correlation with drinks per occasion, the current results indicate it is not a predictor of consumption level. One could assume that, given the absence of a buildup of acetaldehyde among South Koreans with the wild (1/1) gene type, there would be similar typological features exhibited to those tested in past Western research (Kambouropoulos & Staiger, 2001). This was not found to be the case. The failure of SR to predict drinks per occasion appears to be in contrast to past research, which has shown that SR predicts reactions to alcohol-related stimuli and mediates drug consumption levels (Kambouropoulos & Staiger, 2001; Simons & Arens, 2007). This may indicate that there are differences in personality variables driving South Korean drinker levels compared to those of Western populations, with sensitivity to rewards and punishment appearing to play a lesser role in South Korean ALDH2 (1/1) alcohol intake.

Again, some of the differences here may be explained by South Korea's cultural links with Confucianism, where hierarchy is more strictly observed (Becker, 1986; Nisbett, 2003; Yun & Park, 2008). While speculative, there may be less room for individual choice in South Korea, where being party to the group mood is viewed as more important than individual feelings. South Koreans with the wildly occurring (1/1) gene type who have lower levels of certain positive expectancy (e.g. Physical and social expectancy) and SP/SR may be drinking at higher levels than they would like to in order to observe cultural norms. This would then

explain why such variables are not predicting drinking behavior in the same way for South Koreans as they are in Western populations. While not able to draw a direct explanation for cognitive and personality variables from socio-cultural differences, research has shown that implicit cognitions and attitudes can be affected by culture (for review, see Nisbett 2003). Therefore, while not directly part of the research, cultural differences (e.g. strong hierarchical social systems) can give some indication as to the differences being seen between past research and the current wild, (1/1) gene findings.

ALDH2 (2/1)

The current results show there are different correlating and predictive variables in the expected effects of alcohol for those with ALDH2 (2/1). While all six expectancy categories correlated with drinks per occasion for ALDH2 (1/1), social assertion and feelings of arousal and aggression did not correlate for those with ALDH2 (2/1). Furthermore, while tension reduction expectancy positively correlated with drinker levels, the other three expectancy categories actually had small negative correlations with drinks per occasion. While caution must be exercised with such small correlations over such a large population, the negative nature of these correlations tends to support study 1's findings that negative expectancy is more even across all drinker types.

What is more, considering some of the symptoms caused by the buildup of ACD include dizziness, drowsiness, and headaches, it seems quite plausible that such negative sedating affects are likely inhibiting assertive and arousing feelings. Furthermore, the presence of negative sedated effects among those with ALDH2 (2/1) seems to be in line with the positive sedated affects that have been reported, like relaxation and tension reduction. It may be postulated that sedating affects, both positive and negative, are more related to the drinking experience of those with ALDH2 (2/1). The research also somewhat confirms this

with the finding that tension-reduction expectancy predicts alcohol consumption among those with ALDH2 (2/1). This result supports other East Asian research (Hahn et al., 2006) and may indicate that there are some positive effects (e.g. tension-reduction affect) of the buildup of acetaldehyde.

The results also indicated a negative correlation and predictive relationship with SP and drinks per occasion. This appears to account for the results showing that SP predicts the current South Korean sample's drinks per occasion as a whole. As there was no such correlation or predictive power for SP and drinks per occasion among those with ALDH2 (1/1), it appears that only heavy drinkers with ALDH2 (2/1) are likely to be lower in SP. This then suggests that those with ALDH2 (2/1) with *higher* levels of SP are likely to drink less, and indicates that the negative effects of the buildup of acetaldehyde require *lower* levels of SP to help "override" them; perhaps in search of the positive sedated effects. Research suggests that, traditionally, SP is not a good predictor of alcohol consumption (Kambouropoulos & Staiger, 2001; Simons & Arens, 2007), indicating that this is a unique etiological indicator of drinks per occasion that exists only among those with ALDH2, and perhaps just those with the (2/1) allele. This seems plausible given the negative nature of the buildup of acetaldehyde being experienced by those with ALDH2 (2/1). If they are to override the negative effects and prioritize the positive, they would likely need to withstand some discomfort. Therefore the finding showing that heavy drinkers with ALDH2 (2/1) are lower in SP than their ALDH2 (2/1) lighter drinking counterparts is not surprising.

Gender.

The results are in line with W.H.O. (2011) data suggesting that South Korean males are drinking at higher levels than females, with gender found to predict drinks per occasion for both the ALDH2 (1/1) and (2/1) gene types. While physical differences in the ability to

drink alcohol are likely to have an influence on this finding, all available data indicates that South Korean males are drinking at higher rates than South Korean females. The differences observed in the current research may be due to gender role differences that are found more broadly in South Korean culture, likely based on the country's history with Confucius social norms. However, the results do also suggest that females are drinking at higher levels than previously reported.

Conclusion

Although there appears to be differences in SP/SR of South Koreans of all ALDH2 types, the expectancy levels of heavy drinkers with ALDH2 (1/1) seem to support a wealth of research indicating that positive expectancy correlates with drinker levels. Furthermore, despite study 1's results indicating that negative expectancy is at a higher level among heavy drinkers, there is still evidence to suggest that the negative effects of alcohol are influential. Here, the fact that higher SP is seen to have an influence on ALDH2 (2/1) lighter drinker's lower levels of consumption tends to indicate that the negative effects of acetaldehyde are capable of being influential on drinking behavior.

Importantly, despite the negative effects being experienced by those with the mutant (2/1) gene, the results indicate that there are only small differences in their overall alcohol consumption levels. It seems that a combinations of positive (higher tension reduction for ALDH2 (2/2) *heavy drinkers*) and negative influences (negative effects of acetaldehyde) work to allow those with ALDH2 (2/1) to be both protected by the negative effects (lower levels of alcohol dependence) if high in SP, and perhaps at the same time they may be provided with an incentive to drink by the tension-reduction effects if they are low in SP. Furthermore, cultural differences, such as Confucianism, may have an influence on those with the mutation and their drinking habits. As it is considered somewhat impolite to refuse

directions given by elders, drinking on despite the negative effects may help explain the relatively high level of alcohol consumption among males in South Korea.

Overall, the current research sheds some light on why South Korea, despite its large prevalence of ALDH2*2, maintains high levels of alcohol consumption, with both biological and cultural influences likely having an effect. The results suggest that those with ALDH2 (2/1) need to be less sensitive to punishment if they are to maintain high levels of alcohol consumption, at which point they appear to be rewarded with a tension reduction effect. The results also suggest that differences between the current results and past research go beyond ALDH2 (2/1), with one reason being that South Korea's background in Confucianism perhaps leads those that would be less likely to drink heavily to do so.

These results, and those from study 1, indicate that the negative effect of ALDH2*2 are likely heavily involved in the South Korean alcohol experience. Interestingly, heavy drinkers with ALDH2*2 are reporting lower levels of *arousal* expectancy, which is in contrast to both Western MDS and implicit alcohol memory tests. Western research has shown that heavy drinkers strongly associate with the positive *aroused* expectancy (Rather et al, 1992; Reich, Noll and Goldman, 2005). Furthermore, the results suggest that South Korean heavy drinkers may have lower levels of SR than Western populations. This is important as research suggests that those high in SR more readily respond to alcohol related stimuli (Carver & White, 1994). How these factors, coupled with the higher level of negative expectancy, affects the implicit attention bias for alcohol-related stimuli is of interest. The current research wishes to explore how the higher levels of negative expectancy, lower levels of arousal expectancy, and lower levels of SR affect the activation of an alcohol memory network.

Chapter 5

Implicit Alcohol Expectancy Activation: The Role of Negative Expectancy

Alcohol expectancy theory places positive memories of alcohol consumption at the core of problem drinking. The theory suggests that when heavy drinkers encounter environmental configurations that have been encoded as positively related to alcohol, positive memories are automatically, subconsciously triggered, initiating a powerful desire for consumption. The results presented in the first two studies indicate that biological and cultural variables may have an effect on this inadvertent impulse. The higher levels of negative expectancy found in study 1 (Mahoney, Graham, Cottrell, & Kim, 2011) and the differences in alcohol expectancy and BIS/BAS found in study 2 indicate that there are unique aspects to the South Korean population's concept of alcohol consumption. These differences are likely to result in discordant implicit alcohol constructs that may affect subconscious reactions to alcohol-related stimuli.

Study 1 and 2 have also demonstrated that an understanding of cultural differences is essential when explaining differences found across different populations in alcohol-consumption research. This is particularly true for the current research, as results have shown that there are measurable differences that exist in the cognition of East Asian and Western populations that drive customary and philosophical differences. Tests designed to explore implicit perception are reporting holistic and analytic perspective biases that are leading to conceptual anomalies (Nisbett, 2003). As the current research is interested in exploring implicit memory and expectancy actions, a review of such research is vital. The following chapter thus aims to more specifically distinguish the variables that may influence the implicit activation of South Korean alcohol expectancy, considering the existence of such unique characteristics.

Current Alcohol Expectancy Paradigm: Survival Instincts

Research suggests that decision making is based on situational needs, where, for example, “seek” behavior for water will increase in the case of a thirst sensation (Brendl, Markman, & Messer, 2003). Interestingly, activation of a need has also been shown to devalue the importance of other objects in the environment (Brendl, Markman, & Messner, 2003). In part one of their two-part study, Brendl, Markman, and Messner (2003) showed that heavy smokers who were smoke deprived devalued money, as demonstrated by them buying fewer raffle tickets than heavy smokers who were allowed to smoke prior to the experiment. The authors state that this is occurring outside the awareness of the participants, as they were uninformed as to the exact nature of the test. They state that this may occur as motivation has been shown to be a limited source. Importantly, the authors refer to working memory research (Anderson, Reder, & Lebiere, 1996), which shows that there is a limit on the number of concepts that can be consciously active at any one given time, meaning that the CNS appears to prioritize environmental stimuli on a needs basis. This is relevant for the current research, as it may help explain why those participating in implicit alcohol memory tests show an attention bias for alcohol-related words (adjectives) at the expense of words that are considered much easier to recall (concrete nouns) (Reich, Noll, & Goldman, 2005). This is further illuminated by research showing that retrieving certain words interferes with the retrieval of others (Anderson, Green, & McCulloch 2000; Anderson & Spellman 1995), and that in the case of ambiguous words like alcohol expectancy words (adjectives like “happy” that could be applied to countless concepts) for heavy drinkers, the activation of its association to a certain concept appears to inhibit other possible — even more obvious — associations among environmental patterns (Reich & Goldman, 2005; Gernsbacher & Faust, 1991; Neely, 1976). Ultimately, this suggests that the induction of alcohol expectancy among

heavy drinkers through the presentation of an alcohol cue may create a need state that not only triggers an alcohol stimuli attention bias, but also causes devaluation of other environmental elements.

This is supported by Nelson and McEvoy's (2000) free-association test results that have indicated that the strength of a word's association could implicitly vary in regard to *situation* and *context*. That is, the strength of an association is dependent on the context in which the prime word is received. They state that even though their research was not associated with alcohol, those prone to substance abuse should be biased towards words associated with their drug of choice. They based this claim on the results of their "relative strength" hypothesis test, where they placed a previously established associate word of one of the prime words in among the instructions of the test to be taken. They hypothesized that the embedded associate word would be implicitly noticed by the participant, causing a bias that would result in increased recall frequency (Nelson & McEvoy, 2000). Their results confirmed the hypothesis, with the words embedded in the handout increasing in recall.

This implicit reaction can be explained, in part, by theories suggesting that an organism's survival is reliant on its ability to learn about the environment it inhabits, as it attempts to exploit relations between actions and resulting consequences (Balleine, Killcross, & Dickinson, 2003; Balleine & Dickinson, 2000; Corbit & Balleine, 2000; Goldman, Brown, Christiansen, & Smith, 1991). An organism's ability to distinguish between a reward and a threat directly affects its ability to function and survive (Brembs, 2003). However, the overabundance of environmental information available to the central nervous system (CNS) seems to lead the organism to develop attention biases for stimuli that match memories of already encountered events or objects (Mckoon & Ratcliff, 1992; Kunst, Wilson, & Zajonc, 1980; Goldman, 1999). Due to the nature of survival, faster reactions often result in better

outcomes.

Therefore, the speed at which implicit cognitions often occur means organisms are required to implicitly and reflexively “bet” (Reich, Noll, & Goldman, 2005) that environmental stimuli matches information held within memory networks. Hence, when activated by such encode / store / retrieve cognitive activity, the CNS serves to imply that behaving a certain way will result in an advantageous outcome through functions such as increased neurotransmission and elevated heart rate (Erickson, 2007). Therefore, while a layman’s conceptualization of behavior may interpret everyday, mundane actions as being under personal control, the way in which our emotions strike us, and the subsequent effect on behavior, often occurs automatically and without conscious regulation (Kirsch, 1985; Kirsch & Lynn, 1999).

This helps explain Kramer and Goldman’s (2003) results that have shown that heavy drinkers, when cued with an alcohol beverage word in an emotional stroop task, display greater latency than they do for neutral words. Even though heavy drinkers’ reaction times are slower, Kramer and Goldman suggest this indicates greater cognitive interference due to a subconscious attention bias for alcohol expectancy words. There have been several other studies that have also reported heavy drinker attention bias for alcohol expectancy words, using a variety of populations and methodological adjustments (Cox, Brown, & Rowlands, 2003; Feldtkeller, Weinstein, Cox, & Nutt, 2001; Kramer & Goldman 2003), all indicating that heavy drinkers have an implicit attention bias for alcohol-related stimuli.

Alcohol expectancy theory has thus moved from a behavioral background into a more cognitive, memory-based model (Rather & Goldman, 1994). This being the case, understanding implicit points of difference that may exist within the South Korean population that affect the encoding of information (including alcohol) may help explain a South Korean

expectancy alcohol-consumption theory. With a great deal of the current alcohol-expectancy literature having been conducted using Western samples, the understanding of variables influencing cognition and behavior in the East Asian region is important.

Cultural Differences in Cognition and Affect

East Asian culture is believed to have been largely influenced by Chinese philosophy, whereas Western culture is said to have been shaped by the early Greeks. Farming and cultivation methods have been identified as one possible differentiating factor in the opposing development of East Asian and Western philosophy and social customs (Nisbett, 2003), with the different lifestyles of their early civilizations reported as vital to a separation in thinking (Nisbett, 2003). While Chinese communities were required to cultivate large, flat fields in cooperation, Greece's mountainous terrain is said to have encouraged a more isolated working style (Nisbett, 2003). Research suggests that these early ecologies have resulted in opposing ideologies and dialectic variations, which culminate to produce measurable differences in cognition (Ji, Peng, & Nisbett, 2000; Nisbett et al., 2001).

A review of the related literature has highlighted, for example, divergences in general perception (Nisbett et al., 2001). Nisbett et al. argue that East Asians tend to be more holistic and Westerners more analytic. Holistic thought is defined as having an attention bias for the contextual whole, where the relationship between the main object and the field surrounding it appear more as one (Nisbett et al., 2001). Conversely, analytically oriented perception shows bias towards the object within the field, where the surroundings are treated as less important (Nisbett et al., 2001). Holistic thought is believed to be based on accumulated knowledge and an understanding that things change. This view takes in the idea that there is a need for contradictions within various contexts and landscapes, with an overall desire to find harmony in the middle ground (Ji, Peng, & Nisbett, 2000; Nisbett et al., 2001). In contrast, analytic

thought is concerned with object classification, description, and prediction (Ji, Peng, & Nisbett, 2000; Nisbett et al., 2001), where there is a need to avoid contradictions in search of the true nature of the object.

Ji, Peng, and Nisbett (2000) tested this assumption by asking Chinese and American participants to complete a rod and frame test. Participants were told to indicate when they felt a movable rod within a given field was positioned straight up and down. Making it more difficult was the fact that the field behind the rod changed. The results confirmed the hypothesis that the Western tendency to focus on individual objects within a field would result in American students being more efficient, indicating that East Asians are more field dependant than Westerners are. The authors stated that the East Asian students seemed more distracted by the field changing than the Americans, and were thus less successful in placing the rod vertically.

Ji, Peng, and Nisbett (2000) also conducted research that involved an animated scene in which objects would appear either to the left or right of the screen. There were three experimental groups where the left/right images would appear with correlative relationship of either 0, 0.4, or 0.6. The results confirmed Ji, Peng, and Nisbett's hypothesis that, due to their more holistic focus on environmental relationships, East Asian participants would have better accuracy in predicating the correlative relationship of the two objects and that their confidence levels with their decisions would be more akin to their accuracy. Ji, Peng, and Nisbett suggest that the American student's focus on environmental objects not only led them to have poorer predictive powers, but that the focus on individual aspects led them to be more confident in their choice. This overconfidence is said to be a common feature of American cognition, where they tend to have a disproportionate belief in their level of control over situations (Presson & Banassi, 1996).

Masuda and Nisbett (2001) further tested the cognitive styles of East Asians and Westerners by presenting participants with an animated underwater scene of fish and other objects. The test simply presented the participants with the animation before asking them to explain what they saw. Western students' first response generally concerned objects within the tank, such as fish, while Japanese students usually made first reference to the body of water (pond or lake) the fish were in. Their results suggest that East Asians are more likely to focus on the contextual whole at the expense of the object within the picture, whereas Westerners are more likely to focus on objects that exist within the field. Importantly, this occurs largely outside the awareness of the participants, and indicates that these differences are not necessarily a conscious preference, but rather more implicit in nature.

