# THE EFFECT OF ALCOHOLISM ON VISUO-SPATIAL PERSPECTIVE TAKING

by

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Abstract

*Background:* Severe alcoholism is associated with cognitive deficits which research has shown to effect social functioning. Theory of Mind (ToM), the ability to make judgments based on another's state of mind, has only recently been explored in alcohol research. Previous research has shown that alcoholism is associated with deficits in conscious, deliberate emotional processing and humour processing. However, ToM encompasses many social functions, including the ability to take another's visual perspective, but little is known about how cognitive deficits caused through alcoholism may affect these processes. *Aim:* The aim of the experiments in this thesis was to explore how alcoholism may effect automatic visual-spatial processing and the effect of emotional valence of stimuli on this automatic process. *Methods:* Visual processing was measured by asking participants to respond to a dot probe appearing as either congruent (above/below) or incongruent (left/right) to facial stimuli which conveyed a neutral or emotional expression (e.g.a fearful or happy face). Participants were also asked to quantify the level of the emotion expressed using a 7 point-Likert scale. *Results:* The results from the visuo-spatial processing trials (VSPT) show that alcoholism is not associated with any impairment in VSPT; both alcoholics and non-alcoholics showed a perspective reaction time cost when the perspective differed from their own. This can be taken as evidence for automatic VSPT. However, the relevance of the fearful facial expression did cause a reaction time cost for the non-alcoholics that was not demonstrated by the alcoholics. However, both the alcoholics and non-alcoholics showed a delayed response to happy faces when the perspective differed from their own. To address the question as to why it may be the case that alcoholics did not react differently to neutral and fearful faces,

participants were asked to rate the faces for emotional content. In these trials alcoholics rated the neutral faces as containing more emotion than the non-alcoholics. *Conclusions:* The VSPT studies in this thesis suggest that alcoholics do not show any deficits in visual perspective taking, although this research is in its infancy so greater exploration is required. What appears most significant from the experiments is that the emotional content of the stimuli presented creates processing differences between the alcoholics and non-alcoholics as evidenced by their reaction time differences and ratings of the faces. The extent to which these processing differences will effect alcoholic's day to day lives is not known.

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# Chapter 1. Definitions

## 1.1 An introduction to addiction

The term 'addicted' may be used frequently and systematically, but the term is rather ambiguous, with each person having a different experience or belief of what being an addict entails, and thus what addiction really means. It is important to understand addiction through an accurate time defined account, although most non-specialists only thoughts and feelings towards addicts are probably shaped by personal experience and media influence. Addiction definitions have changed over time and are always evolving, thus current addiction research is important because it informs our clinical definitions. The *Diagnostic and Statistics Manual of Mental Disorders* (DSM I-5; see Appendix H for DSM-5 Alcohol Use Disorder Criteria) has evolved its definitions and inclusion criteria of addiction to account for societal changes, expanding research and growing knowledge. These changes (for example the inclusion of compulsive gambling in DSM-IV) reflect a greater medical acceptance of the problems and behaviours associated with addictions which have been driven through by research.

In the book, *Out of It: A Cultural History of Intoxication*, Stuart Walton (2001) notes that throughout history, human beings have sought out ways of altering consciousness with drugs and alcohol. Alcohol and drug use have always been a part of habitual, ritualistic, novel and haphazard societal life, although the culture around the behaviour varies drastically between societies. Walton (2001) notes that specifically 'intoxication' is so inherent in the history of human social lives that it is a wonder why this behaviour is still viewed as an issue of moral or social recalcitrance. Excessive and abusive alcohol drinking may never be deemed 'acceptable', and research can enhance our understanding and ability to deal with the problems it creates in a new, more productive way.

The research in this thesis did not seek to explore alcoholism through one specific definition, but it did intend to understand the interaction between the cognitive processes and social information. Recent research is driving through changes in addiction treatment (Fadardi & Cox, 2009; McMurran,

Cox, Coupe, Witham & Hedges 2010; Vasilaki, Hosier & Cox, 2006). When considering addiction in a different and novel way, treatments can start to be shaped and delivered on the basis of this new research and perspectives. Thus the challenges alcoholics face on both a conscious and automatic/unconscious level require equal consideration. Treatments such as Alcoholics Anonymous, are designed on the premise that alcoholics can recover through stages of experiential learning. While this treatment model is helpful for many, it may not be adequate for all. Treatments based on attention bias are now being delivered in the UK, helping alcoholics to understand that it may also be their heightened awareness of alcohol related stimuli which maintains their addiction. While treatments based on the alcoholic's experiences, thoughts, and emotions are working for many, more recent research and theory (Kornreich et al., 2013; Philippot, Feldman & Coats, 2003) suggest that a generalised emotional perception impairment exists in alcoholism. Given that alcoholics' lifestyles are so maladapted and dysfunctional it is not surprising that this affects their perceptions about the world around them. Thus, it is important to know whether the patients that are receiving treatment are able to adequately understand the mental states of those around them as well as their own.

It was not until the late eighteenth to early nineteenth century that habitual repeated drunkenness was considered a matter for medical intervention. Prior to this it was viewed as 'normal' at the least, and at the most extreme an issue of morality and deviancy. The dangers of social drunkenness and drug use have for some time been a political and social dilemma. Hogarth's image '*Gin Lane*' in 1751, portrays the destructiveness of gin consumption amongst the poor and the general school of thought was that people 'wanted to drink', rather than people 'had to drink'. With the new ease of availability of cheap spirits in the 18$^{th}$ Century came a rise in the number of alcoholics among the poor who increasingly presented themselves to physicians for helping describing their compulsion to drink. It was the beginning of the continuing work of the Temperance Movement that brought the concept of alcoholism to public attention, and made the experiences of the

alcoholic a matter of social, political and medical debate and led to a treatment model of experiential learning and catharsis.

Intoxication is not the same as addiction or alcoholism. Just because alcoholics get 'drunk' doesn't mean that this is all there is to alcoholism. In a clinical and academic review, psychiatric and research professionals debated the distinctions of the terminology frequently used when referring to any type of haphazard alcohol drinking and/or drug taking. Altman et al. (1996) note that the way in which addiction and other related terms – abuse, dependence – are used gives rise to confusion about behaviours, patients and the subject area. These confusions called for clarity. With many multi-disciplinary professionals working with addicts the need for clear definitions was essential. Helpfully Altman et al. (1996) have provided these definitions:

- *Addiction* is restricted to the extreme or psychopathological state where control over drug use is lost

- *Dependence* refers to the state of needing a drug or drugs to function within normal limits; it is often associated with tolerance and withdrawal, and with addiction as defined above

- *Abuse* indicates use of a drug or drugs leading to problems for the individual e.g. loss of effectiveness in society; behavioural psychopathology, perhaps leading to criminal acts (Altman et al. 1996; pg: 286-287)

These distinctions are important and the research in this thesis will discuss continual and harmful alcohol use –alcoholism, and not abuse or intoxication. Intoxication in life may lead to addiction (Plant & Plant, 2006), but as will be discussed, there is considerably more to being an alcoholic than the act of drinking alcohol. The research in this thesis aims to understand the effects of long-term, harmful and repetitive excessive alcohol use, and therefore addiction, on specific social processing tasks.

## 1.2 Addiction – a problem with definition

There may be no definitive definition to what addiction is (West, 2006). Like many issues in behavioural science it relies on observations of a specific population which invariably have idiosyncrasies both between individuals and differences among populations. For example, is there any difference between a nicotine addict and a heroin addict? For some the answer to this is simple: Yes. The lifestyle of the envisaged smoker may seem worlds apart from that of the *criminal junkie*. For others who refer to the underlying cognitive processes which enable addictions rather than the social characteristics the answer may be: No. They are similar: both experience a regular craving for a substance which is damaging their health, yet fail to quit. Furthermore, does the legality of a substance compound its wider acceptance? Here the problem begins because addiction can be understood as a social construct, a myth or as a symptom of wider psychological issues depending on the observer, be they clinician, social group or researcher. Hence addiction can be a matter of subjectivity rather than objectivity (Booth-Davies, 1992). These differing viewpoints and beliefs have created different ways of describing and measuring addiction, which has led to treatment models and theory development.