These differences may be ingrained by language development, and more specifically, the way in which East Asian and Western parents help their children learn a language (Fernald & Morikawa, 1993). Fernald and Morikawa (1993) have noted that Japanese and Korean languages are both verb final languages. This is in contrast to English, where the verb comes before the noun. In English, for example, the process is subject, verb, noun (I play tennis). In Korean and Japanese, however, it is simply noun verb (tennis play), often without a subject. It's believed that the English language lends itself to a greater classification of environmental objects, and that East Asian languages are more focused on actions and relationships between environmental objects (Nisbett, 2003).

In their research, Fernald and Morikawa (1993) observed the way in which 30 American and 30 Japanese mothers interacted verbally with their babies. The research introduced two stuffed animals and two wooden vehicles to the mother and infant, and then noted the types of language that was being used by the mother to describe the toy, particularly in the first two and a half minutes. While there were common traits among both

the American and Japanese mothers, where, for example, they would both slow their speech and repeat words, the mothers also interacted ~~in~~ ways shaped by beliefs and practices specific to their cultures” (p. 649). Their research showed that while American mothers constantly labeled things and focused on the object and its name, Japanese mothers less frequently used the name of the object but rather referred to polite verbal routines. American mothers were more likely to make comments related to the features of the object, such as ears and wheels, etc. Japanese infants, however, were exposed to far less feature naming and far more correct practices in regard to social interaction, where the mothers would introduce sharing language while exchanging the object with their children. Fernald and Morikawa postulated that the actual name of the object was somewhat irrelevant to the Japanese mothers, as they were far more concerned with rituals of polite social custom. Fernald and Morikawa concluded that a mother’s baby speak is influenced by linguistic and cultural differences that perpetuate and sustains the given culture.

This lack of exposure to nouns has been shown to lead to a delayed development of categorization and naming, with Gopnik and Choi (1990) indicating that Korean children, who more frequently used verbs, showed stagnated development in their ability to section and name objects when compared with English-speaking and French-speaking children. In their research, Gopnik and Choi (1990) observed five Korean Americans and three French-speaking North American children and found that Korean children appeared to have their cognitive ability develop at a faster rate than their lexical ability, which lead to higher scores on cognitive tests but lower scores in linguistics tests. This suggested that language by itself is capable of causing differences in cognition, and that furthermore it is perhaps the cultural focus on the whole rather than the object that is causing these differences.

According to Nisbett, Peng, Choi, & Norenzayan (2001), these perceptual and

dialectic anomalies may be influencing their results that show that Chinese students are more likely than American students to endorse proverbs that demonstrate contradiction. Nisbett, Peng, Choi, & Norenzayan (2001) have postulated that, in fact, being able to see truth in seemingly contradictory terms is a form of dialectic thinking, which is guided by tacit ontologies and cultural understandings. East Asian perspective is said to dictate that the environment is constantly changing; an object cannot be separated from its context; and, therefore, studying objects individually ignores the grander scheme of which the object is but a part (Ji, Peng & Nisbett, 2000). Ultimately, an object studied in isolation fails to take into account the role it plays in the greater environment.

Cultural differences in positive and negative affect.

Interestingly, the notion that East Asians tend to endorse the whole as opposed to the individual appears to extend to the perception of emotion (Bagozzi, Wong, & Li, 1999). Research generally suggests that positive and negative affect are bipolar (Green, Goldman, & Salovey, 1993), where individuals tend to report feeling either positive or negative — but not both at once. Theories on whether PA and NA can be active simultaneous or are bipolar have run concurrent for many years. In their review, Russell and Carroll (1999) have indicated that the greater body of research suggests bipolarity. However, Bagozzi, Wong, and Li (1999) suggest that these studies may be failing to take into consideration cultural differences in the way emotion is perceived. Bagozzi et al. suggest that independent-based cultures (Western) usually describe affect as occurring in a bipolar fashion, whereas those in interdependent-based cultures (East Asians) tend to exhibit concurrent affective traits. This is important for the current research as emotion is a vital element of an implicit alcohol-expectancy action, and thus any differences in the way in which it may function in a South Korean population is of interest.

Greek philosophy and affect.

Aristotle is said to have seen logic as the rules of thought that lead to an intellect dictated by reason and truth (Hansen, 1995). This philosophical emphasis on reasoning and logical thought is believed to guide general choices concerning current and future events. This focus is also believed to not only encourage self-reflection and exploration but also help manage understandings of external objects, where even manipulation of social interaction is guided by these ancient Greek principles (Bagozzi et al., 1999; Hochschild, 1979; Potter, 1988). Of great importance here is the notion of categorization, which the Greeks took very seriously. Their curiosity for the world around them saw them develop more complex forms of category and rules among environmental items and circumstances, which is believed to have led to the development of many scientific fields still being researched today (Nisbett et al., 2001).

Categorization is said to extend to the construction of affect and cognition, where Westerners are believed to place greater emphasis on understanding not only one's emotional state but also one's general personality. Westerners are also more likely to see affect as closely related to health, where reflection on past experiences — physical, cognitive, and affective — is encouraged. It is believed that those in Western cultures are encouraged to be not only more sensitive to their own emotions but also the emotions of others, where even emotional reactions *to* emotional reactions must be monitored (Bagozzi et al., 1999).

Bagozzi et al. suggest that as a result, Westerners view emotions as singular and more easily catalogued, where individuals are either feeling one or the other. This remains generally consistent with other Western notions of category, including “mind/body, subjective/objective, self/other, cause/effect, individual/society, (and) passion/intellect” (Bagozzi et al., 1999, p. 646). This leads Bagozzi et al. to postulate that affect is more likely a

result of a greater world perspective than a naturally occurring phenomenon. It has been stated that independent-based cultures have created an idea of affect based not just on Greek philosophy and other social traditions, but also on linguistics (Bagozzi et al., 1999). It's believed that axioms and definitions — parts of speech used to create terms and factual meaning in sentences — have played a great role in the shaping of the Western understanding of affect (Bagozzi et al., 1999). It is postulated that via a combination of axioms and definitions, one can establish truth through different forms of proof that leads to a greater understanding of the precise makeup of “things” around us (Bagozzi et al., 1999). This desire for proof and logic, combined with the tendency to distinguish and categorize, is said to have helped establish the notion that emotions like happy and sad are different, and thus must occur separately.

East Asian affect: the importance of social context.

The Western notion of affect is in contrast, however, with what has been observed in interdependent-based cultures, where it is believed there is a greater focus on removing one's personal desires and feelings for the greater good of the group (Bagozzi et al. 1999; Nisbett, 2003; Nisbett et al., 2001). East Asians, in particular, have been singled out as following an ideal that emphasizes one's place within the society and the benefit that an individual's task brings to the group. Where Greeks preferred logic and classification, early Chinese philosophy — which has been largely adopted in both Korea and Japan — promoted “*dao*,” which places greater importance on correct contextual action (Hansen, 1992, cited in Bagozzi et al., 1999). A *dao* itself is a ritual of behavior and language that is performed in particular situations, where perfecting the act requires learning the names of different *daos* and being able to recognize and enlist the correct decorum and corresponding emotional state. “*Qing*” is considered the emotional element of a *dao*, and is therefore also subject to the context of the

social encounter. That is, one is directed as to the appropriate feelings by the company and the social situation one finds him or herself in. It has been suggested that people are greatly encouraged to adopt their parents' and grandparents' beliefs and customs, and that learning various doas is one way of indoctrination (Bagozzi et al. 1999). Interdependent-based cultures also place little emphasis on personal emotive states, believing that personal feelings have little to no influence in a wider social context (Nisbett, 2003). The focus here is ultimately on being party to the appropriate social mood.

Thus, Bagozzi et al. (1999) report that PA and NA can co-occur in East Asian populations and state that they believe this reflects differences in "conceptualization, experience, and use of emotions across independent-based and interdependent-based cultures" (p. 664). They postulate that Westerners tend to spend a great deal more time analyzing their own and each other's emotional states, whereas East Asian cultures fail to see emotion as a reason for behavior and generally feel that emotions are simply a secondary reaction to events (Bagozzi et al., 1999). Furthermore, Bagozzi et al. highlight the East Asian philosophical tendency to balance things (e.g. Yin and Yang), pointing out, for example, that the Chinese do not believe in a world where life is totally "good." It is thought that this balanced attitude helps them direct and form their affective functions, where feeling either too good or too bad is undesirable (Bagozzi et al., 1999).

This notion of positive and negative affect being experienced concurrently by East Asian populations is important for the current research. As those with ALDH2 (2/1) are suffering negative physical effects immediately during alcohol consumption that appear to be influencing SP and perhaps even causing the higher level of negative expectancy among South Korean heavy drinkers, the possibility that those from an East Asian culture are more inclined to accept negative effect in favor of social harmony may affect their implicit

responses to alcohol- related stimuli.

Implicit Priming: The Importance of Korean Alcohol Free Associations

Nisbett (2003) has suggested that language is part of a circle of environmental influences that helps maintain certain differences that exist in Western and East Asian subconscious thought and affect processes. What is more, research also suggests that the amount of exposure to a word can have an effect on its likability (Zanjon, 1968), with different languages shown to produce variations in word frequencies, which extends to the alcohol concept (Mahoney, Graham, Cottrell, & Kim, 2011). Therefore, it is likely that slightly diverse meanings may be attached to the same concept (represented by a word). Ultimately, representations (words) of a concept (e.g. reward) will differ in meaning across two languages, making it almost impossible to correctly translate meaning with 100% accuracy.

While a large degree of meaning is likely to correspond across languages, non-volitional responses are believed to be sensitive to small variation and inaccuracies, as the subconscious activation of a memory network requires stimuli that is capable of producing a spontaneous, implicit reaction without conscious processing (Reich, Noll, & Goldman, 2005). One of the perceived advantages of implicit priming methods is that they are less vulnerable to external influences and biases born of the testing procedures or researcher influence (Roehrich & Goldman, 1995). It is also widely held that these involuntary emotive responses generated in such tests are largely reliant on a complex, intimate encode / store / retrieve process where the emotional element of the experience is often the catalyst for recollection (Zanjon, 1968).

What is more, words are said to become associated with each other through vast amounts of experiences across many different contexts (Nelson et al., 1998). It is believed

that these concept connections have complicated relationships that can be applied to a number of given themes depending on the situation (Nelson & McEvoy, 2000). That is, the sequential presentation of words like “bar,” “happy,” and “smooth” will cue different memory sets depending on the contextual cue (e.g. chocolate vs. alcohol). When valid alcohol expectancy words are presented in sequential fashion following an alcohol prime, it has been shown that they are subconsciously interpreted by the heavy drinkers’ CNS as related to alcohol, resulting in a false (or at best overeager) prediction of an upcoming drinking event (Carter et al., 1998; Roehrich & Goldman, 1995; Stein et al., 2001). Here, it is suggested the inter-connectiveness of the words representing the “alcohol” concept helps the central nervous system recognize these otherwise ambiguous words as alcohol related.

Therefore, a vitally important element of a memory set activation is the presence of a pattern, and in the case of alcohol expectancy words, a sequential presentation. Here it seems the presentation of the word “happy” would, by itself, be incapable of activating an alcohol memory network and would require a sequence of associates (sociable, confident, horny) closely following it. If there were to be a breakdown in meaning where one or more of the words being used were not actually associated with the concept, then it is probable the strength of activation may not be as strong — if it were to occur at all.

This notion of differing strength of alcohol expectancy activation is supported by Roehrich and Goldman’s (1995) results that suggest that different cues have varying levels of effectiveness. In their research, those who were shown a video clip of people consuming alcohol in a bar setting drank more beer than those presented with alcohol expectancies in the modified stroop task. While the video and the alcohol expectancy word stroop task were both seen to increase beer consumption, the video had a greater affect. This suggests that there are varying levels of cue strength that can produce measurable variations in behavior. This also

suggests that the presentation of a poorly constructed set of alcohol expectancies — a translated set, for example — may result in diminished affect.

Furthermore, in such trials where implicit cues are being used, it is important to be sure the research is activating the correct phenomenon. Research has shown, for example, that mood manipulation does not result in an increase in alcohol consumption, and that likewise the activation of an alcohol expectancy network does not result in an increase in positive mood (Stien et al., 2001). This indicates that implicit mood and alcohol expectancy actions occur separately. Therefore, words such as “happy” require validation as genuine alcohol expectancies, otherwise, the activation of mood or other cognitive functions may be misinterpreted as an activation of an alcohol memory network.

Currently, if researchers exploring a South Korean population wish to illicit such non-volitional actions using translated alcohol expectancy words, they cannot be sure the positive increase/decrease in cognitive activity will, for example, be due to the activation of an alcohol expectancy network. What is more, any results failing to demonstrate an activation of a memory network despite the implicit presentation of translated alcohol expectancy words would need to acknowledge that this may be due to the fact that the word stimulus was not authentic. Therefore, the external validity of results of such an experiment could be improved by using stimuli that originate from the given population rather than a translator.

This notion is supported by Reich and Goldman (2005), who used students as research assistants to help interpret their unrefined free-association data. They stated that they believed the students were more capable of understanding the raw responses, as they were actually a part of the population being sampled. This is in line with the belief that such data should always come from the population being sampled and not from the research team or

any other outside group assuming to know details about the given population. By using students to help process the data, Reich and Goldman (2005) may also have been acknowledging that language, meaning, and representation can change over time, where different generations are capable of not only perceiving things differently, but are also capable of using different language to express the same meaning. That is to say, that any given language will change over time, where different generations tend to adjust the meaning of existing words (e.g. “sick” can now mean “eol”) and, at times, add their own new words to a given lexicon. One of the advantages of periodically updating alcohol expectancy lists, as was the case with Reich and Goldman (2005), is the unearthing of any new expectancy words that may have emerged over time.

Furthermore, neural “circuits” are said to become accustomed to performing certain actions in accordance with certain events (Hopfield & Tanks, 1986). Here, the more often the circuit performs an action, the easier and more likely the action will be performed. When considering that elements of a circuit include environmental contexts and objects, it can be reasonably assumed that changing the context and objects of an environment will in some way inhibit the ease with which a circuit is activated. Any significant change in context should, theoretically, then lead to a reduction in the likelihood the circuit’s action is performed. Therefore, if the environment is, for example, noticeably different from that which one is accustomed to, then motivation for a certain behavior may be in some way inhibited. Differences in intonations, slang, and colloquialisms being used may affect the ease with which a non-volitional action is performed, and in turn the level of implicit motivation being regulated. Therefore, when trying to demonstrate the activation of an alcohol expectancy memory network similar to that seen in the Roehrich and Goldman (1995) modified stroop task, implicit recognition and the ensuing non-volitional cognitive or

behavioral response (e.g. increased beer consumption) is dependent on the accuracy of the association. Put simply, there is no strength of association if there is no association to begin with. If the expectancy word, for example, is not an accurate representation and does not have the required intimate relationship created via experiences with alcohol, then activation is unlikely to occur. The word lists used in such implicit priming studies have been generated by the populations being sampled, which is said to be a vital element of a rigid methodology (Goldman, Greenbaum, & Darkes, 1997).

Conclusion.

While Zanjoc (1968) claimed that some cultural variations in recall previously discovered have probably been rather meaningless, there are differences that represent more serious cultural divisions of understanding. This assumption forms the basis of current research, in that a set of South Korean alcohol expectancies is required before an exploration of the affects of ALDH2*2 on Korean drinking practices can be conducted. The translation of a South Korean alcohol expectancy questionnaire benefited from a reference list of South Korean alcohol expectancies, and the following implicit testing could not be performed without the existence of such a list. Thus, having access to the South Korean alcohol free associations generated in study 1 (Mahoney, Graham, Cottrell, & Kim, 2011) allows the current research to avoid using translations that may not be capable of eliciting non-volitional emotive response, as translated expectancies may not be connected with the delicate, intimate relationships between such things as alcohol expectancy words and the stored alcohol experience or understanding. Thus, following an alcohol cue, the sequential presentation of words that have been shown to be genuinely associated with the South Korean alcohol concept (Mahoney, Graham, Cottrell, & Kim, 2011) should cause South Korean heavy drinkers' CNSs to implicitly recognize the pattern and consequently initiate a measurable

anticipatory reaction.

Therefore, study 3 is designed to explore the implicit activation of South Korean alcohol expectancy memory networks using the free associations generated in study 1. Here, an adjusted alcohol memory test designed by Reich, Noll, and Goldman (2005) will be employed. The memory test involves priming two word lists with cues related to the two embedded word themes — “milk” for grocery items (e.g. cheese, granola, mustard, etc.) and “beer” for alcohol expectancy words (happy, confident, sociable, etc.). Reich, Noll, and Goldman (2005) found that participants who were primed with the word “milk” as the first word of the memory test recalled more grocery words, and *heavy drinkers* who saw the word beer as the first word recalled more alcohol expectancy words. A survey of the participants after the memory test revealed that while some explicitly noticed the relationship between the grocery items, no one made the connection between the word “beer” and the expectancy words. This indicates that upon the presentation of the word “beer,” heavy drinkers’ CNS implicitly recognized the pattern of positive words as related to alcohol, which resulted in the increased recall of alcohol expectancy words.

Importantly for the current research, the increase in heavy drinker recall of alcohol expectancy words in the Reich, Noll, and Goldman (2005) alcohol memory test was mediated by positive aroused expectancies. This is interesting, given that heavy drinkers with ALDH2 (2/1) have reported a lower level of arousal, assertive and aggressive expectancy in study 2. Furthermore, the lower levels of SP among all South Korean drinker types may also affect the implicit response to an alcohol word cue.