For the purpose of the research in this thesis, it is more helpful to explore and discuss the behaviours which have become benchmarks for both clinical and (non-specialist) social definitions. Certain behavioural associations with addiction have become so widely accepted that they have now guided clinical definitions and so are used to categorise populations in empirical research as well as guide community and in-patient treatments. However, as well as these long-established behavioural associations (tolerance – withdrawal symptoms), there are newer, less well understood ones which may, in time, develop our understanding. While this discourse helps develop an insight into the experience of the alcoholic it is not necessary for the interpretation of the experimental results that I am concerned with in my own research.

### 1.2.1 Towards a clinical definition

The latest version of the DSM (5) does not classify alcoholism but rather, alcohol abuse and dependence as different phenomena. Concentrating on dependence it states: 'A maladaptive pattern of drinking, leading to clinically significant impairment or distress' (DSM-5; Appendix B). New to DSM (5) is the ability to diagnose and classify the level of alcohol dependence from mild, to moderate to severe.

Also one of the most widely accepted definitions of alcohol addiction and one that has much influence in clinical work, is the Edwards and Gross (1976) definition of Alcohol Dependence Syndrome, as listed below. Such is the influence and acceptance of these behavioural associations with alcohol addiction they have been mirrored in most other areas of substance addiction. With regards to alcohol addiction, Edwards and Gross's work has been influential in the creating of the DSM (I-V) classification and diagnosis of alcoholism for health professionals. It is suggested by health and psychiatric professionals that at least three of their definitions of alcohol dependence related behaviours may have been manifest in the last 12 months in order for a diagnosis.

The DSM definition and Edwards and Gross (1976) view collectively provides a framework for evaluating the experience of those who abuse and are dependent on alcohol. The two sets of definitions map onto each other and include:

- The need for markedly increased amounts of alcohol to achieve intoxication or desired effect; or markedly diminished effect with continual use of the same amount of alcohol
- The characteristic withdrawal syndrome for alcohol; or drinking (or closely related substance) to relieve or avoid withdrawal symptoms
- Drinking larger amounts or over a longer period than intended

- Persistent desire or one or more unsuccessful efforts to cut down or control drinking
- Important social, occupational, or recreational activities, or recreational activities given up or reduced because of drinking
- A great deal of time spent in activities necessary to obtain, to use, or to recover from the effects of drinking
- Continual drinking despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to be caused or exacerbated by drinking

### 1.2.2 The benefit of a new viewpoint on alcoholism. An introduction to a cognitive perspective

In common with other areas of psychological research alcoholism is now increasingly investigated through cognitive neuroscience (Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003). A cognitive perspective differs from the research and schools of thought which have preceded it, as in many ways, it depersonalises the 'addict'. The positive benefit of this 'depersonalisation' is that it investigates only the thoughts and processes behind the behaviour, the 'pure' or reductionist view of the behaviour. From this perspective there is no intention to make judgement or investigate the history or morality of the addict. Cognitive psychology therefore comes without the issue of morality that alcoholism has historically faced. This perspective does however seek to investigate the decision making processes which may guide and therefore lead to immoral/anti-social behaviour by alcoholics. Hence, cognitive psychology does not totally ignore the social and biological aspect of alcoholism, but rather looks for unique interactions between them. The research in this thesis combines the reductionist view of the cognitive perspective with the experiential insight of the social perspective.

Alcoholism is associated with a range of cognitive deficits, ranging from slow stimulus driven motor reaction in timed tasks (Field, 2005; Oscar-Berman & Marinkovic, 2003; Sharma, Albery & Cook, 2001), to poor memory, and a general lack of skill as demonstrated in cognitive tasks (Parsons, 1987). New research has recently shown that alcoholism is also related to visual spatial deficits (D'Hondt, Lepore & Maurage, 2014). Cognitive deficits caused through severe alcoholism are also considered to cause irregular social behaviour, such as emotional flatness, apathy and inappropriateness (Marinkovic, et al., 2009), due to the impact of alcohol on neural systems. This suggests that many of the social problems alcoholics encounter are neurologically rooted. However, current research is not clear on how one cognitive deficit may affect another cognitive process. Moreover, current research cannot answer how social cognition is affected, how much of a person's personality diminishes through severe alcohol drinking? To what degree does an alcoholic's perception of the world change or become distorted by alcohol related brain damage? These are pertinent questions requiring attention.

### 1.2.3 The role of attention bias/selective attention in alcoholism

Cognitive deficits and biases in addiction are well established phenomena. It has been consistently demonstrated that those who are clinically defined as addicted or dependent on a range of substances show a visual attention bias to addiction related stimuli (Field, 2005; see Jones & Bruce, 2006, for a review). Tiffany's (1990) cognitive model of drug use neatly demonstrates how repetitive exposure to drug related phenomena trigger an automatic, almost effortless, schema and response to drug seeking and taking. Thus, addicts are described as being in a cycle of exposure, reaction, drug-seeking, and consumption. It is the understanding and breaking of this cycle which could lie at the centre of recovery from addiction. This is because alcoholics create a 'narrow behavioural repertoire' (Edwards & Gross, 1976) whereby sole focus lies on addiction related acts, such that daily activities become concentrated around finding relief from withdrawal, with the

added desire to feel mentally and physically high/stable. Motivation to achieve these goals often means alcoholics socialise with other alcoholics and concentrate their activities on their addiction. Interactions with non-addicts can feel unpleasant and confrontational because they are often challenged about their lifestyle (Booth-Davies, 1992).

Cognitive research has helped explain the mental and behavioural reinforcing elements which enable and maintain this dysfunctional behavior (Field, 2005; West, 2006). Specifically, analysis of implicit or automatic processes can explain how alcoholism is enabled unconsciously, whereas that of non-automatic processes can explain how conscious thought and behaviour maintain alcoholism through continual work and resourcefulness (Field, 2005).

### 1.2.4 Significant points of evidence from research on the relationship between attention bias and alcoholism

Research that investigates implicit attention bias to addiction-related stimuli can help explain how alcoholism is maintained and why relapse is triggered. Attention bias explains the naturally occurring interactions between the everyday environment of the alcoholic and how they perceive and process this.

Research has thus far concluded that there is a relationship between attentional bias and -

- rates of recovery (Cox Hogan, Kristian & Race, 2002)
- the chronic level of addiction (Cox, Brown & Rowlands, 2003; Sharma, et al., 2001)
- automatic and non-automatic execution of drug seeking and taking (Field, 2005; Tiffany, 1990)
- cravings and drug expectancy (Cox et al., 2003; Field, 2005; Robinson & Berridge, 1993)

- reward and motivation to use (Colder & Chassin, 1993;Wise, 2004).

The experimental methodology underpinning attention bias research in addiction is well defined. For the most part these are controlled laboratory based experiments. However the cognitive processes involved in selective attention still remain unclear (Field, 2005). Presented above are the suggested effects and association of attention bias on addiction, but how these come to be consequences of selected attention is still an active research question. Evidence suggests that attention biases are automatic as attention shifts in the early phases of information processing (Field, 2005). Various types of measures, such as Stroop, dual processing, dot-probe and gaze measurement tasks, serve to tease out and highlight the range of implicit and explicit processes involved in maintaining alcoholism. In a review by Jones & Bruce (2006) of the research on attention bias and drinking behaviours they state that across varying measures, attention bias to alcohol related stimuli is repeatedly demonstrated and the relationship is strong in excessive drinkers (treatment seekers) and heavy drinkers, as compared to social and light alcohol drinkers (see also, Munafo & Albery, 2006).

### 1.3 Problems with alcohol addiction research - the importance of accounting for confounding variables

Different methodologies have left authors with varying conclusions as to whether attention bias is automatic or what the motivational forces which drive alcoholism may be. For example, in Stroop and dual processing tasks, interference caused through cue salience affects the speed of processing, and hence slows reaction times, and this is explained as an 'attention bias'. However, others – see Field (2005) for a full review - have suggested that this may be indicative of craving, which would also consume and slow attentional resources. When alcohol related stimuli are presented to alcoholics very briefly (100ms) there appears to be strong evidence that attention bias is

automatic (Stormack, Field, Hugdahl & Horowitz, 1997). There is of course a distinction between the attentional resources that shift attention, which may be automatic, and the alcoholic's awareness of this process (Field, 2005). Thus, unconscious shifts in attention to alcohol related cues are not an indication of one's motivation to use. In fact, when stimuli are shown above the conscious level of awareness, or for longer (500ms), it has been shown that alcoholics in treatment exhibit deliberate shifts in attention (Townshend & Duka, 2003a). Problems can arise in interpreting data from speed of detection tasks, as alcoholism and drug abuse is related to general slowing of visuo-motor processes, and therefore slower responses may not be a result of attentional bias at all (Evert & Oscar-Berman, 1995).