Having explored negative expectancy and laid the foundation for translations with the free-association test, and then having explored the psychobiological variables affecting South Korean drinker levels, the current research aims to explore whether a high prevalence

of negative expectancy and the presence of lower levels of arousal expectancy and SP among South Korean heavy drinkers found in studies 1 and 2 will affect implicit activation of an alcohol memory network. This is relevant not only to those in South Korea, but also those investigating the possible effects of negative expectancy on alcohol consumption. If the results show that South Koreans respond to an alcohol prime, it may be the case that negative expectancy has no effect on the instinctive search for alcohol that is displayed by heavy drinkers in Western populations. If, however, there fails to be an activation, it may suggest that the high negative expectancy and lower levels of arousal expectancy and SP — possibly driven by heavy drinkers with ALDH2*2 — may protect against this implicit bias for alcohol-related stimuli, even among heavy drinkers.

Chapter 6

Study 3. Implicit Alcohol Cues: Are Koreans Less Sensitive?

Alcohol expectancy theory suggests that involuntary responses to alcohol related stimuli are catalyzed by memory sets that have connected the positive aspects of alcohol with co-occurring environmental objects and events (Reich, Goldman, & Noll, 2004; Reich, Noll, & Goldman, 2005). It is believed that almost anything encountered while consuming alcohol is capable of becoming an associate of it (Erickson, 2007; Stacy, 1995), where those who have continued exposure to alcohol-related environmental patterns —heavy drinkers—have an increased chance of identifying otherwise everyday objects, situations, and even words as related to drinking (Reich, Noll, & Goldman, 2005; Roehrich & Goldman, 2005).

Associations made between the environment, one's behavior, and outcomes are believed to be an integral part of an innate, psychobiological survival function that serves to predict environmental conditions (Balleine, Killcross, & Dickinson, 2003; Balleine & Dickinson, 2000; Corbit & Balleine, 2000; Goldman, Brown, Christiansen, & Smith, 1991; Reich, Noll, & Goldman, 2005). It is believed that the advantages of a quick response often outweigh the risk of misinterpretation, sometimes leading to the cuing of an incorrect expectation of a certain event (Reich, Noll, & Goldman, 2005). In regards to alcohol, results indicate that heavy drinkers incorrectly interpret positive affect words like "happy" as a cue to a possible drinking opportunity. Given the number of studies reporting that heavy drinkers' cognitive functioning (Drobes, Carter, & Goldman, 2009; Reich et al., 2004; Reich, Noll, & Goldman, 2005) and alcohol consumption levels (Carter et al., 1998; Roehrich & Goldman, 1995; Stein, Goldman, & Del Boca, 2000) are unknowingly altered by exposure to positive alcohol associate words, it can be said that they function as, and therefore are, alcohol expectancy stimuli.

While positive alcohol expectancy word attention biases have been consistently shown to occur in Western heavy-drinking populations, there has been little implicit alcohol expectancy testing conducted among a South Korean population. Given that South Korean free-association tests have identified a somewhat heightened level of negative expectancy among South Korean heavy drinkers (Mahoney, Graham, Cottrell, & Kim, 2011), and that negative expectancy can influence some heavy drinkers' avoidance behaviour (Gaher & Simons, 2007), how higher levels of negative expectancy, lower levels of arousal expectancy, and lower levels of SR affects South Korean heavy drinkers' implicit alcohol attentional bias is of interest.

The Reich, Noll, & Goldman (2005) alcohol memory test is particularly appropriate for the current research, as the methodology used appears to isolate heavy drinkers. As research has shown that even light drinkers drink more upon the presentation of what may be considered a stronger alcohol stimulus (Carter et al., 1998), a test that targets only heavy drinker alcohol expectancy activation is required. Given the establishment of a list of South Korean alcohol expectancy words, the current research aimed to investigate whether an alcohol word prime could activate positive South Korean alcohol associations and result in a higher recall of positive alcohol expectancy words, as was seen in a Western sample (Reich, Noll, & Goldman, 2005).

Method

Participants

One-hundred and eighteen Daegu Health College students (68 female) were recruited from their English language classes. The participants originated from various parts of South Korea, but mainly from the Daegu area. Participants were tested in eight different classes and were randomly assigned either the "–kim chi" or "–soju" condition. Reich, Noll, and

Goldman sectioned their drinker types into non, lighter, and heavier drinkers. Therefore, to facilitate comparison to their study, participants were classified as either non (N=11), lighter (N=59), or heavier (N=49). To create such categories, Dawson, Grant, and Chou's (1995) drinker categories were used, where non drinkers were defined as consuming no more than 12 standard drinks per year, light drinkers were defined as having no more than four standard drinks per week, moderate drinkers were defined as having no more than 14 standard drinks per week, and anything over 14 standard drinks a week was considered heavy drinking. To separate the participants into "lighter" and "heavier" drinkers, the midway point of moderate drinking—nine drinks a week—was chosen. Therefore, those who drank less than 12 drinks per year were considered non drinkers, those who drank nine drinks or fewer per week were considered lighter drinkers, and those who drank 10 drinks or more per week were considered heavier drinkers. UK standard drink size of 10 millilitres of alcohol (International Centre for Alcohol Policies, 1998) was used to define a standard drink.

Materials

The research included two conditions: those who saw "kim chi" as the cue word and those who saw "soju". The word list comprised of 30 words, which included one of the prime words along with 14 food items (e.g. pineapple) and 15 Korean alcohol associates, which were taken from Mahoney, Graham, Cottrell, and Kim (2011). The Korean rice liquor soju was chosen as the alcohol prime, as it is the most consumed alcohol beverage among this population (OECD, 2011). Mahoney, Graham, Cottrell, and Kim dimensionalized the South Korean free associations into eight octants in accordance with Goldman and Darkes (2004), whose results showed that heavy drinkers were more likely to associate with positive arousing expectancies, and that lighter drinkers were more likely to associate with negative sedating expectancies. Therefore, five expectancies were chosen that were more likely to be

endorsed by heavy drinkers, five that were more likely to be endorsed by lighter drinkers, and five that have been shown to be endorsed by both heavier and lighter drinkers (see Appendix 21). Reich, Noll, and Goldman (2005) noted that the unusually high recall of the word “horny” indicated that the participants had an attention bias for this word that was unlikely to be the result of alcohol memory network activation, and even though there existed a direct South Korean translation, it was deliberately not included. Reich, Noll, and Goldman’s study also used the Kucera and Francis (1998) word norms to ensure that the expectancy words and the grocery items that appeared in the memory tests did not differ in mean frequency and length. The current research accessed an equivalent South Korean list (Zhang, 2005), which showed that there was no significant difference in the frequency. Furthermore, the average length of the words also did not differ.

Participants were also asked to complete a 15-item demographic survey. Two items related to drinking habits — how many times a month they drank and how many drinks they typically consumed in one sitting.

Procedure

All of the testing was conducted in Korean, including the instructions given by a research assistant. The research assistant was given a script devised to help provide consistent information for all eight groups. All the testing occurred on Thursday the 12th of August 2010, and took place in a classroom setting. Participants were informed that they were taking part in a memory test where the aim was to remember as many words as possible. They were also informed that they were not obliged to participate and that they could leave at any time or ask for their results to be excluded from the research. They were ensured that no identifying details would be recorded and therefore the test results would remain confidential; however, if they chose to hand back their test and survey then their consent would be

assumed. Participants sat the memory test before filling out the demographic survey.

The memory testing began with the participants being presented with five words unrelated to the study on a standard classroom projector screen via a data projector to ensure that all participants could see the word display. Once the test began, the 30 words to be remembered were displayed one at a time for three seconds, with an ISI of one second. Thirty seconds after the last item, they were given three minutes to recall as many words as possible.

After all the tests and surveys were collected, a debriefing session was conducted, where participants were asked if they were aware of the purpose of the research in an attempt to gauge the effectiveness of the embedded words themes. While several participants reported identification of the grocery theme, no one reported being aware of a link between the memory test and alcohol.

Results

Word category recall.

A 3x2x2 ANOVA was conducted with drinker category (non, lighter, and heavier) and word cue (kim chi and soju) as the independent variables, and word theme recall (grocery and alcohol expectancy) as the dependent variable. There was a significant main effect of the type of words participants were asked to recall, $F_{(1,112)} = 15.69, p < .001, \eta_p^2 = .12$. Significantly more grocery words were recalled than alcohol related words regardless of the cue. The prime word did however mediate a significant interaction between and the type of recalled word $F_{(1,112)} = 4.24, p = .04, \eta_p^2 = .04$. The results show that grocery words were recalled more often when the prime was “Kim Chi” compared to “Soju”. There is no difference in the recall of alcohol words in regard to the type of cue (see Figure 4). There was no significant difference in words recalled between drinker levels, $F_{(2,112)} = .36, p = .7, \eta_p^2 = .006$ or between prime words, $F_{(1,112)} = 3.19, p = .08, \eta_p^2 = .028$. All other interactions, including all those with

drinker level, were non significant ($F < 1$).

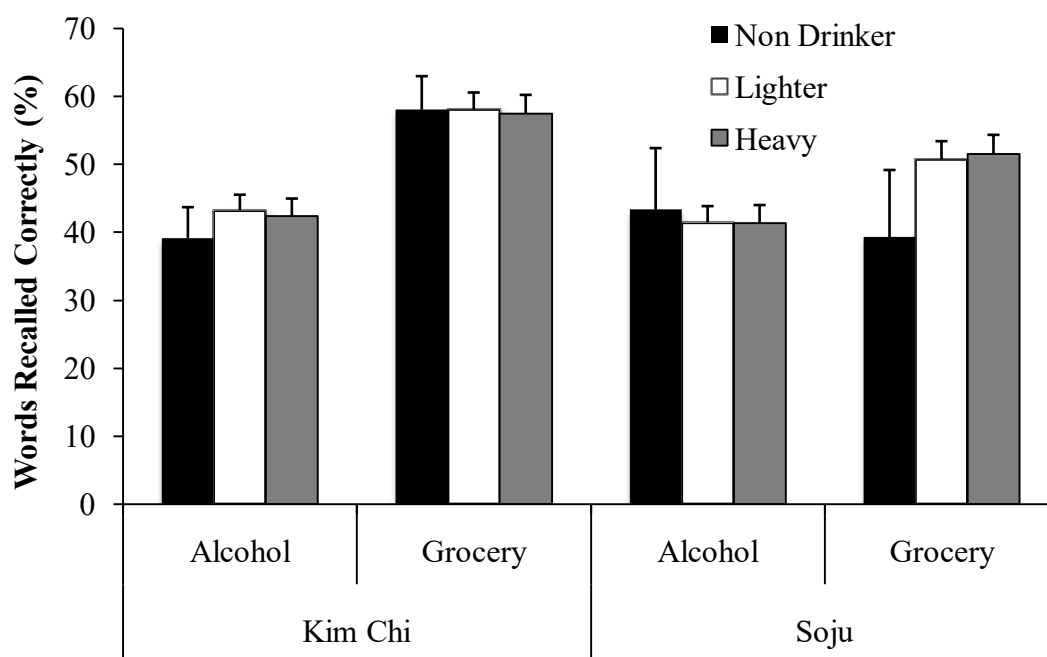


Figure 4: Word cues affect on recall of word categories among different drinker types.

Positive and negative alcohol expectancy word recall.

Two separate 2x3 ANOVAs were conducted on the recall of both positive aroused and negative sedated expectancy word categories, with cue and drinker type the independent variables and word recall the independent variable. There was no significant difference in drinker type recall of aroused alcohol expectancy words across primes, $F_{(1,112)} = 0.41$, $p = .52$, $\eta_p^2 = .004$ (see Figure 5). There was no difference in drinker type recall of sedated words across primes, $F_{(1,112)} = 0.59$, $p = .44$, $\eta_p^2 = .005$.

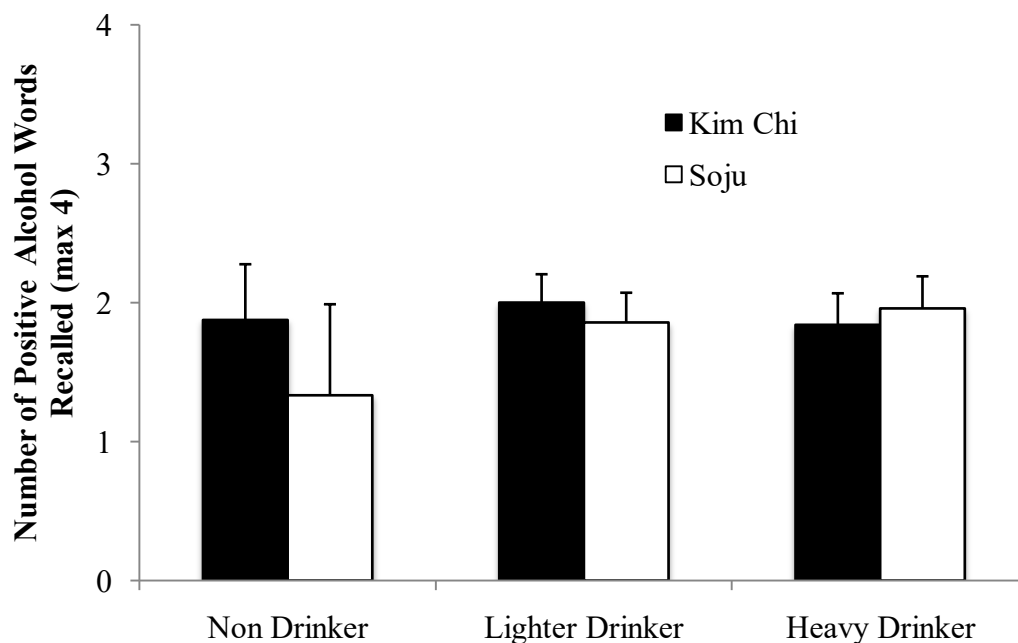


Figure 5: Word cues affect on recall of positive aroused alcohol expectancy words among different drinker types.

Discussion

While Western research has indicated that heavy drinkers will recall more positive alcohol expectancy words upon the implicit presentation of the word “beer” (Reich et al., 2005), there was no such effect in the current South Korean sample for heavy drinkers who saw the word “soju.” The results of the current research are in line, however, with conventional cognitive theories of memory stating that memory sets can be implicitly activated by related cues (Nelson & McEvoy, 2000; Roediger, Balota, & Watson, 2001). A significant increase in the recall of grocery word items for participants who saw “kim chi” indicates that those given the cue were able to better recognize the pattern and identify the theme, resulting in greater recall of grocery words.

Alcohol Expectancy Recall

Study 1 suggested that negative, negative sedating, and sedating expectancies are not predictors of alcohol consumption in a South Korean population (Mahoney, Graham, Cottrell, & Kim, 2011). This finding somewhat contradicts 30 years of Western alcohol-expectancy research, which has indicated that negative expectancies will be high among lighter drinkers and decrease as drinker level increases. This is important when considering that the activation of an alcohol memory network has been demonstrated in heavy drinking Western samples through the increased recall of *positive aroused* alcohol expectancies in an alcohol-related memory test (Reich, Noll, & Goldman, 2005). Therefore, the higher level of negative expectancy, lower levels of arousal, assertive and aggressive expectancies and SR found in a South Korean heavy-drinking population maybe negating any potential increase in positive expectancy word recall upon the presentation of the alcohol cue word “soju.”

One of the features of the Reich, Noll, and Goldman (2005) study was that the two embedded word lists were said to differ in the ease with which they can be recalled, with concrete nouns (grocery words) considered to be more easily visualised and connected than words representing feelings. The strength of association heavy drinkers have between alcohol and positive alcohol expectancy words seems to have allowed to them “overlook” the more obvious connection between grocery items in favour of words that are otherwise processed as everyday positive adjectives.

Given that an alcohol prime has been shown to increase the recall of positive alcohol expectancy words in the presence of more easily recalled concrete nouns (Reich, Noll, & Goldman, 2005), and that research has continually indicated that heavy drinkers show an attention bias for positive alcohol expectancy words (Cox, Brown, & Rowlands, 2003; Feldtkeller, Weinstein, Cox, & Nutt, 2001; Kramer & Goldman 2003), it can be said that

heavy drinkers associate these *positive* words with alcohol consumption. Therefore, the current research suggests that the vague cognitive boundary that exists between alcohol expectancy words and the concept of alcohol is permeated implicitly by positive expectancies, and may therefore be harder to cue in populations with relatively higher levels of negative expectancy. This has previously been demonstrated, as moderate and lighter drinkers in Western populations have been shown to be both higher in levels of negative expectancy and less sensitive to alcohol-related stimuli than heavy drinkers. This alone indicates that negative expectancy plays a mediating role in this lower level of sensitivity to alcohol-related stimuli seen both in the current results and past expectancy research.

The results of the current research suggest, therefore, that it may not be heavy drinkers ‘high level of experience’ with alcohol causing them to associate everyday stimuli with alcohol consumption. It seems more likely that it is the positive affective element of the experience that mediates these strong memory network connections. The current research suggests that, based on the known higher level of negative expectancy found among a South Korean heavy-drinking population (Mahoney, Graham, Cottrell, & Kim, 2011), it may be possible to have high levels of experience with alcohol but not be hypersensitive to alcohol primes. Thus, memory network theories may need to emphasize the positive affective element over high levels of experience, where heavy drinkers are not necessarily encoding alcohol consumption as totally positive may be less inclined to make such strong associations. Indeed, the current research illustrates that a higher level of negative expectancy can somewhat insulate a heavy drinker from implicit alcohol primes. While not suggesting that activation of alcohol expectancy is impossible among a South Korean population, the fact that there has been no increase in the recall of positive alcohol expectancy words for heavy drinkers upon the presentation of the word “soju” lends support to the notion that heavy-

drinking South Koreans have a different, more negative concept of alcohol that exists at a subconscious level. Therefore, in a heavy-drinking population with high levels of negative expectancy, low levels of arousal / assertive / aggression expectancy and SR, such as those found in South Korea, activation of alcohol expectancy may require a more robust alcohol stimulus.