What is clear is that attentional resources per se are compromised in alcoholism because of chronic abuse and also possibly because of attention bias. However as stated, the nature of the processes is still debated. The exact effect that attention bias will have on the process and success of recovery is also still unknown. While a cognitive perspective can offer a useful viewpoint on the subject of alcoholism, it remains difficult to tease out the effect that other confounding variables such as, craving, incentive sensitization, alcohol expectancy etc., will be having on an alcoholics' performance in cognitive tasks. Cognitive explanations therefore provide the literature with evidence on highly controlled experiments, but in the 'real world' when there are so many other variables (drugs included) which will dictate and navigate an alcoholics behavior and cognitions. Therefore there is no research area which can still not fully answer how an alcoholic's skewed cognitions and erroneous perceptions of the world would impact their day to day lives.

# Chapter 2. Theoretical Perspectives.

## 2.1 An introduction to the relationship between social cognition and alcoholism

While biological, cognitive and social models of addiction are important, social-psychological models of addiction offer an alternative perspective. At the centre of such theories is the view that social processing, specifically emotional processing, is impaired. Emotional understanding (see, Philippot, Kornreich & Blairy, 2003), emotional self-regulation (Khantzian, 2007) and emotional expression (for a review of alexithymia see – Thorberg, Young, Sullivan & Lyvers, 2009) are all believed to be linked to alcoholism. Such theories, as will be mentioned below, come with various findings, using different methodologies and participant groups. Overall there appears to be agreement that social cognition is compromised due to brain damage caused through alcohol abuse, specifically in the right hemisphere (Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003) and the frontal lobes (Moselhy, Georgiou & Kahn, 2001; Uekermann & Daum, 2008). The right hemisphere is accepted as playing a major role in social processing tasks and hence damage to this area is believed to be one reason why alcoholics (and drug users) may present with poor social skills (known as the right hemisphere hypothesis, Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003). Similarly, extensive damage to the pre-frontal cortex caused through alcohol abuse is associated with problems with executive functioning; such damage may in part be a cause of a lack of social comprehension in alcoholics (known as the frontal lobe hypothesis, Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003). This damage may extend to children of alcoholics who also show some evidence of diminished brain activity in the right hemisphere while processing facial stimuli (Hill et al., 2007).

### 2.1.1 Poor social skills as precursor to addiction

'Poor social skills' is a vague term which can be used to describe a two-way process: firstly, the ability to understand the behavior of others in a social context; secondly, the ability to socialise and make yourself understood by others. For example, a person who may be chronically shy or suffer from social anxiety may have difficulty in communicating with others but have no problem in understanding others'. Intriguingly, evidence has suggested that those who suffer with depression and anxiety display significantly better levels of reading and estimating others mental states (Theory of Mind; ToM) than controls (Cox & Hotham, 2007; Harkness, Sabbagh Jacobsen, Chowdrey & Chen, 2005). So in order to connect poor social skills as a precursor to alcoholism greater clarity is needed. The question remains: are poor social skills in alcoholics a cause or an effect? Are we stating that those with alcoholism have a hard time socialising and this is forcing them into addiction because relief can be found in substances? Or are we arguing that addicts find it difficult to understand others and that this may also be a precursor to addiction? Or both?

Of relevance to the research in this thesis is whether 'poor social skills', in any form, are a precursor to addiction, as this research aims to investigate the impact of alcoholism on social processing. It is important to understand whether deficits in social skills are actually a driving force into alcoholism and extant before the onset of alcohol misuse. Poor social skills are highly correlated to a range of psychological problems (Khantzian, 2007) and a high proportion of mental health patients also report drinking high levels of alcohol and taking illicit drugs. However this may be a matter of association and not causation. More importantly, it is not necessarily the case that all alcoholics have mental health issues or have problems with socialisation. It may be proposed that some addictions, for example, alcohol, engender a very social element; an element which is perhaps missed by the alcoholic patient during abstinence. Other research has also shown that especially in adolescence the social element of alcohol drinking is very important: it can be used as a way to make a connection with peers as well as to prove one's worth (Plant & Plant, 2006) and is often used to enhance social times and enjoyed as

part of a collective (Walton, 2001). There is also some evidence to suggest that poor social skills are not necessarily the result of a child having an alcoholic parent (Segrin & Mize Menees, 1996), perhaps suggesting that parents themselves were not unsocial, and that their drinking behaviour neither inhibited nor limited their child's ability to socialise.

### 2.1.2 The self-medicating hypothesis

Many drinkers expect alcohol to improve their sociability but it may be the expectation itself that gives alcohol this property. Alcohol is largely associated with stress reduction, social pleasure and a distraction from worries (Lang, 1985); so its ability to disinhibit is its appeal. Heavy intoxication however will not improve sociability and may not provide any positive outcomes; quite the opposite has been shown to be true (Lang, 1985).

The self-medicating hypothesis is a useful point of reference here as it provides an argument that lack of emotional regulation and understanding of others play a crucial role in the maintenance of addiction including alcoholism. This theory, based on clinical observations, by Khantzian (2007), supports the notion that certain substances are sensitive to specific painful affect states which patients have difficulty in regulating, and it is the relief from these states that is powerfully reinforcing and addictive to users. It is the relief from the painful affect state which reinforces continual use of the drug/alcohol.

From this viewpoint, addicts primarily experience problems with emotional self-regulation, self-care, relationships and self-esteem, and this theory explains why one person would become addicted to heroin, for its ability to sedate and physically calm the body and mind, and another to cocaine, for its ability to excite. Thus, depending on one's own state and circumstances, certain drugs would be more desirable than others (Khantzian, 2007). As certain substances provide desirable states relevant to one's personal circumstances, the paraphernalia is largely irrelevant - it is the affect state the pharmacological substance delivers which is addictive.

A powerful motivator to continue substance use is the desire to constantly self-medicate. Anecdotal evidence has suggested that social phobics drink to alleviate the anxiety felt in social situations (Shepherd & Edelmann, 2007), but this may also serve to provide self-justification for drinking heavily. To explain this maladaptive cycle of events Khantzian (2007) writes that, 'dependence is tied intimately to an individual's attempt to cope with his or her internal emotional and external social and physical environment' and thus in the absence of any other coherent theory this psychoanalytic approach states that 'a person's ego organisation and sense of self-serve or fail the individual's attempts to cope..' (pg. 65). Resorting to substances is a means of dealing with everyday problems but ultimately it is not external forces which are creating addiction, but intra-psychical tensions. To this extent Khantzian (2007) also states 'some of the observed pathology in addicts is the result of drug use [including alcohol] and its attendant interpersonal involvements' (pg: 66). Thus, the causes of addiction can be vast and unclear, and not always a result of external forces and not necessarily because of problems with socialisation. Addiction may also be the result of poor self-regulation and medication, issues which go far wider than can be described here. Khantzian has also most importantly made the point that when an addicted client presents it can be difficult to tease apart the elements which have contributed to addiction and those which are the consequences of it.

Poor social skills may be an element in the driving force towards addiction but its connection as an exclusive force has little empirical weight. There are, however, many other elements which are worth briefly mentioning which may also compound one's susceptibility to addiction. For example, availability of substances remains a huge driving force, as does exposure, issues of mental health, and of course the natural desire and curiosity of drinking and drug taking. Reviewing 'inadequate' explanations for why people become addicted Booth-Davies comments 'such models are comforting in the short term, since they imply normal or adequate people do not take drugs. But this explanation overlooks some basic truths such as the fact that taking drugs is pleasurable and that by and large people who take drugs do so because they want to and because they like it, rather than because they are

forced into it by outside pressures' (1992: pg, 22-23). Importantly, there is no 'fixed truth' as to why any one person may become addicted and this research is not concerned with the causes of addiction. The research in this thesis is therefore well placed to investigate the consequences of alcoholism.