This also leads to the suggestion that there are different factors driving South Korean heavy alcohol consumption. While positive alcohol expectancy still predicts South Korean drinker levels (Mahoney, Graham, Cottrell, & Kim, 2011), socio-cultural differences may be more involved in the unusually high levels of alcohol intake among South Korean males (W.H.O., 2004). East Asian cultures are, for example, widely believed to place greater emphasis on group harmony, where one's emotions are less important than the mood of the group as a whole (Nisbett, 2003). It may be the case that South Koreans have a somewhat more obligatory, social view of heavy alcohol consumption, where people who do not like alcohol drink on despite their own personal negative expectations, and do so in the belief that the co-occurrence of positive and negative feelings is normal.

The fact that ALDH2*2 causes negative effects that result in a lower level of alcohol dependence leads to the hypothesis that the failure to activate an alcohol memory network may also be influenced by the high levels of ALDH2*2 found in the South Korean population. Given that South Korean males have a high level of alcohol consumption (W.H.O., 2011), and that this population has around 30% ALDH2*2 prevalence, it is likely that there would be a considerable proportion of participants in the current research with an ALDH2*2 enzyme who report themselves as being heavy drinkers. The negative effects experienced by those with the mutant gene are likely to cause higher levels of negative expectancy. This would theoretically affect the overall results, as their higher levels of negative expectancy

should insulate them from the alcohol cue word (–soju”), just as negative expectancy may have insulated lighter and moderate drinkers from the alcohol cue word (–beer”) in the Reich, Noll, and Goldman (2005) study.

Conclusion

Similar to the results of the Reich, Noll, and Goldman (2005) study, the current results support the notion that memory network activation is aided by the presentation of related cues. The increase in the recall of grocery word items for participants who saw “kim chi” indicates that a word cue helps organize embedded themes that appear within the memory tests word list. The fact that the presentation of the word “soju” was unable to activate heavy drinkers’ alcohol memory network indicates that this population may have a lower level of sensitivity to such stimulus input when compared with past research. Ultimately, the current research supports results that suggest that South Korean heavy drinkers may be retrieving memories related to alcohol in a more negative way (Mahoney, Graham, Cottrell, & Kim, 2011).

Overall, the results support memory network theories that suggest a contextual prime can help organize embedded word categories and mediate higher recall of words from that category in a memory test (Nelson & McEvoy, 2000; Reich, Noll, & Goldman, 2005). The results fail, however, to support the notion that an alcohol word prime causes increased positive alcohol expectancy word recall for heavy drinkers. The current research postulates that high levels of ALDH2*2 found among South Korean heavy drinkers may be interfering with the attention biases for alcohol expectancy words that have been demonstrated in past expectancy research using Western samples. The results may help those wishing to implement intervention programs in South Korea. As results have shown that Western style intervention programs are not as effective among a South Korean population (Namkoong et

al., 2003), the current findings may assist future research adjust their theoretical perspectives to explore the unique South Korean variables associated with alcohol-expectancy.

Chapter 7

General Discussion

Alcohol-expectancy theory has continued to evolve since the initial 1979 national North American questionnaire first directly tested population's individual expectations of the effects of alcohol. From the "seven dwarfs" survey, alcohol-expectancy theory has expanded into self-reported drinking frequency correlations, cognitive memory network modeling, intervention programs that challenge expectancy, and the exploration of the subconscious activation of alcohol expectancy. The current research is now helping extend alcohol expectancy theory beyond Western research and into East Asia, where the results have both supported and differed from previous expectancy findings.

While early South Korean alcohol-expectancy research gauged the positive expectancies of South Korean homeless children (Park, Kim, Kim, & Sung, 2007), there has not been until now an exploration of the negative expectancies using a South Korean sample. Therefore, one of the major findings of the current research is the discovery that there is little difference in negative expectancies across all levels of South Korean drinkers, with South Korean heavy drinkers appearing to have a more negative concept of alcohol than Western heavy drinkers. There are also differences within the South Korean population itself, where, for example, ALDH2 (2/1) drinks per occasion is moderated by tension-reduction expectancy, and where social assertive expectancies and arousal and aggressive expectancies are not seen correlating with drinks per occasion for those with ALDH2 (2/1), as they do for those with ALDH2 (1/1). What is more, there was a negative predictive relationship between arousal and aggressive expectancies and drinks per occasion for those with ALDH2 (2/1), indicating that heavy drinkers with the heterozygous enzyme have *lower* levels of the arousal

expectancy than lighter ALDH2 (2/1) drinkers.

As alcohol expectancies are said to represent memories of past drinking events, both the free association and AEQ results indicate that South Koreans and Westerners perceive the alcohol experience differently. The inability of an alcohol word cue to activate a South Korean alcohol memory network may also point to a different encode / store / retrieve process, where South Korean heavy drinkers appear to have a lower level of sensitivity to external alcohol primes than Western heavy drinkers. Given that research has suggested those with ALDH2*2 report higher levels of negative expectancy (Hendershot et al., 2009), the current research postulates that many of these differences found in the current research are likely to be influenced in some way by the effects of ALDH2*2. Here, for example, high levels of ACD experienced by ALDH2*2 heavy drinkers appear to be involved in higher levels of tension-reduction expectancy and lower levels of arousal and aggression expectancy. Furthermore, the initial negative effects caused by ACD may be contributing to a more even level of negative expectancy found across all South Korean drinker types, which is postulated to be lowering the level of sensitivity to an alcohol word stimulus.

Sensitivity to punishment was also shown to differentiate the current results from past research using Western samples, where the BAS has typically been identified as a more reliable predictor of heavy drinking than the BIS (Kambouropoulos & Staiger, 2001). Lower levels of SP has, however, been shown to predict higher levels of alcohol consumption among the current South Korean sample. This appears to be mediated by ALDH2 (2/1) heavy drinkers, as SP did not predict heavy drinking for those with the wild (1/1) gene type. Notably, tension-reduction expectancy was the main affect of ALDH2*2 drinks per occasion, with lower levels of both SP and arousal and aggression expectancy also shown to have predictive roles. This suggests that those with low levels of SP are more likely to withstand

the negative effects of ACD, which appears to lead to a rewarding, high level, tension-reduction effect that also lowers levels of arousal and aggression. Therefore, when considering the current results in conjunction with research showing that direct administration of ACD into reward areas of the brain results in greater dopamine activity than EtOH (Heinz et al., 2004), the notion that there are positive elements to the buildup of ACD is plausible.

The results can also lend support to the notion that language and culture influences free associations (Zanjonc, 1968). While speculative, the smaller alcohol associate raw set size and the overall higher recall of the word “feel good” may be attributed to cultural/linguistic differences, where East Asia’s general preference for shorter dialogue, repetition of sentiment, and dislike for public debate (Becker, 1986) may lead to a smaller, more uniform alcohol associative set. Furthermore, the translation of the leading statement “alcohol makes me...” into Korean appears to have allowed for a greater variety of physical (e.g. “tasteless”, “stomachache”) rather than emotional associations (e.g. “happy”), which indicates that differences in language have affected the types of words recalled.

Finally, the results have shown that while ALDH2*2 (taking into consideration the eight participants with the homozygous 2/2 gene type) predicts drinks per occasion, the actual level of alcohol consumption per occasion does not differ significantly between ALDH2 (2/1) and the wild (1/1) gene type. While it was not hypothesized that those with the ALDH2 (2/1) enzyme would be drinking at the same rate as those with the wild occurring (1/1) type, the national South Korean alcohol consumption figures indicated that those with ALDH2*2 would likely be consuming large amounts despite their lower levels of alcohol dependence. It seems unlikely that those with the wild ALDH2 (1/1) gene type would be able to generate such large national alcohol consumption figures by themselves if 30% of the population were

to be drinking at significantly lower levels. This is particularly so when considering female drinker rates are also relatively low (W.H.O., 2011). The current results thus tend to support the notion that those with ALDH2*2 are contributing to the maintenance of South Korea's high drinking rates. The current research suggests that, paradoxically, the buildup of ACD may provide protection *and* incentive, where those with the mutant gene who are able to withstand the negative effects and drink heavily are rewarded with a reinforcing tension-reduction affect, but are conversely not as easily addicted.

Like many other countries, South Korea is experiencing serious alcohol-related social problems, where nearly 50 out of every 100,000 deaths are attributed to drunk driving, which is, for example, more than two times the Australian figure (W.H.O., 2011). Compounding these problems is the suggestion that intervention programs in South Korea are not as successful as other countries (Namkoonget al., 2003; Park, Kim, Kim, & Sung, 2007). The current results indicate that such programs in South Korea would benefit from the identification of ALDH2 type, as those with the mutant 2*2 genes appear to have unique motivation and personality traits that influence their alcohol consumption levels. Furthermore, the adoption of Western-style therapeutic applications may fail to take into consideration the differences found in the current research that go beyond biology. As the current results suggest unique factors predict alcohol consumption in those with the widely occurring (1/1) enzyme, intervention programs that are based on the findings of research exploring South Korean populations may be more successful than past programs that have been modeled on Western-style approaches.

Alcohol Free Association

As it is widely accepted that responses generated in free-association tests represent strength of association between concepts, the current research is confident in putting forward

the current South Korean free associations as representative of the South Korean population's concept of alcohol. The current research tested 257 participants, which is around two times the suggested sufficient word norming sample size of 100 — 150 participants (Reich & Goldman, 2005). Furthermore, the current research has adopted a refined free-association testing method that tends to increase a given word set by more than 10 associates on average (Nelson & McEvoy, 2000). Therefore, the current research is not only confident in the number of participants that have been used, but also in the testing procedures that have ensured that the associate set is as comprehensive as possible.

In using Nelson and McEvoy's (2000) free association methods, the current results are also comparable with the most recent Western alcohol free-association test, where Reich and Goldman (2005) compiled a thorough list of alcohol expectancies to the question "alcohol makes one...". Interestingly, Reich and Goldman reported that negative expectancy was playing a larger role than previous expectancy research had shown, where "sick," for example, was the strongest associate with a probability of reporting of .07 across all drinker types, with "happy" and "relaxed" second and third strongest, respectively. This higher level of negative expectancy fits well with the current results, even though the associate highest in probability of recall in the current research, "feel good", is a positive expectancy. Despite the strength of "feel good", however, eight of the top ten South Korean associates were negative, lending support to the notion that the negative effects of alcohol appear to be more closely associated with the concept of alcohol than first thought, and particularly so for the current South Korean sample.

Free association and the alcohol experience.

Theorist suggests that attitudes can be activated outside an individual's awareness (Greenwald & Banaji, 1995; Zanjoc, 1980), where, for example, favorable and unfavorable

attitudes towards a social object can subconsciously affect attitudes towards others. Furthermore, association tests have shown that country name likability ratings will increase or fall in relation to the positive or negative meaning words they have been paired with (Zanjoc, 1968). These attribution errors are also said to extend to word frequency, where the more a word is encountered the more it is liked (Zanjoc, 1968). If this is the case, and attitudes need not be in the conscious awareness to be influential, it seems likely that the differences seen between the current South Korean sample and past research using Western samples may represent a separation in the conceptualization of alcohol at an implicit level.

While the divergence of alcohol free associations in the current research from previous research may seem trivial, the disparity between the South Korean strongest associate (feel good = .12) and the Western equivalent (sick = .07) is worth exploring. Given that alcohol has been shown to have a large associative set, where even small separations in recall probability can indicate a larger separation in association, a difference of .05 represents around 70% more South Korean participants recalling the strongest associate –“feel good” than Western participants recalling the strongest associate –“sick.” As will be discussed in more detail later, differences in language and culture may influence such results, where, for example, repetition of sentiment is sought at social gatherings in East Asian countries (Becker, 1986). It may also indicate that the buildup of ACD helps produce a less expansive positive experience for a large portion of the South Korean population, which is supported by the current results showing that social-assertive as well as arousal and aggression expectancy do not correlate, and in fact have a negative relationship with drinks per occasion for those with ALDH2 (2/1). That is, the results from the AEQ may indicate that these effects (assertive/arousal) are not being as commonly experienced by heavy drinkers with heterozygous enzyme, and are thus leading to a smaller set of positive associates when

compared with Western studies. Here, words like ~~energetic~~,” ~~talkative~~,” and ~~boisterous~~” are not as representative of the ALDH2*2 drinking experience, resulting in a less diverse positive associative set and a more universal positive expectancy in ~~feel good~~.”

This is not the only possible effect of ACD on South Korean alcohol associate recall, however, where the strongest negative associates were also different in meaning and expectancy classification (~~sick~~” is classified as negative and ~~dizzy~~” is classified as negative sedated) from past Western research. As dizziness is a symptom of the buildup of ACD, it is not surprising that the word ~~dizzy~~” has such a strong association with the South Korean concept of alcohol. Furthermore, other negative sedated and sedated associates —~~dopey~~” (.05) and ~~sleepy~~” (.05) respectively — were equal third in probability. Further strong negative associates that might be related to the symptoms of a buildup of ACD include ~~headache~~” (.04), ~~stomachache~~” (.03), ~~flushed~~” (.02), ~~hot~~” (.02), and ~~feverish~~” (.01). This indicates that words seen to represent the effects of ALDH2*2 are relatively high in association.

It should also be mentioned that positive sedated expectancies, such as ~~relaxed~~,” were not high in association for the current South Korean population, while the word ~~relaxed~~” appeared as the third strongest in the Western free-association tests (Reich & Goldman, 2005). There were in fact only 6 expectancies categorized as positive sedated in total. While in line with Reich and Goldman’s (2005) results (positive sedated was excluded from their regression analysis due to their overall low recall probability), it is somewhat surprising that both the current results and past research have indicated that tension-reduction expectancy is related to high drinker levels among those with ALDH2*2. Given that those with the mutations make up around 30% of the South Korean population, it can be assumed that a set of the South Korean alcohol free associations would include several words high in

associative strength that are related to tension reduction.

This lower level of South Korean tension-reduction association is interesting, as it may indicate that the high levels of negative and negative sedating expectancy found among those with ALDH2*2 is suppressing tension reduction recall, where negative associations are not only higher in probability strength but also in number. That is, the association strength of negative expectancies for those with ALDH2*2 is strong, and there are several different representations of it. This then would theoretically stifle the more positive tension reduction associations and force them further down the probability list, as participants can only respond with one associate at a time. It is important to note that even though alcohol expectancy theory prefers to cite compound cueing theories, where a host of associates are activated in unison rather than one by one (hierarchically) (Nelson, McEvoy, & Pointer, 2003), the nature of a free-association test is hierarchical. Therefore, it is likely that those with ALDH2*2 are implicitly prioritizing the negative effects over the more positive tension-reduction expectancies, which results in a lower probability of tension-reduction expectancy recall. This would be supported by the stimulus devaluation theory, which postulates that the initial effect is the most influential. In case of those with ALDH2*2, the negative effects are occurring, at the very least, in unison with the positive and are thus appearing to be a prominent, more easily recalled memory.

Furthermore, the number of people with ALDH2*2 that are continuing to drink despite the negative effects, across the entire South Korean population, is not large. Here, only a portion of the 30% of those with ALDH2*2 are drinking at high levels and experiencing the tension-reduction expectancy; our research suggests it would be around 10% of the overall South Korean population. As research has suggested that it is *large* amounts of ACD producing the tension-reduction affects (Hahn et al., 2006), lighter and moderate

drinkers with ALDH2*2 are unlikely to be experiencing this negative reinforcement. In fact, McCarthy et al. (2001) reported that women with ALDH2*2 reported *lower* levels of tension-reduction expectancy. Therefore, even though regression analysis shows that tension-reduction predicts ALDH2*2 drinks per occasion, on the whole the number of participants who are experiencing this unique tension-reduction effect is low and perhaps ALDH2*2 light drinkers may even be experiencing less tension-reduction expectancy than those with the wild (1/1) gene (McCarthy et al., 2001). Thus, while all of those with ALDH2*2 (30% of the South Korean population) are experiencing the negative effects, such as dizziness and tiredness, only ALDH2*2 *heavy drinkers* are experiencing the benefits of the tension-reduction affects. This might indicate that the comparatively lower level of tension-reduction free association is, at least in part, the result of the effect of heavy drinking among those with ALDH2*2.

It is also important to note that it is somewhat misleading that a positive associate (“feel good,” rather than the negative “dizzy”) is the item with the highest probability of recall. Here it must be mentioned that the total level of negative expectancy is at a higher level across all drinker types, despite the strongest associate being positive. One might be led to believe that because “feel good” is the number one associate (and particularly strong in association when compared with past expectancy research using Western populations), the overall South Korean concept of alcohol is positive. This was not found to be the case. The current research findings suggest that the testing method (allowing for five responses to the prime “alcohol makes me...”) have produced a better overall representation of associations than if only one response was allowed. The results further suggest that this method has identified associates that are strong, but not necessarily the strongest. This has enabled the discovery of a more even level of negative expectancy in the current South Korean sample.

Even though there was a high recall probability of the word “feel good,” the top ten associates consisted mostly of words like “dizzy,” “dopey,” and “sleepy.”