### 2.1.3 Poor social processing as a consequence of alcoholism

There is evidence to suggest that some poor social processing may be the *result* of alcoholism. This body of research suggests that through the pursuit of repeated intoxication the consequential neural damage caused is such that this has deleterious effects on socialisation. The main findings of this body of research suggest alcoholism and poor social cognition may be explained by –

Visuo-spatial deficits: The right hemisphere is accepted as playing a major role in visuo-spatial abilities and is also recognised as one fundamental area which experiences trauma from substance abuse. Misidentification of emotions may be because of poor cognitive processing which causes slow recognition and misidentification (Ellis & Oscar–Berman, 1989; Clark, Oscar –Berman, Shagrin & Pencina, 2007).

Abnormal processing of social information: As detected through slow response time and high rates of error in emotional processing tasks and a lack of inhibitory control. The frontal lobes are compromised in functioning because of substance abuse; their ability to mediate activity from the amygdala is minimal and thus possibly relates to a bias in exaggerating emotions (Duka & Townshend, 2004)

Interpersonal feelings of stress: Linked with abnormal processing. For various reasons, one's own stress may not be dealt with well and may be

compounded by sub-cortical damage, which may explain exaggerated or blunt responses to emotional stimuli (Philippot, Feldman & Coats, 2003).

The chapter has discussed the definitions of alcoholism as well as possible social precursors to alcohol misuse and its social consequences. The next chapter will discuss the relevance of social processing which will explore the contention that alcoholism causes social processing deficits.

## Chapter 3: Part One: Cognitive and Emotional Processing: Evidence.

### 3.1 A review of the evidence of the links between impaired social processing and alcoholism

If alcoholics are drinking in part due to social awkwardness, introversion, shyness, lack of self-confidence/esteem, i.e., maladaptive perceptions of how others see them (inferiority), then their continued drinking will be reinforced by both pre-existing social deficits and the psychopharmacological effects of alcohol.

The research discussed in this chapter highlights the deficits that alcoholics show in a range of social processing tasks. While the research to be discussed does not identify or evidence the reasons why any one person may drink it does highlight the range of social processing problems which are linked to alcoholism. It also makes suggestions as to the damaging effect this will have on their social abilities. Alcoholism may contribute to introversion amongst other social deficits but society does not appear to have any less of an expectation of the standards of social behaviour just because someone is an alcoholic. In fact, as has been argued in Chapter 1, throughout recovery there may actually be an increased expectation of alcoholics (by professionals) that they will engage in group treatments and be motivated by empathetic understanding and experiential learning.

In order to be 'successful' socially, we all need the ability to navigate through our social worlds, understanding the thoughts, feelings and perspectives of others (on both superficial and deep levels). Even our most basic daily interactions come with an expectation of how we should behave and what we expect or demand from others. Empathy, the ability to understand the mental and/or emotional state of others, requires the ability to process social information correctly; thus enabling successful and positive social interactions. Good social interactions are key to ensuring conflict resolution and fundamental to this is an ability to successfully manage oneself,

and one's environment. For alcoholics these sorts of successful social interactions may be instrumental in their reduction in drive to use alcohol as a coping mechanism. Apperly, Samson and Humphreys state humans' "unique aptitude for reasoning about mental states - known as Theory of Mind (ToM) - can help explain the unique character of human communication and social interaction. ToM has been studied extensively in children, but there is no clear account of the cognitive basis of ToM in adults" (2005; pg: 572). ToM may be compromised in adults who have experienced brain damage through accidents, organic lesions and disease. It may also be impaired by self-inflicted trauma – such as alcohol abuse (Evert & Oscar-Berman, 1995; Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003; Parsons, 1987). Research demonstrates that alcohol abuse in adults may compromise social processing and shows that basic emotion recognition tasks and estimation of emotional stimuli is impaired (Clark et al., 2007; Kornreich, et al., 2013; Maurage**,** Campanella, Philippot, Pham & Josain, 2007; Maurage Campanella, Philippot, Martin & de Timary 2008; Townshend & Duka, 2003b**).** This body of research asserts that impaired social processing and deficits in nonverbal communication play a crucial role supporting and maintaining the maladaptive coping mechanisms of alcoholics (Philippot, Kornreich & Blairy, 2003; as cited in, Philippot, Felman & Coats, 2003).

Figure 3.1 describes the relationship between alcoholism and social processing as suggested by many lines of research. It illustrates how alcoholic's social skills may be affected by diminished ToM/empathy caused through deficits in the understanding of emotional stimuli, namely, accurate identification, interpretation and evaluation of emotions in a range of contexts. The model proposes that alcoholism is related to cognitive deficits (shown above the other processes asserting a hierarchy of importance), which in turn is related to poor social skills, and therein diminished ToM and emotional accuracy. To date, there is no clear direction on how these elements are related to each other, only that alcoholism is associated with these impaired social functions. It is still an active research question how each one of these elements affects each other and to what degree these elements trigger continual alcohol drinking. The purpose of this model is to highlight the current school of

thought (as presented in the research in this thesis) on how alcoholism is detrimental to an alcoholic's ability to navigate their social world. Research by Uekermann, Channon, Winkel, Schlebush and Daum (2006) suggests these processing deficits may also be exacerbated by poor executive functioning. Similarly, research by Clark et al. (2007) provides evidence that chronic alcoholism and old age in alcoholism compounds the effects of social processing deficits that would naturally occur in older age non-alcoholics. What is absent from existing research is a coherent explanation as to the processes underpinning social skills deficits in alcoholics. It is the contention of this thesis that visual spatial perspective taking (VSPT) is a contributing factor, and the research herein aims to understand how automatic perspective taking may be linked to emotional processing.


Figure 3.1. The relationship between social skills, ToM and the processing of emotional stimuli.

### 3.1.1 The effect of impaired executive functioning on social processing and ToM

To date very little research has focused on alcoholics' understanding of empathy. Instead there has been a tendency to concentrate on the recognition

and evaluation of emotional stimuli only (Philippot, et al., 1999). There is good reason to believe that ToM and social processing may be affected by alcoholism because poor executive functioning (as identified in the literature on alcoholism) is associated with a lack of skill in the perception of affective stimuli (Clark et al., 2007; Moselhy et al., 2001; Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003, Philippot et al., 2003). The right hemisphere and frontal lobe hypothesis also suggests that certain social functions will become impaired in execution; for example, humour processing. One study which has made attempts to understand the possible relationship between ToM, social processing and the confounding effects of poor executive functioning caused through alcoholism is that of Uekermann, et al. (2006). They suggest that one way in which to understand *any* link between ToM and alcoholism would be to examine the effects of alcoholism on humour processing - which requires an understanding of another's mind in order to 'get' the joke. Understanding jokes often involves understanding what the characters within the joke are intending to do or say. Thus ToM is not only about understanding another's emotions, but also their thoughts and intentions (Apperly, 2010). Uekermann et al. (2006) have sought to expand upon research which shows patients with frontal lobe lesions have difficulty in social processing – specifically humour comprehension – similar to that of alcoholics who may also suffer damage to this region of the brain. Uekermann et al. (2006) aimed to discover whether poor ToM and poor humour comprehension would be significant distinguishing factors between alcoholics and non-alcoholics.

Fifty eight participants were tested by Uekermann et al. (2006). The alcoholic group consisted of 29 in-patients. For the assessment of humour processing a paper and pen task was utilized which was a modified version of a task used by Uekermann, Channon and Daum (2006). Participants were presented with a joke stem and were asked to choose one of a variety of endings. The correct processing of the funny punch line requires one to be able work through two stages. Firstly, to understand the incongruity of the other endings (incongruity detection), and secondly, resolution of the correct one (resolution). The four endings were the correct funny ending (C), a slapstick ending (funny but incorrect) (S), an illogical ending (I) and a logical, but

unfunny, ending (L). According to Uekermann et al. (2006), the slapstick ending reflects congruity only, and the logical and illogical answers represent resolution and incongruity respectively. Participants were also asked to rate how funny the ending of the story was on a four point scale – Not funny to Very funny and how funny each ending made the story. They were also asked to rate the logic of each ending on a four point scale. Two non-mentalistic questions were asked to gauge general comprehension. At the end the participant was presented with the correct funny punchline and three mentalistic questions which referred to the perspective of the Mother and the children, then the comprehension of the correct funny punchline. Participants were recorded and awarded scores for correct or partially correct answers by two judges.

**Example of joke**

It was Mother's day. Anna and her brother had told their mother to stay in bed that morning. She read her book and looked forward to breakfast. After a long wait she finally went downstairs. Anna and her brother were both eating at the table.

***Alternative endings***

Logical: Anna said ' Hi Mom, we didn't expect you to be awake so early'.

Slapstick: Anna picked up an egg and smashed it on her brother's head.

Illogical: Her brother said 'We have a new teacher at our school'.

Correct: Anna said 'It's a surprise for Mother's day. We cooked our own breakfast'.

***Non-mentalistic questions***

1. Were Anna and her brother at school?
2. Did Anna and her brother cook the evening meal?

***Mentalistic questions***

1. What did Anna's mother think when Anna told her to stay in bed?

2. Why did the children want their mother to stay in bed on Mothers day?

3. What did the mother think when the children said 'We cooked our own breakfast' (Uekermann et al., 2006)

The results revealed a significant difference between the alcoholic group and the control group for the number of correct funny punchlines – with the alcoholic group choosing fewer correct punchlines – 67.38% versus 90.94% respectively. This difference is further demonstrated by the significant difference in slapstick (S) and logical (L) endings chosen as answers by the alcoholic group 7.33% (S) and 23.81% (L) respectively, as compared to the control group who chose these two endings less than 5% of the time (or lower). Funniness ratings, as measured by rating each ending, were compared only for those who chose the correct punchline. However, this analysis also revealed a significant difference in the rating of the correct ending, the slapstick ending and the illogical endings which received lower funniness ratings from the alcoholic group. Thus this is an indication that the alcoholics did not perceive the joke to be as humorous as the control group albeit there is no evidence as to why this may be. However, it could be speculated that this is an indication of the neurological damage caused by alcoholism which has blunted the alcoholic's ability to process the complexity and perspective of humour. Thus this is more evidence of the blunted effect associated with alcoholism but demonstrated under new test conditions.

Results for the non-mentalistic questions also revealed a significant difference, with the alcoholic group offering fewer correct responses. Uekermann et al. (2006) attribute this difference to lack of comprehension skills in the alcoholics. Responses to the mentalistic questions revealed a significant difference also due to fewer correct responses being offered by the alcoholic group. With regards to executive functioning, the data produced by

the working memory element of the Wechsler Intelligence (1997) test revealed that the alcoholic group made more errors when reciting back letter and number sequences compared to controls. However, there was no difference between groups for the set-shifting test.

This study by Uekermann et al. (2006) highlights some possible key differences between alcoholic and control groups in their performance on this social processing task, and the relationship between their cognitive impairments and their social processing abilities. Their study has shown that alcoholics compared with controls are impaired with respect to *both* cognitive and affective elements of humour processing. Alcoholics demonstrated poor mentalising abilities (the ability to understand the world through the perspective of another) through their low funniness ratings and their lack of ability to choose the correct punchline and their poor performance on the working memory task. They suggest that poor executive functioning, such as poor working memory, may have an impact on the cognitive component of social processing and that poor mentalising skills may have an impact on the affective and cognitive element of social processing.

Uekermann et al. (2006) comment that these findings add to the literature supporting the hypothesis that participants with right hemisphere and pre-frontal cortex trauma experience a range of social processing difficulties, from basic to complex problem solving tasks within basic and complex social scenarios. Such research shows that the problems alcoholics face with social processing go beyond facial emotional recognition. Moreover, it shows that there are two routes that research might take to help understand the link between alcoholism and mentalising: 1) emotional understanding – i.e. what effect does alcoholism have on understanding another's emotions? 2) general comprehension, i.e. what effect does alcoholism have on ones capacity to understand the mental state of others**.**

In a more recent interview questionnaire study, Bosco, Capozzi, Colle, Marostica and Tirassa (2013) investigated ToM in adults with alcohol use disorder (AUD). Using the Theory of Mind Assessment Scale (THOMAS) they found that adults with AUD scored worse than controls when answering a

range of questions such as ‘Do you notice when others feel good? When does that happen? Can you give an example?’ On the basis of the answers provided to 39 questions such as this they argued that the ability to ascribe mental states is impaired in adults with AUD.

While these two studies suggest that social processing is somewhat different in alcoholics, it may be premature to suggest that alcoholics are unable to ascribe mental states to others given that no studies to date have directly assessed their ability to do so. However even if we accept the claim that alcoholics are impaired in their ToM processing, these studies only provide evidence for impairment in deliberate, conscious reasoning about mental states. They do not provide evidence that alcoholics are impaired in their ability to rapidly make ToM computations in real time – computations that are relevant to successful real life social interaction.

### 3.1.2 The effect of alcoholism on emotional facial recognition

When examining social processing and alcoholism, research has consistently focused on emotion recognition. One of the first and most cited studies was by Philippot et al. (1999) who investigated whether alcoholics present a deficit in the perception of emotional expression. They based their hypothesis on the following rationale:

- Deficits in communication can present very early in life and may be a driving force for drinking. Self-medicating with alcohol can be a comforter in socially intimidating scenarios and also a way of finding relief from isolation. This has already been discussed to some degree above (2.1.1-2.1.2).
- Positive social skills have been linked to positive treatment outcomes.
- An important role in interaction is understanding the state of others and being able to process this information effectively. Empathy therefore has a key role in successful and positive

> interaction. Alcoholics are confronted daily with varying levels of interpersonal problems which may not be dealt with efficiently and this may be a motivator for continued drinking.

Thus the importance of being able to understand emotion in others is a necessary social skill. The authors argue that in 'real-life', emotions are mostly expressed non-verbally and therefore it is crucial to be able to identify and understand this visual information.

To test this, twenty seven in-patients were recruited who met the DSM-III criteria for alcohol dependence. Participants were presented with photographs conveying facial expressions of happiness, anger, sadness, disgust and fear. Additionally the expressions varied in intensity from neutral, mild, moderate, to strong. Participants were asked to rate on a 7-point Likert scale the intensity of each expression.

The alcoholics' and the controls' ability to identify emotional expressions accurately and the correct level of intensity follow a similar pattern. However, the alcoholics made more errors, particularly in the case of identifying anger and disgust, which the authors describe as emotions of 'interpersonal interest' (emotions that are relevant to the alcoholic at the time and that they may be experiencing regularly) (See also, Kornreich et al., 2002). In terms of intensity ratings, alcoholics rated the faces as systematically more intense than controls across all expressions with the exception of happiness. The largest difference in intensity rating was that of anger. Duka and Townshend (2004) suggest that overestimates of facial emotions may be related to disruption with frontally mediated disinhibition processes that would usually 'rein in' hyper-emotional activity, resulting in an exaggerating bias.

The results of Philippot et al., (1999) suggest that alcoholics overestimate the intensity of emotional expressions and this effect is most pronounced when the valence of the face is mild to moderate. This strongly suggests - along with other research discussed throughout this chapter - that overestimation is a distinguishing factor which separates alcoholics from the non-alcoholic population. Moreover, the estimation or judgement of low

intensity emotion (the subtle end of social processing) appears to be where the problems of accurately gauging emotions begin for alcoholics. Two potential problems that Philippot et al. (1999) suggest alcoholics may face as a consequence of these deficits are firstly, that they will misinterpret the emotional expressiveness of those around them which may lead to an escalated reaction and, secondly, they may be more likely to misinterpret the intentions of those around them making them somewhat more vulnerable or more dangerous in response to others. Although speculative, such results and assertions suggest a need for more research into the consequences of social processing deficits and alcoholism.

Philippot et al. (1999) also found that alcoholics systematically rate faces as more intense, are less accurate at recognition, and fail to detect emotion in a range of presented stimuli as compared with controls. More recently, Kornreich et al. (2013) found that alcoholics are impaired in their ability to detect emotion in music compared with controls. Such research provides evidence that alcoholics do not *only* show abnormal processing of emotions in facial stimuli tasks *but also* in other socially relevant domains. Kornreich et al. (2013) suggest alcoholics exhibit 'general' deficits in the processing of emotional information which can start to be built into a model of alcoholism. The knowledge to date is very limited, therefore extending this research and employing new methodologies will create a better understanding as to the extent and depth of the problems that alcoholics face in emotional and social processing contexts.