Interestingly, given the low number of non drinkers across all three studies, coupled with the fact that there was no significant difference in the drinks per occasion of ALDH2 (1/1) and ALDH2 (2/1) in study 2, it seems probable that when alcohol is being consumed socially in South Korean, it is regularly done so in the presence of someone with the genetic mutation. Thus, it may result in a more negative social experience for everyone (all gene types), as one third of the group are likely to be showing the negative physical effects of the buildup of ACD, and/or verbalizing their discomfort. Stimulus devaluation research suggests that this could by itself lead to a more negative general conceptualization of the alcohol experience not only for those with ALDH2*2, but the entire South Korean population. Stimulus devaluation suggests that encountering a more negative environment, in this case caused by the negative behavior and verbalizing of those with the mutant gene, may be enough to devalue alcohol for those with the wild, efficient (1/1) gene. That is, even those who are not experiencing the negative effects of the buildup of ACD are plausibly being influenced by the negative alcohol-related language being used by those with ALDH2*2. These negative associations would be strengthened by the sight of the negative physical reaction (e.g. facial flush). If this is the case, then it is not necessarily just those with ALDH2*2 accounting for the seemingly higher level of negative expectancy. That is, those with ALDH2 (1/1) may themselves be responding with more negative alcohol associates, as they are constantly surrounded by the negative appearance, language, and behavior of those with ALDH2*2, thus contributing to the higher levels of negative alcohol expectancy found in the South Korean alcohol free-association test.

Another difference between the current results and past alcohol free-association

research was the raw expectancy list size. While the South Korean alcohol associate raw list size was large at 152 words, previous Western free-association tests have generated a raw set of around 800 words (participants were given 30 seconds to give as many responses as possible) related to alcohol (Rather et al., 1992). In both the current research and past expectancy research, raw set sizes represent the response list in its entirety, before words that are considered to have the same meaning are combined into one response. It appears then that the raw South Korean alcohol free-associations set size is, while still broad, more uniform in nature when compared with past raw Western alcohol free-association lists. Furthermore, refined response category set sizes in the Reich and Goldman (2005) study were as large as 52. The largest in the current research, however, was 44. This also indicates that the South Korean concept of the effects of alcohol consumption is perhaps less expansive. This is even further emphasized when considering that the average number of responses per participant was nearly one response higher in the South Korean sample than in Reich and Goldman's. That is, when asked to give five responses, the South Korean participants averaged 4.5 out of 5, whereas the Western participants averaged around 3.5 (Reich & Goldman, 2005). As stated, free-association research has shown that allowing for an extra response has seen an increase of around 12 more associates to any given concept (Nelson & McEvoy, 2000). Therefore, an average of one more response per participant should result in the South Korean associate list being *larger* rather than smaller. Again, this indicates that there may be a more culturally uniform view of the alcohol experience, where the current South Korean population appears to have a more commonly held set of associates than past research using Western populations.

South Korean Alcohol Expectancy

More recently, alcohol-expectancy research has used cognitive theories to help move away from an earlier behaviorist framework, where memory network models are believed to

better explain the expectancy action mediating heavy drinkers' behavior upon the presentation of alcohol-related stimuli. Affect is an important element of such theories, where, for example, Lang's (1987) memory model suggests that when environmental stimuli match nodes of stored information in the CNS, a psychobiological response is triggered that leads to an emotive reaction. Furthermore, theories of learned behavior have also been sourced, where, again, an important part of the information encode / store / retrieve process is the emotional element. Taken together, theories used to outline alcohol expectancy suggest that cognition and behavior are often regulated by memories of the emotional aspect of an experience, with positive memories initiating approach actions, and negative memories driving avoidance behavior. The current research suggests however that, in regards to alcohol consumption, this relationship may be more complex among populations with high levels of the mutant gene ALDH2*2. Higher levels of negative expectancy found among South Korean heavy drinkers is not reducing drinks per occasion, but, based on past genetic research (see Ball, 2008), may still somehow be protecting against lifetime dependence for those with the mutant gene.

Negative expectancy and heavy drinking.

One of the advantages of dimensionalizing the list of South Korean alcohol free associations is that it enabled the assessment of negative expectancy. Importantly for the current research, there has recently been more focus on the influence of negative expectancy, where, for example, there are two types of heavy drinkers that can be distinguished by negative consequences: 1) those who perceive their heavy drinking to be a problem, at which point they stop, and 2) those who continue to drink heavily despite the expected negative outcomes (Gaher & Simons, 2007). This is relevant given that those with ALDH2 (2/1) are drinking at around the same level as those with the widely occurring ALDH2 (1/1) type, despite maintaining lower levels of lifetime dependence. Therefore, while the current results

suggest the negative effects of the buildup of ACD are not causing a difference in drinks per occasion, it does, based on past research, mitigate the risk of lifetime dependence (see Ball, 2007). This then produces two hypotheses regarding the current South Korean sample that fit well with Gaher and Simons' results: 1) that positive expectancy has more influence over drinker rates, but that, conversely, 2) negative effects protect against some forms of problematic alcohol consumption. The current research theorizes that, like in the Gaher and Simons' study, negative expectancy defines different types of heavy drinkers, where those with ALDH2 (2/1) who have high tension-reduction expectancy and low SP are capable of drinking at high levels but appear to be better protected from lifetime dependence by the negative effects.

Importantly, it is theorized that the essence of subconscious cognition can be seen in the blurry relationship that exists between even small elements of one's past experience and one's current behavior (Greenwald & Banaji, 1995). Words presented in the instructions of a memory test will, for example, increase in recall — even though participants are unaware of being exposed (Nelson, McKinney, Gee & Janczura 1998). Researchers use this type of implicit action to explain how heavy drinkers interpret alcohol expectancies as a "go" signal for alcohol consumption (Rather & Goldman, 1994), where the fuzzy boundary between positive meaning words and alcohol consumption allows for misinterpretation. It is suggested that higher levels of exposure to an environmental pattern helps form these strong interconnections, and results in memory networks that are geared towards interpreting ambiguous stimuli as related to that particular environmental outcome. While evidence to the contrary can challenge the deduction, the reinforcing properties of EtOH are believed to insulate heavy drinkers from the negative after affects (Stacy, Leigh, & Weingardt, 1994; Lewicki, Hill, & Sasaki, 1989). This may not, however, be the case for those with ALDH2*2,

as the immediacy of the negative effects should theoretically reduce the effectiveness of the initial positive reactions to EtOH.

Therefore, the current research findings suggest that context is a vital element for heavy drinkers with high levels of negative expectancy. Here, both positive and negative expectancy can cue a positive or negative reaction depending on the given social environment. As previous results have shown that alcohol cues can cause a reduction in neural activity (Ihssen, Cox, Wiggett, Fadardi, & Linden, 2010), and that pairing alcohol related stimuli with negative affective pictures results in a lowering of alcohol consumption (Houben, Havermans, and Wiers, 2010), the current findings suggest that a South Korean heavy-drinking population is more easily influenced by the social context, both positively and negatively.

Overriding negative effects.

Notably, and somewhat paradoxically, research has suggested that lighter drinkers also drink more alcohol when presented with alcohol expectancy words (Carter et al., 1998). This would indicate that positive alcohol expectancy can be primed for all drinker types. This is important for the current research for two reasons: 1) it shows that the negative effects usually being prioritized by lighter drinkers can be overridden and 2) it demonstrates that the more specific the prime the greater the chance and *level* of activation. Furthermore, Reich, Noll, and Goldman's (2005) more subtle memory test method, that saw only heavy drinkers recalling more positive alcohol expectancy words when primed with the word "beer," appears to suggest that the implicit activation of alcohol expectancy "threshold" is lower for heavier drinkers. This then may also indicate that when presented with a more specific cue, South Korean heavy drinkers, despite their higher levels of negative expectancy, will likely demonstrate increased alcohol consumption, just as lighter drinkers do (Carter et al., 1998). The research findings suggest that there may be less difference in the susceptibility of

South Korean drinker types to implicit alcohol cues, where South Korean heavy drinkers have a more similar expectancy activation “threshold” to that of South Korean lighter drinkers.

What is more, it is generally agreed that it is the positive effects of alcohol consumption that have a greater influence over drinker rates than the negative effects. Given that higher levels of negative expectancy have not been seen to be mediating drinks per occasion in the current South Korean sample, the current results would seem to lend support to this notion. Despite the higher levels of negative expectancy among heavier drinkers, South Korea remains high in both alcohol consumption (OECD, 2011) and dependence (W.H.O., 2004). This is where perhaps the dualism of affect (believed to be more acceptable among East Asian nations) may provide some answers. That is, the ability of South Koreans with ALDH2 (2/1) to suffer the negative effects appears to be moderated by SP and the cultural tendency to accept the negative aspects of an experience with the positive. At this point, the positive aspects of EtOH, and possibly ACD, provide enough incentive for repeat behavior.

Therefore, the current research again suggests that context is important where high levels of negative expectancy exist, not only among lighter drinkers, but also among heavy drinkers with high levels of negative expectancy. Given that the current research indicates that the higher level of negative expectancy interrupts the ease with which alcohol expectancy can be activated (supported by results showing lighter drinkers do not respond to an alcohol prime in a memory test (Reich, Noll, & Goldman, 2005), a more directly related alcohol context may be needed to activate alcohol expectancy among a South Korean heavy-drinking population. As research has shown that the likability ratings of country words (Germany) can be manipulated by the meaning of a paired adjective (great), it is plausible

that the South Korean alcohol concept more easily changes in relation to the context that one finds oneself in. That is, when in a group where alcohol is being espoused with such words as “feel good,” “excited,” and “enjoy,” it is rated more highly than in a context where words like “dizzy,” “sleepy,” and “dopey” are being used to describe it.

Neurological adaptations: The search for alcohol.

Alcohol-expectancy research is now part of a larger field exploring how the desire to predict upcoming events affects behavior. It is important to note that alcohol-expectancy theorists believe that problematic alcohol consumption is in some way maintained through implicit systems that infer a course of action prior to the event taking place (Reich, Noll & Goldman, 2005). Cognitive processes that are designed to take advantage of upcoming opportunities give an organism an advantage over its competition. This is why those who prioritize alcohol (heavy drinkers) tend to show attentional biases for stimuli that are relevant to their “prey.” Researchers believe that heavy drinkers’ nervous systems tend to, often incorrectly, gamble on a certain environmental stimuli being related to alcohol in attempt to take full advantage of any opportunity to drink (Reich, Noll, & Goldman, 2005). On the basis of the current research it may be contended that a South Korean heavy drinker’s higher level of negative expectancy may reduce the valence of alcohol, and thus lower its “hunting” priority level.

Importantly, such implicit reactions are said to often occur on a needs basis, where the focus of an organism will change depending on its regulatory state (Palfai, Monti, Ostafin, & Hutchison, 2000). That is, when it is thirsty, water becomes the focus; when it is hungry, food becomes the focus (Brendl, Markman, & Messner, 2003). Theorists suggests that changes in the MDS to heavy amounts of alcohol intake leads the CNS to process alcohol as a primary need similar to way food and water (Erikson, 2007). Therefore, in the absence of

this primary need, the CNS provides motivation to search for the desired substance and outcome, and in the case of heavy drinkers, the absence of alcohol results in a search for a drinking opportunity.

It is possible, however, that ALDH2*2 may help protect against this psychobiological maladaptation. If free-association tests are a reflection of motivation for drinking, and if, as is proposed, the expectancies themselves are representative of the emotive responses experienced during alcohol consumption, then it is likely that the higher level of negative expectancy found in the current research would short-circuit this expectancy action that is mediating the elevated levels of implicit motivation. Although lighter drinkers have been shown to increase their alcohol consumption after the presentation of an alcohol prime, research has conversely shown that they respond to alcohol-related stimuli with *reduced* neural functioning (Ihssen, Cox, Wiggett, Fadardi, & Linden, 2010). Therefore, when it comes to more subtle alcohol cues, it seems plausible that South Korean heavy drinkers (perhaps driven by those with ALDH2*2) are not responding to alcohol-related stimuli with such a “rush” of MDS activity because of their higher level of negative expectancy. If this is the case, it may help explain why drugs that are designed to disrupt alcohol related neural activity are less effective in a South Korean population (Namkoong, et al., 2003). That is, motivation among some South Korean heavy drinkers may not be driven solely by dopamine activity in the MDS, meaning that drugs like Acomprosate do not reduce motivation for alcohol consumption among heavy drinkers who do not respond to alcohol with such heightened neural activity.

Importantly, Zanjoc (1980) suggests that the first response of an organism to a stimulus is affective, and thus individuals often behave based on emotion and subsequently use cognition to justify this response (Zanjoc, 1980). Thus when trying to recall objects,

names, places, or events, it is often the emotive element that strikes first. As a free-association task theoretically requires participants to access memory structures related to the concept in question, participants completing the statement “alcohol makes one...” are likely giving answers that are driven largely by emotion. If this is the case, then the higher level of negative expectancy is not only related to memory but also a negative emotion. This leads to the possibility that the first response of a heavy drinker with ALDH2*2 to alcohol-related stimuli may be implicitly negative, and may require outside influences or other motivating factors to overlook this negative reaction.

Stacy (1997) suggests that the more often a psychobiological action is performed, the easier and more likely it is that the action will occur again. Importantly, however, if the affective element is positive, then both motivation and the likelihood of that particular action being performed increases. The current research suggests that the expectancy action for those with ALDH2*2 is being performed with a negative element first or in unison with the more positive aspects. This would then theoretically lower motivation for the behavior, even if the behavior were encountered often. Here, personality variables such as SP and cultural beliefs such as dual affect allow the circuit to process aspects of the negative in anticipation, or in favor, of the positive.

Furthermore, when a theoretical cognitive circuit include high levels of both positive and negative effect, cognitive dissonance is likely to occur. Theorists suggest that in such cases, the implicit attitude often wins out eventually. The current results would suggest that this implicit attitude may be negative among a South Korean population, and particularly for those with ALDH2*2. This leads to the contention that many heavy drinkers with ALDH2*2 may eventually revert back to their implicitly negative attitude towards alcohol, lowering their alcohol consumption and therefore reducing their overall group lifetime alcohol

dependence rates. Here, as those with ALDH2*2 get older and gain more social power, the lower levels of external pressure may allow them to “re-associate” with their initial negative attitude, and thus lead to a lowering of consumption levels.

Emotion more influential than experience.

Schvaneveldt's et al. (1985) research indicates that experts in certain fields are able to process information related to their work faster than novices. This observation has been applied to drinking, where it has been noted that heavy drinkers appear to have superior “knowledge” concerning alcohol consumption, which leads them to process alcohol-related stimuli faster than lighter drinkers. The results of the current research query whether this is the case for South Korean heavy drinkers, and perhaps more specifically, heavy drinkers with ALDH2*2. As the information being implicitly processed by heavy drinkers in Western studies has been shown to be positive in nature, the question remains as to whether the negative effects being experienced by heavy drinkers with the mutation would interrupt these superior processing abilities. Even though South Korean heavy drinkers are drinking at similar or even higher levels than those in Western countries (particularly South Korean men), the results from the memory test suggest they may not be processing alcohol-related information as efficiently. Perhaps here the higher levels of negative expectancy and the lower levels of SR (theorized to be related to conditioned responses to alcohol) found among South Korean heavy drinkers is reducing their drinking “expertise”. Therefore, in relation to implicit reactions to a given stimuli, it may be that “superior knowledge” of alcohol is not as important as the emotional aspect assigned to it. That is to say, heavy drinking alone would not create a hypersensitive alcohol memory network, there must be a strong, implicit, positive attitude towards alcohol as well.

It should be emphasized, however, that positively “geared” alcohol memory

networks still appear to be having a major effect on South Korean heavy-drinking practices. While the results of the current research may indicate that a South Korean population appears less sensitive to subtle alcohol primes, the results also show that positive expectancy is moderating drinks per occasion. Given that Roehrich and Goldman (1995) have shown that the more direct the stimuli the greater the increase in alcohol consumption, it is important to stress that exposing a South Korean population to more obvious alcohol stimuli would likely result in changes in cognition and behavior. It is also likely that if, as was the case with the Roehrich and Goldman study, South Korean alcohol-expectancy words were to be exposed in conjunction with a video of alcohol consumption, implicit recognition of the positive-meaning words' association with alcohol consumption would likely increase beer consumption. As stated earlier, concepts are often organized and given meaning by contextual cues, where a word like "one," can differ in meaning through the implicit presentation of cue words like "marijuana" or "ice-cream." If positive South Korean alcohol-expectancy words were to be placed in a more direct context with alcohol, then it is likely an alcohol memory network would be activated.

It seems obvious, however, that the current results cannot be explained through expectancy theory alone. Research indicating that there are cultural differences in perception at a subconscious level may help shed some light on some of the differences being seen in the current research, not only for alcohol expectancy, but also for the results indicating differences in personality (SP/SR) variables mediating drinks per occasion. Importantly for the current research, those with the wildy occurring ALDH2 (1/1) gene are not showing the same predictive variables associated with alcohol consumption as in Western studies. This is important, as it may be expected that South Koreans with the more common (1/1) gene type would have a more similar experience to that of Western populations, where the wild (1/1)

gene type is prevalent. However, SR is not predicting ALDH2 (1/1) drinks per occasion, as has been the case in Western samples. This indicates that ALDH2*2 is not the only factor influencing the alcohol consumption patterns of South Koreans. Therefore, the following section explores the relationship between past cultural research in an attempt to explain some of the differences discovered in the current research.

South Korean Culture and Drinking Practices

Nisbett (2003) suggests that Westerners are more likely to focus on the individual and extend this to the perception of everyday social objects, whereas East Asians are more likely to value the social whole and a more general group mentality. The current research may lend notional support to such research and other theories of implicit holistic perception, where, for example, the higher level of recall of the phrase “feel good” appears to indicate that there is a more communal-minded approach to the positive aspects of alcohol consumption in this South Korean sample. Importantly, communicative styles used in East Asian social gatherings are said to be directed mainly at organization, where the focus is on the shared experience (Becker, 1986). This may be leading to a less expressive communication style, particularly among South Koreans, where children have, for example, been shown to be less expressive than not only American children, but also Chinese children (Gopnik & Choi, 1990). A desire for agreement and tendency to be less expressive may help explain why the South Korean associate set appears less expansive. If the same level of communicative group bias is applied to the South Korean alcohol consumption experience, then it seems likely that this would result in a more commonly shared and more compact alcohol vocabulary. The current results suggest that this may be the case.

The restriction of early forms of communication between communities is also believed to have influenced current-day East Asian languages, where smaller lines of

dialogue (e.g. less words per sentence) are common (Becker, 1986; Nisbett, 2003).

Furthermore, while East Asian nations have recently adopted aspects of Western ways of life, there has been little movement in the accepted levels of debate (Becker, 1986), with East Asian countries still appearing to be less inclined to challenge opinion in an open forum. This is again important for the current research, as this dislike for debate would likely be evident in drinking circles, and may help explain why those with the mutant gene are partaking in a similar level of alcohol consumption to those with the normal gene, as the current results have shown. That is, they simply may not feel comfortable saying no. Researchers suggest that elders generally lead social events in East Asian societies, where refusing to follow the leader's wishes (even in something as lighthearted as alcohol consumption) can be seen as disrespectful (Becker, 1986). The current results suggest that for those with ALDH2*2 who have lower levels of SP and higher tension-reduction expectations, the acceptance of this situation and conformity to social norms may be more of a requirement than a personal decision.

Another important difference identified in East Asian and Western cultures that may also help define the current results is the notion that East Asians are more likely to endorse dialectic contradictions. Here proverbs such as "water is forever yielding, yet nothing can stop it" are more likely to be seen as representative of everyday life by East Asian populations (Ji, Peng & Nisbett, 2000). This is believed to be reflective of the East Asian focus on constant changes in nature, where objects cannot be separated from the context that they exist in. Things are never mutually exclusive, where it is said that East Asian cultures typically do not believe it possible to live in a world that is totally good (Becker, 1986). If this is the case, then those with ALDH2*2 may be able to accept the negative effects of the buildup of ACD as part of the experience in pursuit of the positive tension-reduction effects.

Therefore, those who have a lower level of SP are more likely to withstand the negative effects of the buildup of ACD not only in search of the positive aspects, but also in the belief that they must somewhat accept that the negative elements are part of the wider experience. This belief is then theoretically reinforced by the tension- reduction affect, making the next opportunity to drink even more acceptable, and for some it appears it may even be attractive.

As reviewed earlier, this idea that positive and negative can co-exist in harmony appears to extend to the East Asian notion of affect. As affect is a vital element of an alcohol expectancy action, the notion that East Asians believe that positive and negative feelings can co-occur is important, as those with the ALDH2*2 gene types are likely to be experiencing the positive and negative effects simultaneously. Bagozzi et al. (1999) suggest that while Westerners appear to perceive effect as bipolar, where one can only feel happy or sad, East Asians more often indicate experiencing positive and negative effects concurrently. Bagozzi et al. further notes that the two most important elements of the Chinese affective construct — “qing” and “dao” — both have context as a vital element. That is, emotional states are largely guided by the situation and company one finds oneself in. The social mood is believed to be more important than an individual’s feelings, where one’s own emotions are considered less important than the communal event. This fits well with the current research finding and may mean that the social context is very important for South Korean heavy drinkers.

When applying these cultural beliefs to the current results, the picture of why those with ALDH2*2 continue to drink despite the negative effects becomes clearer. East Asian cultures tend to be more encouraging of conformity, where hierarchy is adhered to more so than in Western cultures. Furthermore, the notion that positive and negative can co-exist may allow East Asian people to more easily accept the negative aspect of a certain situation in favor of the desired social experience. Thus, those with the mutant ALDH2*2 genes are

likely finding themselves in situations where they are continuing to drink to be one with the group. Therefore, those with ALDH2*2 who have low levels of SP are encouraged not only by the theoretical tension-reduction effects of the buildup of ACD, but also by the belief that positive and negative effects can co-occur, and further the implicit desire to gain the respect of the group and the feeling of acceptance that accompany it. Here, there may be both positive and negative elements to the cultural influence over those with ALDH2*2's heavy-drinking practices. In terms of the negative, those with ALDH2*2 may wish to avoid public confrontation with the leaders of their social groups, where refusal may be seen as disrespectful. The positive motivation may lie in the desire to be part of the group mood, where great cultural importance is placed on one's role in aiding the group event. In both cases, the acceptance of both the positive and negative effects are theoretically more likely among an East Asian population, where the South Korean affective construct, for example, theoretically allows both positive and negative effects to occur concurrently (Baggozzi et al., 1999).

Gender differences.

The octant categorization of the alcohol free associations identified gender as the main predictor of drinks per occasion, while the genetic profiling indicated that both the ALDH2 (1/1) and (2/1) gene types had gender as a predictor of drinks per occasion. While past research has cautioned against over interpretation of gender differences (Reich & Goldman, 2005), as males are physically capable of consuming at greater levels, W.H.O. (2011) figures suggest that the gender differences discovered in the current sample may be indicating a genuine difference in male and female behavior towards alcohol.

Some have suggested that while women's social standing has increased in recent years, economic and political status are still relatively low when compared with other first

world countries (Cho et al., 2008). As described earlier, East Asian nations place great value in hierarchical social systems, where, for example, males have greater power than females. If this is the case, the lower female drinking levels may be explained by the cultural belief that it is not a woman's role to partake in drinking activities. South Korean women with an ALDH2*2 type are likely to experience less pressure to drink than males, which may also contribute to the lower levels of female alcohol consumption. It may be the case that the interdependent culture that exists in South Korea pushes males with ALDH2*2 to drink, but may allow females with ALDH2*2 to more easily devalue alcohol. Ultimately, the current results lend support to the notion that South Korean males drink significantly more than South Korean females but they do not reflect the huge differences seen in W.H.O. (2011) figures. The current results might suggest that female drinking rates have increased, and that the lower levels of alcohol consumption among South Korean females may be driven by women in older age brackets, as the current sample's average age is around 21. The current results may be indicating that there is a difference in young, female South Koreans' attitudes towards alcohol, where perhaps increased education and social power is beginning to extend to things like drinking.

Interestingly, past research has indicated that gender differences in alcohol consumption are moderated by poor coping strategies (Cooper et al., 1992). This may be important for those trying to reduce alcohol consumption levels in South Korea, as figures reported by the OECD (2011) rank South Korea as first in both average hours worked per year and suicide rates. This suggests that there are perhaps high levels of stress and poor access to appropriate coping strategies. Therefore, those involved in intervention programs may be aided by paying attention to not only ALDH2*2 type but also gender and coping strategies when trying to devise programs for problem drinkers. Alcohol may be seen by

those who are experiencing high levels of stress as a relief strategy, particularly among men.

Practical Implications.

The current research indicates that South Korea has unique aspects to the alcohol experience that would likely make successfully applying Western and European style intervention programs difficult. These differences go beyond ALDH2*2, with other cultural factors, such as the strong belief that drinking establishes manliness and the notion that one is only an alcoholic when physical, social, and financial status are greatly affected (Namkoong et al., 2003), also influential. The current results indicate that there are also differences in expectancy and etiological factors that, when combined with a more locally devised intervention program, may help lift the success rate of such dependence-reduction programs.

Importantly, Darkes and Goldman (1993) have demonstrated that challenging alcohol expectancy can lead to a significant lowering of self-reported drinks per occasion. The current results indicate that South Korean health care professionals could benefit from the knowledge that those with ALDH2*2 have different positive expectations of the effects of alcohol. As expectancy is theorized to be involved in motivation for intake, the higher levels of tension-reduction expectancy among those with ALDH2*2 demonstrates differences in drive for consumption. Here, other options for tension reduction may be suggested to patients, where breathing techniques, hot cognition identification, and even exercise may be seen as more helpful for those with ALDH2 (2/1) than those with ALDH2 (1/1). Furthermore, given that research has suggested that activation of negative expectancies can result in a lowering of alcohol consumption, a focus on the unique negative effects of the buildup of ACD might be helpful. As research has suggested that the activation of negative expectancies can have an adverse effect on alcohol consumption (Gaher & Simons, 2007), the reduction of alcohol consumption using negative primes would theoretically be more effective in a South Korean

heavy-drinking population.

Limitations.

Conducting cross-cultural research has presented several challenges for the current research, not least the lack of validated psychometric tools with which to test South Koreans. Whilst the Korean versions of the AEQ and the SPSRQ were translated using the best available translation techniques, nothing can quite substitute for questionnaires that have been devised using input from the population being tested. Another limitation of the current study is the absence of established South Korean expectancy categories. Although the American categories were applied in this study so that comparisons could be drawn between the two populations, and the expectancy categories are likely to be similar in many areas, the lack of validated tools available to explore expectancy outside of the English language somewhat limits research in other countries. Furthermore, whilst the sample would appear to be a good representation of the younger South Korean population, it may not be such a good representation of the South Korean population as a whole.

Future research.

Exploring the level at which changes in behavior become apparent after the presentation of alcohol stimuli, for both a Western-based sample and a Korean-based sample, may aid those exploring and attempting to reduce alcohol consumption in the region. It could be hypothesized that a South Korean sample would require a more direct stimuli, or longer exposure time to produce a change in drinking behavior or alcohol related cognition.

Understanding how negative alcohol cues affect South Korean alcohol consumption would also be of interest, as research has shown that the activation of negative expectancy can result in a lowering of alcohol consumption (Carter et al., 1998; Houben, Havermans, and Wiers, 2010). A direct comparison between Westerners and South Koreans would illuminate

whether the higher levels of negative expectancy found in the current research would result in the activation of negative expectancy having a greater effect on South Korean alcohol consumption.

Future research may also benefit from comparing the drinking practices of South Korean exchange students when overseas and in their home country. The lower levels of drinking found among East Asian students while overseas (Oei & Jardim, 2007) could be in part due to the change in cultural expectations, where they may feel less social pressure to drink in a foreign country. Furthermore, as these results suggest there may be unique aspects to the South Korean drinking experience, future research could benefit from the confirmation of the expectancy octants among this group.

Future research would also benefit from genetic testing to identify whether the apparent lower level of sensitivity to an alcohol cue word is mediated by ALDH2*2. If future results were to indicate that South Korean heavy drinkers with the normal ALDH2 (1/1) gene were as sensitive to alcohol cues as Westerns and that the non response observed in the current research was mediated by ALDH2*2, then the biological differences could be confidently identified as the mediating factor.

Conclusion

It is important to note that there has been little alcohol-expectancy research conducted in South Korea. The little research that has been conducted has been done so with versions of various alcohol expectancy questionnaires that have not been translated using the given population's input. There has been no direct assessment of South Korean alcohol expectancy and ALDH2*2 and alcohol consumption, and there has been no direct assessment of South Korean BIS and BAS in conjunction with ALDH2*2 and alcohol consumption. Finally, there has been little exploration of the effects of implicit alcohol cues in a South

Korean population.

Overall, the three phases of the research were designed to somewhat cover the spectrum of alcohol-expectancy research. The free-association test provided information on negative expectancy, and also provided the vital content needed to move forward with the translation of the AEQ and the administration of implicit tests. The second study explored biological, cognitive, and personality variables mediating alcohol consumption levels. The final study investigated how these variables may have affected the implicit activation of an alcohol memory network. These research findings may be of value to those in South Korea trying to lower the high levels of alcohol consumption, particularly among males. The focus on alcohol expectancy has the potential to inform those exploring alcohol-related implicit responses and the variables that may affect them.

The results of the current research add to past research, and provide new direction for future research. It is becoming more evident that the buildup of ACD can produce both negative and positive effects, where the initial negative consequences are replaced with a relaxation effect. The current results support this, indicating that those who are more likely to approach negatively viewed stimuli (low levels of SP) are more likely to override the negative effects of ACD in favor of the positive effects. The current research also supports the notion that the reinforcing properties of alcohol have greater influence on drinking behavior than its negative consequences, as the higher level of negative expectancy is not seen mediating drinks per occasion. The results do tend to suggest, however, that South Korean heavy drinkers' higher levels of negative expectancy, aided by their lower levels of both arousal and aggressive expectancy and SR, may interfere with an implicit reaction to alcohol. This is in line with research showing that lighter drinkers are both higher in negative expectancy and lower in SR, and lower in sensitivity to covert alcohol cues.

As SR did not predict consumption levels as it has done in the past, it appears that those who have a highly negative view of alcohol, those who do not find it as “rewarding”, can continue to drink at high levels. This also helps explain why SP is more predictive in the ALDH2 (2/1) participants, as the negative effects caused by the high levels of ACD are so aversive that those with higher levels of tolerance to negative stimuli are more inclined to drink.

Given that South Korean heavy drinkers with the more common (1/1) gene type are also not (as a group) high in SR, cultural differences appear influential. As South Korea has a high level of alcohol consumption, particularly among males (W.H.O., 2011), combined with the fact that there is a higher level of negative expectancy, the current research postulates that the Confucian notion of hierarchy that is evident in South Korean culture plays a role in the country’s maintenance of high drinking levels among men, despite the prevalence of ALDH2*2. The directive style of social interaction, and the belief that negative and positive can coexist, may cause those who normally would be in lighter drinker categories to drink at higher levels.

The negative social impact of heavy drinking in South Korea is high, where, for example, the yearly death rate from liver cirrhosis is around four times that of the Australian level (W.H.O., 2011). Therefore, the results of the current research are important not just from a greater knowledge perspective, but also from a practical point of view. South Korean intervention programs need to take into consideration not only cultural differences that exist between the West and the East, but also the biological differences that exist within their own communities. The current research suggests that effective alcoholism programs throughout East Asia will need to devise applications that cater for biological differences in the processing of alcohol, where ALDH2*2 identification is strongly advised. Given that there

are different expectancies of the effects of alcohol between the two gene types, knowing which motivations to challenge could result in more efficient and effective outcomes.

Ultimately, the current research indicates that heavy drinking is a mixture of both biology and environment. The protective nature of the negative affects experienced by those with ALDH2*2, whilst lowering levels of lifetime alcohol dependence, appears to be mediated by environment. As the experience of those with the less effective enzyme is by and large negative, other environmental factors appear to be just as, if not more, influential on deciding to drink. Given the nature of Confucianism, the current research finding suggest that to lower the levels of alcohol consumption in South Korea, senior members of the community would need to be targeted to drive a cultural rethink of their practices. A focus on senior members of a group taking more responsibility for the behavior (e.g. drink driving) of their group members is suggested, where intervention programs or anti-drunk-driving ad campaigns, for example, may benefit from educating people as to the importance of good leadership. By considering the biological, cognitive and socio-cultural influences outlined, it is hoped that future research and intervention programs may be able to both further knowledge about, and lower levels of, alcohol consumption in South Korea.

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Appendix 1

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South Korean alcohol free associations: Negative expectancy not predicting drinks per occasion

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Abstract

Introduction and Aims. Cultural and biological particulars existing in East Asian countries are likely to mediate differences in the alcohol consumption experience. Despite this no research to date has directly explored the alcohol free association or expectancy of any East Asian nations. The current research aims to provide a set of South Korean alcohol expectancies. **Design and Methods.** Two hundred and thirty-seven South Koreans participated in an alcohol free association test and completed a demographic survey. **Results.** The results both confirmed and contradicted areas of past alcohol expectancy research. There appears to be differences in associates with high probability of recall and alcohol expectancy, where negative, negative sedating and sedating expectancy categories were not found to be predictors of South Korean drinker level. **Discussion and Conclusion.** The results suggest that South Koreans have a more even level of negative expectancy across all drinker categories, possibly due to a combination of linguistic, cultural and biological difference found among this population. The results provide a list of South Korean alcohol free association norms for future alcohol research in the region, with the results also underlining the need for alcohol free association tests among East Asian nations. [Mahoney BJ, Graham D, Cottrell D, Kim K-Y. South Korean alcohol free associations: Negative expectancy not predicting drinks per occasion. *Drug Alcohol Rev* 2011]

Key words: alcohol, drinking, expectancy, South Korea, free association.

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Appendix 2

Free Association Survey

Please fill this survey out quickly with whatever comes to mind.

Alcohol makes me.....:

1 _____

2 _____

3 _____

4 _____

5 _____

Appendix 3

Translated Free Association Survey

다음 질문에 연상되는 여러분의 생각을 작성해 주시기 바랍니다. 머리에 떠오르는 생각을 바로 적어내시면 됩니다.

술을 마시면 여러분은 어떤 생각이 드십니까?

1 _____

2 _____

3 _____

4 _____

5 _____

Appendix 4

Demographic Survey

Please fill in the following and attach to your memory test answer sheet.

- (1) Date of Birth _____
- (2) Sex _____
- (3) Marital Status _____
- (4) Enrolled Course _____
- (5) Years at Daegu Health College _____
- (6) Current employment status (e.g. full time) _____
- (7) Do you suffer from migraines? If so, how regularly? _____
- (8) Have you ever suffered concussion? _____
- (9) Do you have problems with your sight (e.g. color blindness, short sightedness etc.) _____
- (10) On average, how many hours a night do you sleep? _____
- (11) How many hours sleep a night do you feel you need? _____
- (12) Do you drink coffee on a daily basis? If so, how many? _____
- (13) How many times do you drink alcohol a month? _____
- (14) On those occasions, how much do you drink (e.g. X glasses of wine)? _____
- (15) Do you smoke Cigarettes? If so, how many a day? _____

Appendix 5

Translated Demographic Survey

통계학 조사

주어진 설문지에 성실히 답변해 주시기 바랍니다.