### 3.1.3 Variations in presentation of emotional stimuli on alcoholics' performance in a social processing task

Social interactions are a mix of visual and auditory information and thus being socially competent should require skills in processing both. Given that alcoholics have previously been shown to have deficits in visual emotional recognition (Philippot et al., 1999), Maurage et al. (2007) researched the relationship between alcoholism and emotional facial expression (EFE). This is the first study within this field to present social

information to alcoholics cross-modally - visually *and* auditorily. Maurage et al. (2007) aimed to discriminate between these two recognition skills. Hence, Maurage et al's (2007) uni/cross-modal processing paradigm was designed to test participants' reactions to emotional information when presented aurally and/or visually. The expected result was that information presented cross-modally should enhance recognition of emotion as the information presented is enhanced by its volume and availability.

Twenty alcoholics undertook an emotion-detection task in which they were presented with faces and voices, presented separately (uni-modal conditions) or simultaneously (cross-modal condition). Two categories of faces and voices were used and varied in terms of emotional content (anger or happiness). In the cross-modal condition, faces and voices were always congruent.

Results for accuracy revealed an interaction effect between group and modality. This interaction occurred because alcoholics made more errors than controls in the visual detection task, but not in the auditory task. Alcoholics were also slower overall as compared to the control group. Moreover, results showed specifically that for *controls only* the cross-modal effect enhanced accuracy and speed of detection. Thus, for alcoholics the enhanced facilitation had no effect in improving their performance. In fact, further analysis comparing the alcoholics' performance for each modality showed that their cross-modal performance was significantly worse than their performance on the visual or auditory (uni-modal) tasks. Maurage et al. (2007) conclude that alcoholism has diminishing effects on the ability to understand/perceive EFE. Furthermore, they argue that studies based on uni-modal stimulations cannot adequately bring to light the problems that alcoholics face with emotional processing. They speculate that this cross-modal impairment may be one reason why alcoholics so often present with obvious impairments in their ability to process social/emotional information in treatment settings but that the use of uni-modal stimulation in experimental settings means that only mild deficits are detected. Such assertions call for more research on the extent of the deficits alcoholics face with social and emotional processing.

### 3.1.4 Speed of reaction and a test of object and facial recognition. Are alcoholics just slower to react to all stimuli?

Uekermann et al. (2006) showed that alcoholics are slower to react to general stimuli including those not concerned with social processing, such as working memory and inhibition (Stroop) tasks. Maurage, et al. (2008) also investigated whether deficits in EFE are specific to emotional features or a result of more general impairments caused by alcoholism which may lead to inaccuracy in visual and auditory tasks. In Maurage et al. (2008) the non-alcoholics and alcoholics completed control and experimental measures. The control measures consisted of basic visual object recognition and basic facial recognition tasks both of which included recording the alcoholic's reaction time to the images as they appeared singly on the screen. The experimental condition consisted of recognition of features of human faces – gender, age, race, and positive and negative emotion.

The results from this study by Maurage et al. (2008) showed, with regard to the control conditions, alcoholics' responses only differed significantly to that of the non-alcoholics' in the reaction time task in that the alcoholics were slower. In the experimental measures, alcoholics overall made twice as many errors as the non-alcoholic group when asked to accurately select the correct gender of the face. However, when asked to select from a choice of emotions alcoholics were more likely to select incorrectly the ones which corresponded to the face. Specifically, alcoholics made more errors when detecting negative emotion and female faces. With regards to reaction times, alcoholics were systematically slower to respond in all tasks. Most interestingly with regards to social processing and alcoholism, alcoholics in this study by Maurage et al. (2008) exhibited a reaction time (RT) cost to emotional stimuli over that of reacting to the non-emotional stimuli as measured by the gender, age and race questions.

In this study by Maurage et al. (2008) and in the earlier study by Uekermann et al. (2006) both sets of findings suggest that alcoholism is linked to a slower response to environmental stimuli and that this effect is more pronounced when a response to emotional stimuli is required. Moreover,

Uekermann et al. (2006) suggest that it is when alcoholics are required to respond quickly to complex facial expression that their deficits are especially highlighted as compared to non-alcoholics.

### 3.1.5 The effects of age and severity of alcoholism on making judgements to emotional stimuli

Clark et al. (2007) investigated the relationship between alcoholism and judgements of affective stimuli through two types of cues: faces (presented as drawings) and words. They also investigated the effect that the age of the participant would have on the ability to link facial and emotional information. They hypothesized that there would be a difference between the alcoholic group and the control group, believing that alcoholics would show more deficits in their ability to make judgments. Furthermore, Clark et al. (2007) predicted that within the alcoholic group there would a difference in judgments between younger and older participants, with older alcoholics showing the greatest deficits in judgments, due to a longer time of abusing alcohol which would cause greater cognitive impairments as well as the natural effects of aging compounding this. They also recruited alcoholic participants with Korsakoff Syndrome and separately investigated their ability on all tasks as compared to Non-Korsakoff alcoholics and non-alcoholics. They reasoned that alcoholic Korsakoff patients would demonstrate a greater inability than alcoholic non-Korsakoff patients in all tasks compared with controls. They argued that both linguistic and visual cues could be used in order to make a distinction between right hemispheric damage, which is mostly associated with visual processing, and left hemispheric damage which is associated with linguistic processing.

Results suggested that differences in judgment of intensity of expressed facial emotion (conveyed by drawings) and words were associated with chronic levels of alcoholism and related damage. Correlation analysis demonstrated that the greater the damage from alcohol the more exaggerated the intensity ratings were for both the visual and linguistic emotional cues. Results further suggested that age made no difference in intensity ratings for

the normal controls but for the alcoholic group intensity was more exaggerated in older participants, possibly implying that a longer life of drinking is associated with more sub-cortical damage. In their review on the evidence supporting brain dysfunction caused through alcoholism Oscar-Berman and Marinkovic (2003) concur there is some evidence to suggest that alcoholism accelerates the brain's natural aging process from the onset of abusive alcohol drinking. Moreover, Oscar-Berman & Marinkovic (2003) state that the evidence also supports the possibility that older adults (50+) are especially vulnerable to the cumulative effects of heavy alcohol consumption. The symptoms of this damage within the over 50 year old population (slow responses/recognition tasks) is disproportionably expressed because it is also this population that would through the natural ageing process also become slower and show more signs of error in cognitive tasks. However, consideration also needs to be given to the prospect that many years of not processing emotional stimuli, because of limited experience caused through possible social isolation and a limited range of social experiences may also have diminishing effect on social processing skills.

### 3.1.6 Areas for development: looking forward within this research area

The empirical research presented above suggests that alcoholics have problems with estimating the intensity of emotional stimuli, as well as delayed speed of reaction to emotional and environmental stimuli. The evidence shows that severity of alcohol abuse and age can exacerbate these problems (Clark et al., 2007; Oscar-Berman & Marinkovic, 2003; Oscar-Berman & Schendan, 2000). However, although the research presented in this Chapter provides consistent evidence that alcoholics experience problems when processing social and, moreover emotional information, there are questions which remain unanswered:

- During which part of the processing route do alcoholics start to encounter problems? Is this a problem with recognising emotions and being unable to discriminate between them, such

that it is a 'labelling error'? (Maurage, Campanella, Philippot, Charest, Martin, & de Timary, 2009). Or are the problems that alcoholics are encountering with processing emotional information only in the stages of evaluation/estimation?

- What impact does this poor ability of emotional recognition/estimation have on mentalisating abilities – ToM and/ or perspective taking?

- If impaired ToM processes do exist, is this an issue of understanding, or a problem with speed of reaction emotional stimuli?

- What are the automatic and non-automatic processes in identifying emotions, and which of these processes may be impaired in alcoholics?

- Would emotionally *relevant* information be less salient in the presence of *relevant* addiction cues? For example, would highly relevant social information, such as a fearful or threatening face be less relevant, or at the least remain unnoticed, if alcohol paraphernalia were simultaneously presented? Does one detract attention from the other and if so, what are the possible implications?

Although the above research has laid the foundation in helping us to understand that alcoholism, at least when severe, may lead to an inability to recognise emotions, other research is required. It is important to comprehend the extent to which further social processing tasks may also be compromised. Understanding this will not only help to understand social processing in greater depth, but will also contribute to an informed understanding of the risks of heavy drinking.