- (1) 생년월일 _____
- (2) 성 (M/F) _____
- (3) 사회적 신분 _____
- (4) 전공 _____
- (5) 학년 _____
- (6) 현재 파트 타임으로 일하고 있습니까? _____
- (7) 편두통에 시달리고 있습니까? 만약 그렇다면 얼마나 자주 편두통을 느끼십니까? _____
- (8) 뇌에 심한 충격을 받은 적이 있으십니까? _____
- (9) 색맹이나 근시안 같이 시력에 문제점을 가져 보신적이 있습니까? _____
- (10) 평균적으로 하루에 수면시간은 얼마나 되십니까? _____
- (11) 하룻밤에 몇 시간의 수면 시간이 필요하다고 느끼십니까? _____
- (12) 낮시간에 기본적으로 커피를 마십니까? 만약 그렇다면 하루에 몇 잔을 마십니까? _____
- (13) 한 달에 몇 번 정도 술을 마시나요? _____
- (14) 술을 마시게 되는 경우에 얼마나 마시게 되나요?(e.g. 와인 X 잔) _____
- (15) 흡연을 하시나요? 그렇다면 하루에 얼마나 피우십니까? _____

Appendix 6

Informed Consent Form

This administrative form
has been removed

Appendix 7

Translated Consent Form

This administrative form
has been removed

Appendix 8

Top 30 South Korean Free Association Response Probabilities by Drinker Level

Overall (N = 237)		1 – 3 Drinks (N = 46)		4 – 6 Drinks (N = 46)		7 – 9 Drinks (N = 86)		>9 Drinks (N = 59)	
Expectancy	P	Expectancy	P	Expectancy	P	Expectancy	P	Expectancy	P
Feel good	0.12	Feel good	0.10	Feel good	0.13	Feel good	0.10	Feel good	0.16
Dizzy	0.09	Dizzy	0.10	Dizzy	0.12	Dizzy	0.08	Dizzy	0.06
Dopey	0.05	Headache	0.07	Tasteless	0.05	Dopey	0.07	Dopey	0.04
Sleepy	0.05	Sleepy	0.07	Concerned	0.05	Sleepy	0.07	Enjoy	0.04
Bitter	0.04	Bitter	0.06	Dopey	0.04	Enjoy	0.04	Sleepy	0.04
Headache	0.04	Stomachache	0.05	Bitter	0.04	Bitter	0.03	Bitter	0.03
Enjoy	0.03	Tasteless	0.04	Stomachache	0.04	Stomachache	0.03	Excited	0.03
Stomachache	0.03	Dopey	0.04	Sleepy	0.04	Headache	0.03	Headache	0.03
Concerned	0.03	Feverish	0.04	Headache	0.03	Gloomy	0.02	Gloomy	0.03
Tasteless	0.03	Sick	0.03	Flushed	0.02	Blank	0.02	Talkative	0.03
Flushed	0.02	Flushed	0.03	Comfortable	0.02	Frank	0.02	Brave	0.03
Hot	0.02	Hot	0.03	Blank	0.02	Confident	0.02	Hot	0.02
Excited	0.02	Concerned	0.03	Talkative	0.02	Brave	0.02	Comfortable	0.02
Sad	0.02	Excited	0.02	Excited	0.02	Tasteless	0.02	Concerned	0.02
Talkative	0.02	Tipsy	0.02	Sad	0.02	Happy	0.02	Relaxed	0.02
Feverish	0.01	Sad	0.02	Hot	0.01	Laugh	0.02	Drunk	0.02
Unpleasant	0.01	Dislikable	0.02	Confident	0.01	Drunk	0.02	Unpleasant	0.01
Comfortable	0.01	Cool	0.02	Amusing	0.01	Tired	0.01	Sad	0.01
Emotional	0.01	Unpleasant	0.01	Sociable	0.01	Talkative	0.01	Stomachache	0.01
Tipsy	0.01	Gloomy	0.01	Smelly	0.01	Numb	0.01	Confident	0.01
Gloomy	0.01	Enjoy	0.01	Nauseated	0.01	Hot	0.01	Flushed	0.01
Irritated	0.01	Irritated	0.01	Feverish	0.01	Comfortable	0.01	Laugh	0.01
Happy	0.01	De-stressed	0.01	Regretful	0.01	Excited	0.01	Blank	0.01
Laughing	0.01	Tired	0.01	Emotional	0.01	Sad	0.01	De-stressed	0.01
Blank	0.01	Heart beating	0.01	Tipsy	0.01	Irritated	0.01	Tasteless	0.01
Dislikable	0.01	Brave	0.01	Enjoy	0.01	De-stressed	0.01	Sociable	0.01
De-stressed	0.01	Amusing	0.01	Irritated	0.01	Relaxed	0.01	Feverish	0.01
Frank	0.01	Relaxed	0.01	Laugh	0.01	Nauseated	0.01	Regretful	0.01
Tired	0.01	Odd	0.01	Brave	0.01	Tipsy	0.01	Good	0.01
Confident	0.01	Sociable	0.01	Hungry	0.01	Concerned	0.01	Emotional	0.01

Appendix 9

Expectancy Category List

Aroused

Korean	English	Korean	English
배고픈	Hungry	성적으로 흥분한	Horny
소변마려운	Urinate	담배생각나는	Smoke
갈증나는	Thirsty	자극적인	Strong

Positive Aroused

Korean	English	Korean	English
자신감있는	Confident	들뜬	Excited
웃긴	Funny	웃음나는	Laughing
스릴있는	Thrilled	솔직한	Frank
활발한	Lively	힘이세진	Powerful
활력소가되는	Energetic	머리가맑아지는	Clear
현명해지는	Wise	용감한	Brave
설레는	Fluttering	유머스런	Humorous
재미있는	Amusing		

Positive

Korean	English	Korean	English
기분좋은	Pleasant	놀고싶은	Playful
행복한	Happy	사교적인	Sociable
신나는	Joyful	상쾌한	Fresh
좋은	Good	이성적인	Sensible
즐거운	Enjoy	갈증이해소되는	Slakeable
편안한	Comfortable	상쾌한	Refreshing
평온한	Peaceful	시원한	Cool
자유로운	Free	애교부리는	Charming
감상적인	Sentimental	관대해지는	Generous
기복이심한	Good mood	맛있는	Tasty
감성적인	Emotional	단	Sweet
반복하는	Repetitive	판단력이없는	Nonjudgmental
말이많은	Talkative	겸손한	Humble

Positive Sedated

Korean	English	Korean	English
몸이가벼운	Lightened	망각의	Oblivious
걱정없는	Carefree	후련한	Unburdened
홀가분한	Lighthearted	스트레스해소되는	Relaxed

Sedated

Korean	English	Korean	English
그저그런	So so	말없는	Quiet
알뜰뜰한	Tipsy	배부른	Full
취한	Drunk	몽상적인	Dreamy
몸이무거운	Heavy	허무한	Empty
피곤한	Tired	없음	Nothing
힘든	Hard	머리가무거운	Woozy
힘없는	Feeble	나른한	Relaxed
졸린	Sleepy	이상한	Odd
그리운	Yearn		

Negative Sedated

Korean	English	Korean	English
달아오르는	Flushed	둔한	Slow
열나는	Feverish	생각없음	Thoughtless
상기된	Hot	기억이없는	Forgetful
따뜻한	Warm	메스꺼운	Nauseated
이해안되는	Incomprehensible	토할 것 같은냐차	Sick
바보스러운	Foolish	속쓰린	Stomachache
머리아픈	Headache	거북한	Unwell
몽롱한	Dopey	긴장된	Nervous
멍한	Blank	염려되는	Concerned
정신없는	Befuddled	찝찝한	Uneasy
혀가꼬이는	Tongue-tied	심난한	Serious
답답한	Stuffy	혼란스러운	Confused
감각한	Numb	혈압이높아지는	High bld Pressure
어지러운	Dizzy	제정신이아닌	Insane
균형감각이없는	Unbalanced	가슴이뛰는	Throbbing
시야가흐린	Blurred	두근거리는	Heart beat fast
맛없는	Tasteless	이중인격의	Dual personality
잘안들리는	Inaudible	차가운	Cold

Negative

Korean	English	Korean	English
기분나쁜	Unpleasant	우울한	Gloomy
역겨운	Disgusting	살기싫은	Despairing
찝찝한	Uncomfortable	싫은	Dislikable
회상에젖는	Retrospective	비싼	Expensive
회하는	Regretful	향이있는	Fragrant
쓴	Bitter	냄새나는	Smelly
외로운	Lonely	목이아픈	Throat Hurt
슬픈	Sad	눈이따가운	Eye ache

Negative Aroused

Korean	English	Korean	English
짜증나는	Irritated	공격적인	Aggressive
귀찮은	Annoying	수치심없는	Shameless
화난	Angry	자제력을잃은	Uncontrollable

Appendix 10**Original Alcohol Expectancy Questionnaire (Brown et al., 1980)**

Item Questionnaire Statement
Number

EXPECTANCY I (Global Pos Exp)

- 16 More creative thoughts pop up after drinking.
- 91 I become lustful when I drink.
- 20 Drinking makes it easier to concentrate on the good feeling I have at the time.
- 30 If I'm feeling restricted in any way, a few drinks make me feel better.
- 31 Men are friendlier when they drink.
- 32 It is easier for me to meet new people if I've been drinking.
- 38 Alcohol makes me need less attention from others than I usually do.
- 95 Alcohol makes me feel closer to people.
- 40 After a few drinks, I feel more self-reliant than usual.
- 42 When drinking, I do not consider myself totally accountable or responsible for my behavior.
- 43 Alcohol enables me to have a better time at parties.
- 45 Drinking makes the future seem brighter.
- 49 I drink when I'm feeling mad.
- 50 Drinking alone or with one other person makes me feel calm and serene.
- 51 After a few drinks, I feel brave and more capable of fighting.
- 52 Drinking can make me more satisfied with myself.
- 54 My feelings of isolation and alienation decreases when I drink.
- 62 Alcohol makes me worry less.
- 65 Alcohol seems like magic.
- 68 Drinking helps me get out of a depressed mood.
- 69 After I've had a couple of drinks, I feel I'm more of a caring, sharing

person.

- 70 Alcohol decreases my feelings of guilt about not working.
- 71 I feel more coordinated after I drink.
- 72 Alcohol makes me more interesting.
- 76 If I'm feeling afraid, alcohol decreases my fears.
- 82 When I'm antisocial, drinking makes me more gregarious.
- 83 Alcohol makes me feel better physically.
- 87 Alcohol makes it easier to forget bad habits

EXPECTANCY II (Sexual Enhance Exp)

- 47 I often feel sexier after I've had a couple of drinks.
- 59 I'm a better lover after a few drinks.
- 66 Women can have orgasms more easily if they have been drinking.
- 79 I enjoy having sex more if I've had some alcohol.
- 80 I am more romantic when I drink.
- 81 I feel more masculine (feminine) after a few drinks.
- 88 After a few drinks, I am more sexually responsive.

EXPECTANCY III (Physical & Soc Exp)

- 3 Some alcohol has a pleasant, cleansing, and tingling taste.
- 5 Drinking adds a certain warmth to social occasions.
- 8 Time passes quickly when I'm drinking.
- 15 Drinking makes me feel good.
- 17 Having a few drinks is a nice way to celebrate special occasions.

- 22 When I feel “high” from drinking, everything seems to feel better.
- 28 Drinking is pleasurable because it is enjoyable to join in with people who are enjoying themselves.
- 29 I like the taste of some alcoholic beverages.
- 84 Sometimes when I drink alone or with one other person it is easy to feel cozy and romantic.

EXPECTANCY IV (Positive Soc Asser Exp)

- 7 When I’m drinking, it is easier to open up and express my feelings.
 - 14 Drinking gives me more confidence in myself.
 - 19 When I’m drinking I feel freer to be myself and do whatever I want.
 - 21 Alcohol allows me to be more assertive.
 - 26 I find that conversing with members of the opposite sex is easier for me after I’ve had a few drinks.
 - 36 If I have a couple of drinks, it is easier to express my feelings.
 - 41 After a few drinks, I don’t worry as much about what other people think of me.
 - 48 Having a few drinks helps me relax in social situations.
 - 63 A few drinks makes it easier to talk to people.
-
- 73 A few drinks makes me feel less shy.
 - 90 It is easier to act on my feelings after I have had a few drinks.

EXPECTANCY V (Relaxation Exp)

- 57 Alcohol helps me sleep better.
- 61 Alcohol decreases muscular tension.

- 64 After a few drinks I am usually in a better mood.
- 74 If I'm tense or anxious, having a few drinks makes me feel better.
- 75 Alcohol enables me to fall asleep more easily.
- 78 Alcohol can act as an anesthetic, that is, it can deaden pain.
- 85 I feel like more of a happy-go-lucky person.
- 86 Drinking makes get-togethers more fun.
- 89 If I'm cold, having a few drinks will give me a sense of warmth.

EXPECTANCY VI (Arousal & Aggressive Exp)

- 10 Drinking makes me feel flushed.
- 33 After a few drinks, it is easier to pick a fight.
- 11 I feel powerful when I drink, as if I can really influence others to do as I want.
- 12 Drinking increases male aggressiveness.
- 67 At times, drinking is like permission to forget problems.

Appendix 11**Alcohol Expectancy Questionnaire Back Translation**

Item Questionnaire Statement
Number

EXPECTANCY I (Global Pos Exp)

- 16 I have creative thoughts after drinking alcohol.
- 91 I get a desire for sex after drinking.
- 20 I use drinking to sustain a good time.
- 30 A few drinks alleviate any stifling feelings I might have.
- 31 Guys become friendlier after drinking.
- 32 It's easier to meet new people after drinking.
- 38 Drinking allows me to feel less conscious of the people around me.
- 95 Alcohol makes me feel closer to other people.
- 40 I feel a stronger sense of independence after a few drinks.
- 42 Drinking makes me lose my sense of responsibility and duty regarding my actions.
- 43 Alcohol allows me to have more fun at a party.
- 45 Drinking makes the future look brighter.
- 49 I drink when I get angry.
- 50 I feel more at ease and at peace when I drink alone or with one other person.
- 51 I feel more brave after a few drinks, and feel like I could even get into a fight.
- 52 Drinking makes me feel more satisfaction about myself.
- 54 Drinking makes me feel less isolated and alienated.
- 62 Alcohol relieves my worries.
- 65 Alcohol is like magic.
- 68 Alcohol helps me feel less depressed.
- 69 I feel I become more thoughtful and considerate of others after two or

three drinks.

- 70 Alcohol makes me feel less guilty about not working.
- 71 I feel more in tune after drinking.
- 72 Alcohol makes me a more fun person.
- 76 Alcohol reduces my fear when I'm afraid.
- 82 I change from unsociable to sociable after I drink.
- 83 Alcohol makes me feel better physically.
- 87 Alcohol helps me forget about my bad habits.

EXPECTANCY II (Sexual Enhance Exp)

- 47 I feel more sexy after two or three drinks.
- 59 I feel more desirable after a few drinks.
- 66 Women find it easier to have an orgasm after drinking.
- 79 I enjoy sex more after drinking a bit.
- 80 I become more romantic after drinking.
- 81 I feel more masculine (feminine) after having a few drinks.
- 88 I respond more sexually after a few drinks.

EXPECTANCY III (Physical & Soc Exp)

- 3 Some alcoholic drinks have a crisp, clean, and fizzy taste.
- 5 Drinking alcohol makes social activities more exciting.
- 8 Time passes quickly when I'm drinking.

- 15 Drinking makes me feel good.
- 17 Having a few drinks is a good way to celebrate special occasions.
- 22 When I'm feeling good after drinking, I feel good about everything.
- 28 Drinking is enjoyable because it allows me to have a good time with people.
- 29 I like the taste of some alcoholic drinks.
- 84 Sometimes it's easier to feel close and romantic when drinking with one other person.

EXPECTANCY IV (Positive Soc Asser Exp)

- 7 When I'm drinking, it is easier to open up and express my feelings.
- 14 I feel more confident about myself when I'm drinking.
- 19 I feel more freedom when I'm drinking and I feel like I can do whatever I want.
- 21 Alcohol makes me become a more active person.
- 26 I've discovered that it's easier to talk to members of the opposite sex after having a few drinks.
- 36 It's easier to express my feelings after two or three drinks.
- 41 I don't worry about what people think of me after having a few drinks.
- 48 Having a few drinks makes me more relaxed in social settings.
- 63 Having a few drinks makes it easier to start conversations with others.
- 73 A few drinks make me feel less shy.
- 90 It's easier to do what I feel like doing after having a few drinks.

EXPECTANCY V (Relaxation Exp)

- 57 Alcohol helps me sleep better.
- 61 Alcohol reduces tense muscles.
- 64 I generally feel better after a few drinks.

- 74 Having a few drinks makes me feel better if I'm nervous or worried about something.
- 75 Alcohol makes it easier to fall asleep.
- 78 Alcohol relieves pain by acting as a tranquilizer.
- 85 I feel like a more optimistic person.
- 86 Alcohol makes social gatherings more fun.
- 89 When I'm cold, having a few drinks makes me feel warmer.

EXPECTANCY VI (Arousal & Aggressive Exp)

- 10 Alcohol makes me feel flushed.
- 33 It's easier to start a fight after having a few drinks.
- 11 When I drink, I feel strong enough to influence others to do what I want.
- 12 Alcohol increases the aggressive nature of men.
- 67 Sometimes, alcohol helps you forget about your problems.