The next part of this chapter will provide an introduction to the relevance of perspective taking (a key aspect of ToM) and alcoholism and the need for further investigations in the wider field of social processing.

## Chapter 3: Part Two: Cognition and Emotional Processing. Theory of Mind and Perspective Taking.

### 3.2 The effect of alcoholism on perspective taking: The importance of ToM

Having a ToM allows one to understand and predict another person's behaviour based on their beliefs, desires and intentions. Showing empathy based on understanding others' emotional and mental states may lie at the centre of successful socialisation (Apperly, 2011; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). Traditional ToM research asks questions about our ability to make judgements of what another person might know, think or want. Research tends to focus on others' mental states, but in order to fully understand another person's intentions and behaviours, a more holistic perspective needs to be considered, - what another person might perceive, e.g., hear, taste or smell, or see (their visual persective of the world).

These processes of thinking about others are probably below the conscious level of awareness: we do not explicitly 'think aloud' while processing this information, but nonetheless, these discrete and automatic processes are considered important in our ability to process social information (Bargh, 1994). In order for our behaviour to be appropriate and relevant to the situations we are in, it helps if we are able to process social information quickly and accurately. From this view, understanding another person's visual perspective may help us to make choices within our interactions, because by seeing what another sees, and reacting to visual cues, we can add extra meaning to our conversations. Therefore, understanding another's visual perspective is one of many aspects of social and cognitive processing which aids competent socialisation (Qureshi, Apperly, & Samson, 2010).

In order to have a comprehensive understanding of social processing, research would benefit from looking beyond mentalising tasks alone such as asking participants to correctly identify emotions from facial expressions. Research needs to look towards what the participant is experiencing with

regards to senses, such as what they may be seeing. From here we can start to understand whether discrepancies in understanding others are due to errors in the processing of environmental information such as visual perspective-taking errors. The remainder of this chapter will present research on visual perspective taking and make the case for why this is of relevance in a understanding alcoholism and deficits in social processing.

### 3.2.1 Visuo-spatial perspective taking (VSPT) explained

Visuo-spatial perspective taking (VSPT) tasks require participants to accurately adopt another person's perspective – usually via an avatar on computer-based tasks. Level 1 VSPT may be described as the ability to adopt another's visual viewpoint, and understand the spatial arrangement of objects from another person's perspective. For example, a young infant aged 3-4 years old, who may lack sophisticated cognitive resources, may be able to understand the visual arrangements of objects from another person's perspective and give basic information about what the other person may be able to see, all done without reference to their own perspective (Flavell, Everett, Croft & Flavell, 1981). So, an infant sitting opposite an adult may correctly state that a toy between them is showing its other side to the adult. Another example in adult participants is when a dot probe briefly appears either side of an avatar and the participant is asked to make a basic decision about whether the dot appeared to the left or right of the avatar. When a dot appears above/below an avatar this is considered a perspective which is congruent to the viewer's own, that is because there is no conflict in perspective. What is above or below the avatar is the same for the viewer. However when a dot appears to the left or right of an avatar the brain automatically takes on both the visual perspective of the avatar and the perspective of the object in relation to its own position. In a study by Quereshi et al., (2010) participants accommodate the irrelevant viewpoint of an avatar even though they are instructed to ignore it, demonstrating that the brain automatically and effortlessly adopts perspectives of others even when we do not need to. The question remains: why? It could be argued that understanding

the world from another's perspective, even though irrelevant, is necessary for our own protection, or that simply this Level 1 perspective selection is undertaken because knowing what another sees facilitates our own social comprehension. Ultimately we do not know why we do this, or the meaning behind it, at this point in the research process what is known is that we automatically processes others viewpoints and that this is of social relevance.

It should be noted that VSPT is divided into two levels and Level 2 VSPT describes the additional process whereby one has the ability to see and state what another can see even though the others viewpoint may be entirely different to their own. Here, for example, the child needs to think logically about what the experimenter can see by evaluating the scene in front of them. This is a more cognitively effortful task.

There is a lack of agreement within the literature as to how VSPT is triggered. Some suggest that perspective taking is triggered by the mere representation of another human, as in objects which represent a human or more specifically, the presence of another mind (Abell, Happe, & Frith, 2000; Zwickel, 2009). Research such as Abell et al. (2000) and Zwickel (2009) infers that VSPT can be triggered in one person (the observer) by another person *or* object, as long as the conditions for agent representation are met. This would suggest that objects do not have to be human (triangles moving in human like ways have triggered VSPT; Zwickel, 2009) to trigger VSPT and it would also suggest that stimulus can be neutral– the significance of which is discussed more throughout this thesis. Contradicting this idea however is one study by Tversky and Hard (2009), their study shows that the presence of an agent or 'mind' was not enough to trigger VSPT and that more is needed. Their results suggest that a human action, such as reaching for an object, was also required (as also shown by Mazzarella et al., 2012).

To further explore the conditions under which VSPT is triggered Zwickel and Müller (2010) examined the possibility that VSPT could be triggered by emotion (namely fear). Indeed their results suggest that action in the sense of bodily movement is not required to trigger VSPT and that emotion (fear), which in itself could be considered an action, can also trigger

VSPT. Moreover their results suggest the presence of another mind is also not sufficient to trigger VSPT (neutral faces failed to trigger perspective taking), and that, VSPT is triggered by 'relevance' such as the emotion fear. What all this evidence seems to suggest is that we adopt another's visual viewpoint automatically – cognitively effortlessly – but that this effect is more robust when the stimuli around us are particularly salient (such as an action or an emotion).

### 3.2.2 VSPT and perceived emotion

Zwickel and Müller (2010) have shown that VSPT happens spontaneously in computer based tasks when the stimuli are particularly salient. In their task participants respond, reacting as quickly as possible, by pressing a selected key on a computer keyboard which corresponds to a dot probe which is shown for 500ms to the left or right of a fearful or neutral face (incongruent task), or above or below the neutral and fearful faces (congruent condition). Zwickel and Müller (2010) state that a slower reaction to the dot probe within the facial stimuli conditions is indicative of spontaneous VSPT, and that this would be more pronounced when the perspective differed from their own – incongruent condition – comparable to the congruent condition. Their results showed a reaction time (RT) cost only when the perspective of the face differed from their own, i.e., they were slower to respond to dot probe in these trials, and this RT cost was more pronounced when the face conveyed a fearful expression. The authors suggest that this RT cost to fearful faces demonstrates that the relevance of the face increases the likelihood of spontaneous VSPT and that because there was no RT cost between the neutral face and the baseline condition we cannot conclude that the facial stimuli itself was relevant enough to arouse VSPT.

### 3.2.3 Linking VSPT and alcoholism

The above studies were carried out with healthy participants, and in the research reported here we consider whether brain trauma caused through

injury, disease, or, specifically here, substance abuse may make visual processing tasks more difficult. To date, no known research has investigated the impact of alcoholism on VSPT. Alcoholism is believed to have detrimental effect on visuo-spatial abilities (Butters, Cermack, Montgomnery, & Adinolfi, 1977; Ellis & Oscar-Berman, 1989; Oscar-Berman & Marinkovic, 2003), mostly noted by longer reaction times compared to controls and also higher rates of errors across a range of socially relevant and intellectual tasks (Parsons, 1987; Uekermann, et al., 2006). For example, Maurage et al. (2008) showed that alcoholics, compared to controls, show deficits when processing complex facial stimuli, such as the detection of positive and negative emotions, where the alcoholics made nearly twice as many errors. Although the alcoholics were significantly slower to react to the stimuli, these inaccuracies still existed in the alcoholic group when speed of reaction was controlled for. More recently, it has been reported that because alcoholism causes visuo-spatial deficits (for a review see Bűhler & Mann, 2011; Moselhy, et al., 2001; Müller-Oehring, Schulte, Fama, Pfefferbaum, & Sullivan, 2009; Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003), this could be one contributing factor in alcoholics' impaired ability to process social information and especially the ability to recognise and evaluate emotions (Ellis & Oscar-Berman, 1989). From research on patients with alcohol-related brain damage, the effects of poor cognitive functioning on social and general processing tasks are well established (see Bűhler & Mann, 2011, for a recent review), but because social processing is not 'domain specific' (Apperley, et al., 2005), exact impairments caused through brain trauma and therefore substance abuse may vary across individuals and between aetiologies. How long-term alcoholism affects social processing is still very much unknown, because the scope for damage varies between individuals and the location of damage may vary.