Appendix 12

Translated Korean Alcohol Expectancy Questionnaire

<u>Item Number</u>	<u>Questionnaire Statement</u>
--------------------	--------------------------------

EXPECTANCY I

- | | |
|----|--|
| 16 | 술을 마신 뒤엔 좀더 창의적인 생각이 떠오른다 |
| 91 | 술을 마시면 성욕이 생기게 된다 |
| 20 | 음주는 기분 좋은 순간들을 유지시키는데 더 용이하게 작용한다 |
| 30 | 어떤 식으로든 답답한 느낌을 받을 때 몇 잔의 음주는 기분을 나아지게 만든다 |
| 31 | 남성들은 술을 마시면 더 상냥해 진다 |
| 32 | 술을 마시면 새로운 사람들을 만나는 것이 더 쉬워진다 |
| 38 | 알코올은 평소 때 보다 다른 사람들에 대한 주의를 덜 갖게 만든다 |
| 95 | 알코올은 다른 사람들과 더 가깝게 느껴지도록 한다 |
| 40 | 몇 잔의 음주 후 평소보다 좀 더 자립심을 느낀다 |
| 42 | 술을 마시면 나의 행동에 대한 책임감이나 의무감을 완전히 상실하게 된다 |
| 43 | 알코올은 파티에서 내가 좀 더 즐거운 시간을 갖도록 해준다 |
| 45 | 음주는 미래가 더 밝아 보이도록 만든다 |
| 49 | 화가 나면 나는 술을 마신다 |
| 50 | 혼자 또는 다른 한 사람과 술을 마시면 차분하고 평온한 느낌을 준다 |
| 51 | 몇 잔의 음주 후에 나 자신이 더 용감해지고 기꺼이 싸움도 할 수 있을 것처럼 느껴진다 |

- 52 음주는 나 자신에 대해 더 만족감을 갖게 한다
- 54 술을 마시면 고립감이나 소외감이 줄어든다
- 62 알코올은 걱정을 덜어준다
- 65 알코올은 마술 같다
- 68 음주는 우울한 감정에서 벗어나도록 도와준다
- 69 술을 두 세잔 마신 후엔 나는 좀 더 사려 깊고 배려하는 사람이 되는 것 같다
- 70 알코올은 일하지 않는 것에 대한 죄책감을 감소시킨다
- 71 술을 마신 후 좀 더 조용된 느낌이 든다
- 72 알코올은 나 자신을 좀 더 흥미롭게 만든다
- 76 내가 두려움을 느낄 때 알코올은 그 공포를 경감시킨다
- 82 내가 비사교적일 때 술을 마시면 좀 더 사교적이게 된다
- 83 알코올은 육체적으로 기분을 더 좋게 만든다
- 87 알코올은 나쁜 습관들을 잊게 만드는데 더 용이하게 한다

EXPECTANCY II

- 47 두세 잔의 술을 마신 후엔 종종 내가 더 섹시함을 느낀다
- 59 몇 잔의 술을 마신 후 나는 더 매력적인 연인이 된다
- 66 술을 마신 후 여성들은 오르가즘을 더 쉽게 느낄 수 있다
- 79 약간의 음주 후에 나는 성관계를 더 즐기게 된다
- 80 술을 마시면 나는 더 로맨틱한 사람이 된다
- 81 몇 잔의 술을 마신 후엔 나는 좀 더 남자/여자 다와 지는 느낌이 든다
- 88 몇 잔의 술을 마신 후엔 나는 좀 더 성적으로 반응을 한다

EXPECTANCY III

- 3 일부 알코올은 상쾌하고 깔끔하며 특 쏘는 맛을 가지고 있다
- 5 음주는 사교 활동에 어떤 흥분을 가미시켜준다
- 8 술을 마실 때면 시간이 금방 지나간다
- 15 음주는 기분을 좋게 한다
- 17 몇 잔의 술을 마시는 것은 특별한 때를 축하하기 위한 하나의 좋은 방법이다
- 22 술을 마시고 기분이 고조되어 있을 때면 모든 것이 다 좋게 느껴진다
- 28 술을 마시는 것은 유쾌하다 왜냐하면 기분 좋게 향유하는 사람들과 함께 즐길 수 있기 때문이다
- 29 나는 일부 알코올 음료들의 맛을 좋아한다
- 84 때때로 혼자 또는 다른 한 사람과 함께 술을 마실 때면 쉽게 아늑하고 로맨틱한 느낌이 든다

EXPECTANCY IV

- 7 내가 술을 마시고 있을 때면 나는 마음을 열고 나의 감정 표현을 더 쉽게 하게 된다
- 14 술을 마시면 나 자신에 대한 자신감이 더 생긴다
- 19 술을 마시고 있을 때면 나 자신이 더 자유롭게 느껴지고 내가 원하는 것은 무엇이든 한다
- 21 알코올은 나로 하여금 더욱 적극적인 사람으로 만든다
- 26 몇 잔의 술을 마신 후엔 다른 성별의 사람들과 대화하는 것이 더 용이하다는 것을 발견하게 된다
- 36 두세 잔의 음주를 하면 나의 감정을 표현하는 것이 더

쉬워진다

- 41 몇 잔의 음주 후엔 다른 사람들이 나를 어떻게 생각하는지에 대해 더 이상 염려하지 않는다
- 48 몇 잔의 음주는 사회생활에 있어 나를 느긋하게 만드는데 도움을 준다
- 63 몇 잔의 음주는 다른 사람들에게 말을 건네는 것을 더 용이하게 한다
- 73 몇 잔의 음주는 나를 덜 수줍게 한다
- 90 술을 몇 잔 마신 후엔 내 감정에 따라 행동하기 더 쉬워진다

EXPECTANCY V

- 57 알코올은 수면에 도움을 준다
- 61 알코올은 근육의 긴장을 줄여준다
- 64 몇 잔의 음주 후엔 보통 기분이 더 좋아진다
- 74 내가 긴장하거나 걱정스러운 일이 있을 때 몇 잔의 술을 마시면 기분이 나아진다
- 75 알코올은 더 쉽게 잠이 들도록 해준다
- 78 알코올은 마취제 같은 역할을 해서 고통을 덜어준다
- 85 내가 더 낙천적인 사람이 된 것 같은 느낌이 든다
- 86 음주는 사교모임을 더 재미있게 만든다
- 89 추위를 느낄 때 술을 몇 잔 마시면 온기를 느끼게 해 줄 것이다

EXPECTANCY VI

- 10 술을 마시면 화끈 달아오르는 느낌이 들게 한다
- 33 몇 잔의 음주 후엔 쉽게 싸움을 걸게 된다

- 11 술을 마시면 내가 원하는 것을 하도록 다른 사람들에게
영향력을 끼칠 수 있을 만큼 강력해지는 것 같다
- 12 음주는 남성의 공격적인 성향을 증가시킨다
- 67 때때로 음주는 문제들을 잊을 수 있게 도와주는 것 같다

Appendix 13**Original Sensitivity to Punishment and Reward Questionnaire****Sensitivity to Punishment and Sensitivity to Reward 9 (Short Form)**

1. Does the good prospect of obtaining money motivate you strongly to do some things?
2. Are you often afraid of new or unexpected situations?
3. Is it difficult for you to telephone someone you do not know?
4. Do you often do things to be praised?
5. Do you like being the center of attention at a party or a social meeting?
6. In tasks that you are not prepared for, do you attach great importance to the possibility of failure?
7. Are you easily discouraged in difficult situations?
8. Are you a shy person?
9. When you are in a group, do you try to make your opinion the most intelligent and the funniest?
10. Whenever possible, do you avoid demonstrating your skills for fear of being embarrassed?
11. Do you often take the opportunity to pick up people you find attractive?
12. When you are with a group, do you have difficulties selecting a good topic to talk about?
13. Do you generally give preference to those activities that imply an immediate gain?
14. Whenever you can, do you avoid going to unknown places?
15. Do you like to compete and do everything you can to win?
16. Are you often worried by things that you said or did?
17. Do you, on a regular basis, think that you could do more things if it was not for your insecurity or fear?

18. Do you sometimes do things for quick gains?
19. Comparing yourself to people you know, are you afraid of many things?
20. Do you often find yourself worrying about things to the extent that performance in intellectual abilities is impaired?
21. Do you often refrain from doing something you like in order not to be rejected or disapproved of by others?
22. Would you like to be a socially powerful person?
23. Do you often refrain from doing something because of your fear of being embarrassed?
24. Do you like displaying your physical abilities even though this may involve danger?

Appendix 14**Sensitivity to Reward and Punishment Back Translation****Sensitivity to Punishment and Sensitivity to Reward**

1. How strongly are you motivated by the prospect of earning money?
2. Do you consistently fear new things or changes you didn't expect?
3. Are you afraid of calling someone you don't know?
4. Do you consistently do things to get compliments from others?
5. Do you enjoy being the center of attention at parties or social gatherings?
6. In terms of things you are not prepared for, do you bear in mind the possibility of failure?
7. When faced with difficult situations, do you get discouraged easily?
8. Do you consider yourself to be timid?
9. When with people, do you try to make yourself the smartest and the funniest?
10. Do you refrain from revealing your abilities for fear of embarrassment?
11. Do you consistently seize opportunities to go after attractive people?
12. With what group of people do you find it difficult to find an appropriate conversation topic?
13. Do you prioritize activities that give immediate benefits?
14. Do you avoid going to unknown places whenever possible?
15. Do you like to compete, and do you do all things to win as much as possible?
16. Are you consistently worried about things you said or did?
17. Do you think you would be able to do more things if you weren't afraid or nervous in daily situations?
18. Do you sometimes do things to get quick gains?

19. Compared to other people you know, are you afraid of a lot of things?
20. Do you worry about things so much to a point where you think you might have suffered damage to your intellectual abilities?
21. Do you often refrain from doing things you like because you're afraid of rejection by others?
22. Are you becoming an influential person in society?
23. Do you often refrain from doing things for fear of embarrassment?
24. Do you enjoy showing off your physical abilities, even though it might sometimes be dangerous?

Appendix 15

Translated South Korean Sensitivity to Punishment and Reward Questionnaire

Sensitivity to Punishment and Sensitivity to Reward 9 (Short Form)

1. 돈을 벌 수 있다는 긍정적인 기대가 당신으로 하여금 무언가를 하도록 강한 동기를 부여합니까?
2. 당신은 종종 새로운 것이나 예상치 못한 상황들을 두려워하십니까?
3. 당신이 알지 못하는 누군가에게 전화하는 것이 어려우십니까?
4. 당신은 종종 칭찬받기 위한 일들을 하십니까?
5. 당신은 파티나 사교 모임에서 주목의 대상이 되는 것을 좋아하십니까?
6. 당신이 준비가 되지 않은 일에 있어서, 당신은 진지하게 실패의 가능성을 염두에 두십니까?
7. 어려운 상황들에 직면해 있을 때 당신은 쉽게 낙담하십니까?
8. 당신은 수줍은 편입니까?
9. 사람들과 있을 때 당신은 자신의 생각이 돋보이도록 지적이면서도 최대한 재미있게 표현하려고 노력하는 편입니까?
10. 당신은 창피 당하는 두려움 때문에 가능하다면 당신의 능력을 드러내는 걸 피하십니까?
11. 당신이 매력적이라고 판단되는 사람들에게 작업을 걸기 위해 그 기회를 종종 잡으십니까?
12. 당신이 어떤 그룹과 함께 있을 때 이야기 하기에 적당한 주제를 찾는 데 어려움이 있으십니까?
13. 당신은 일반적으로 즉각적인 이득이 있는 활동들에 우선권을 둡니까?

14. 가능하다면 당신은 미지의 장소로 가는 것을 피합니까?
15. 당신은 경쟁하기를 좋아하고 가능한 이기기 위해 모든 일을 하십니까?
16. 종종 당신이 언급했거나 행동했던 일들에 대해 걱정하십니까?
17. 당신은 정기적으로 만약 당신이 불안전하거나 두려운 감정이 없었다면 더 많은 것들을 할 수 있었다고 생각하십니까?
18. 당신은 때때로 빠른 성취를 얻기 위한 일들을 하십니까?
19. 당신이 알고 있는 다른 사람들과 자신을 견주어 보았을 때 당신은 많은 것들에 두려움을 느끼십니까?
20. 당신은 자주 지적 수행 능력을 떨어뜨릴 만큼 일들에 대해 과도하게 걱정하는 스스로 발견하십니까?
21. 당신은 다른 사람들에게 거절당하거나 반대 당하지 않기 위해 당신이 좋아하는 일을 종종 자제하십니까?
22. 당신은 사회적으로 영향력 있는 사람이 되고 싶습니까?
23. 당신은 창피당할 두려움 때문에 무언가 하려는 것을 종종 자제하십니까?
24. 당신은 비록 위험을 내포하게 되더라도 자신의 신체적 능력들을 과시하는 걸 좋아하십니까?

Appendix 16

Letter of Approval

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has been removed

Appendix 17

Translated Letter of Approval

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Appendix 18

Genetic Testing Ethics Approval

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Appendix 19

Information Sheet



JAMES COOK UNIVERSITY

Cairns Queensland Australia Telephone: (07) 4042 1111

Information Sheet

You are invited to take part in a research project about how differences in drinking ability are affected by attitudes towards alcohol. The research is being conducted by Benjamin Mahoney as part of his PhD at James Cook University, Australia. Many Koreans are unable to break down alcohol properly due to ALDH2*2, which means they often feel sick when they drink, and the research would like to know how this affects Koreans' drinking habits.

If you would like to be involved in the study, you will be asked to stay behind after class and fill out some forms and give a mouth swab, where a nursing student will insert a swab into your mouth for 30 seconds. The questionnaires will be presented one by one, and the mouth swab will be conducted at the very end of the session, and overall, it should take about 30 minutes of your time. Questionnaire 1 will test your alcohol expectancy, questionnaire 2 will test your cognitive stimulus preferences, and the demographic survey gives us personal details like gender and drinking practices. All of the data collection will take place in the classroom of your English class.

You may withdraw from the research at any stage without any need explain or prejudice. You may also withdraw any unprocessed data from the study.

There is no pain or danger involved in the testing, and no personal details will be recorded regarding the ALDH2 testing, but if you feel upset or distressed in any way, please advise the researchers and you will be referred to student administration.

Again, no personal or identifying details will be collected, so your results will remain completely confidential. Not even the researcher will know anyone's identity. The results of the study will be used in research publications to *Psychopharmacology of Addiction*. You will not be identified in any way in these publications.

If you have any questions about the research, please contact:

Benjamin Mahoney	Deborah Graham	Tina Langford
English Professor	Supervisor	Ethics Officer
Soonchunhyang University	JCU, Cairns Campus	JCU, Townsville Campus
		+617 4781 4342
	deborah.graham@jcu.edu.au	tina.langford@jcu.edu.au

Appendix 20

Translated Information Sheet



JAMES COOK UNIVERSITY
 TOWNSVILLE Queensland 4811 Australia Telephone: (07) 4781 4111

Information Sheet

여러분들은 한국인들의 음주 패턴을 통해 유전자와 인식기능이 음주에 얼마나 큰 영향을 미치는지에 대한 연구 프로젝트에 참여하게 되었습니다. 이번 조사는 벤자민 마호니 교수에 의 주관 하에 그의 모교 호주 James Cook 대학의 연구에 기여하게 될 것 입니다.

여러분들이 이 연구에 참여에 이의가 없으시다면 강의가 끝난 후 교실에 남아서 설문지를 작성하고 ALDH2 실험을 위해 구강 채취를 하셔야 합니다. 각자 설문지를 한 부씩 받게 될 것이며 구강채취는 설문지 작성 후 마지막에 진행 될 것 입니다. 그리고 전체 소요 시간은 30 분 정도 예상 되어 집니다. 테스트는 여러분의 강의실에서 진행이 될 것입니다.

이 연구에 참여하는 것은 스스로의 자발적인 의사이고 참가자가 원하지 않을 때는 언제든지 어떠한 설명이나 편견 없이 실험의 참여를 중단할 수 있습니다. 여러분 들은 본인이 원치 않으면 어느 때라도 어떤 부연 설명 없이 실험에서 빠질 수가 있습니다.

실험을 하는 동안 어떤 통증이나 위험도 없으며 ALDH2 테스트 과정에서 개인 정보의 유출은 없을 것입니다. 그러나 혹여 라도 감정의 변화나 정신적인 고통을 느낀다면 주저하지 말고 본인의 상태를 설명해주시고 바로 도움을 받도록 하십시오.

참가자의 이름은 어떠한 경우에도 공개되지 않을 것이며 실험 결과에 나타난 개개인의 신상은 철저히 비밀이 보장될 것입니다. 이 모든 결과들은 "Psychopharmacology of Addiction" 라는 제목의 과학 잡지에 실리게 될 것 입니다..

문의 사항이 있으시면 언제든지 연락바랍니다:

Benjamin Mahoney	Deborah Graham	Tina Langford
English Professor	Associate Dean, Post Graduate Research	Ethics Officer
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Appendix 21

Memory Test Alcohol Expectancy Word List

Endorsed by Lighter		Both		Endorsed by Heavier	
Korean	English	Korean	English	Korean	English
어지러운	Dizzy	사교적인	Sociable	말이 많은	Talkative
졸린	Sleepy	애교부리는	Charming	용감한	Brave
둔한	Slow	웃긴	Funny	들뜬	Excited
바보같은	Foolish	놀고싶은	Playful	자신감있는	Confident
나른한	Languid	편안한	Comfortable	활력소가되는	Energetic