In the next chapter Experiment 1 is introduced. This first experiment was designed to understand whether alcoholics' problems with social processing would extend to visual perspective taking. Moreover given alcoholics poor ability to process facial emotion, would this lack of skill interfere or hinder their visual perspective taking ability when a face conveys

emotion? The findings of Uekermann et al. (2006), Maurage et al. (2009) and Kornreich et al. (2013) have all shown that problems exist for alcoholics not only in decoding emotions of facial stimuli but also humour processing, bodily posture and prosody, and emotion in music. These three research examples provide the justification to extend the research area and understand what other areas of social processing may also be affected by alcoholism.

### 3.2.4 Rationale for the Thesis

The introduction to this thesis presented a review of the evidence suggesting links between impaired social processing and alcoholism. While the research discussed did not identify or evidence the reasons why any one person may drink it highlighted the range of social processing problems linked to alcoholism. Research demonstrates that alcohol abuse in adults may compromise social processing and shows that basic emotion recognition tasks and estimation of emotional stimuli are impaired (Clark et al., 2007; Kornreich, et al., 2013; Maurage**,** et al., 2007; Maurage et al., 2008; Townshend & Duka, 2003b**).** This body of research asserts that impaired social processing, and deficits in nonverbal communication, play a crucial role supporting and maintaining the maladaptive coping mechanisms of alcoholics (Philippot, Kornreich & Blairy, 2003; as cited in, Philippot, Felman & Coats, 2003). This literature presented highlights the damaging effect that alcoholism has on social functioning and how this may further impact on treatment outcomes**.**

The aim of this thesis was to understand the effect that alcoholism has on a specific social process, namely, VSPT. The reason for choosing VSPT as opposed to any other social-cognitive process is there is evidence that alcoholics show visual spatial deficits in non-social tasks. Furthermore, it has been shown that alcoholics have deficits in processing emotional facial stimuli. It is possible therefore that VSPT is a contributing factor to the deficits in emotional processing. As stated in Chapter 2, this thesis does not seek to explore the antecedents to alcoholism, therefore the assumption

underpinning the experimental conditions is that deficits in VSPT would be a '*consequence'* of alcoholism.

The aims of this thesis are to:

- Understand the effect of alcoholism on an important social processing task, namely, VSPT.
- Explore how alcoholism effects VSPT (if at all)
- Understand the impact of emotion on VSPT in alcoholics

The experimental trials in this thesis (Experiments 1,2,3,5) utilised the VSPT procedure developed by Zwickel and Müller (2010). The reason for choosing their procedure as opposed to any other VSPT procedure is that theirs is a more parsimonious experimental design that captures data on both VSPT *and* emotion, (unlike many other VSPT experiments).

# Chapter 4

## 4.1 Experiment 1: Understanding the Impact of Alcoholism on VSPT

All human beings require the ability to clearly navigate through their social worlds, to understand the thoughts, feeling and intentions of others. This human aptitude for reasoning about mental states is known as ToM and has been studied extensively in children and more recently in adults and patients with brain damage (Apperley, 2010 for a review). Having a ToM allows one to understand and predict another person's behaviour based on their beliefs, desires and intentions. We can reason about others mental states in a slow deliberate fashion, for example, when considering the motives of a suspected criminal in a court of law, but it is also important that we are able to process social information quickly without much cognitive effort in real time social interactions.

ToM may be compromised in adults who have experienced brain damage through accidents, organic lesions and disease. It may also be impaired by alcohol abuse (Evert & Oscar-Berman, 1995; Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003; Parsons, 1987). While research has demonstrated that alcohol abuse in adults compromises social processing, such as the recognition and evaluation of emotional stimuli (Clark et al., 2007; Kornreich, et al., 2013; Maurage et al., 2007; Maurage et al., 2008; Townshend & Duka, 2003b**)**, very few studies have directly investigated the relation between alcohol abuse and ToM.

Uekermann et al., (2006) investigated the relation between ToM and alcoholism through the study of humour processing – they reasoned that one needs to understand another's mind in order to 'get' the joke. They found that humour processing was worse in alcoholics compared to non-alcoholics, especially in their ability to answer mentalistic questions regarding the joke scenario.

In a more recent interview/questionnaire study, Bosco et al., (2013) investigated ToM in adults with alcohol use disorder (AUD). Using the Theory of Mind Assessment Scale they found that adults with AUD scored worse than controls when answering a range of questions such as '*Do you*

*notice when others feel good? When does that happen? Can you give an example?*' On the basis of the answers provided to 39 questions such as this they argued that the ability to ascribe mental states is impaired in adults with AUD.

While these two studies (and those reported in greater depth in Chapter 3) suggest that social processing is somewhat different in alcoholics, it may be premature to suggest that alcoholics are unable to ascribe mental states to others given that no studies to date have directly assessed their ability to do so. However, even if one accepts the claim that alcoholics are impaired in their ToM processing, these studies only provide evidence for impairment in deliberate and conscious reasoning about mental states. They do not provide evidence that alcoholics are impaired in their ability to rapidly make ToM computations in real time – computations that are relevant to successful 'online' social interaction. Thus the aim of the present study was to investigate such processing in alcoholics as well as non-alcoholics.

One such task used to investigate this processing was a visual perspective taking task devised by Zwickel and Müller (2010). They reasoned that a key feature of understanding the mental state of another is in the ability to represent the world from their viewpoint.

In their computerised task participants had to respond to a dot probe which was shown for 500ms to the left or right of a fearful or neutral face (incongruent perspective conditions), or above or below the neutral and fearful faces (congruent perspective condition). Participants had to respond if the dot was on the left or right of the screen, as they saw it. The authors suggested that a slower reaction time (RT) to make the left/right judgement in the incongruent condition, compared to the other conditions was indicative of spontaneous VSPT. A baseline trial displayed blank rectangle instead of a face. It was found that there was indeed an RT cost when the perspective of the dot probe differed from their own and this cost was more pronounced when the face conveyed a fearful expression as opposed to a neutral expression. Zwickel and Müller (2010) concluded that the presence of a fearful face elicits automatic taking of the 'other' perspective in a visuo-spatial perspective taking task.

To date, no known research has investigated the impact of alcoholism on VSPT even though alcoholics show deficits in visuo-spatial abilities. Non-alcoholics show rapid engagement with visual stimuli, whereas alcoholics show a delayed response to visual stimuli and this may affect emotional perception (D'Hondt et al., 2014; Butters, Cermak, Montgomnery, & Adinolfi, 1977). Alcoholics are also notably impaired when processing complex facial stimuli e.g., ratings of emotional faces and facial decoding (Maurage, et al., 2008).

Given the findings from the two ToM studies with alcoholics, and the larger number of studies reporting problems processing emotionally charged stimuli, it may be suggested that alcoholics would also be impaired in their ability to consider the perspective of another. Using an adapted methodology from Zwickel and Müller (2010), Experiment 1 investigated whether alcoholism has any effect on visual-spatial perspective taking (VSPT).

To measure VSPT alcoholics were recruited via a charity funded treatment service within the South East of England and compared to non-alcoholics (staff from the treatment service centre) - this distinction was further made by using a questionnaire to identify problematic alcoholic drinking. VSPT was measured by reaction time responses to neutral and fearful faces – a black rectangle acted as a baseline control measure. Stimuli were congruent or incongruent with the perspective of the participant, i.e., if the dot probe was presented to the left/right of the face this was incongruent with the participants perspective, but if presented above/below the face then this was congruent with the participants perspective. A significant adaption between the Experiments within this thesis and Zwickel and Müller's (2010) is that within these experimental trials participants were not asked to observe or identify the gender of the facial stimuli. This is because the correct identification of the gender of the faces was not in question or of interest in this experiment, there is no evidence in the literature that this may be impaired within alcoholic populations. Secondly, having participants answer the gender questions adds a considerable length of time on to the experimental trials which may affect alcoholics' motivation, perseverance, attention and ultimately their performance.

### 4.1.1 Aims of the Experiment

This study aims to assess alcoholics undertaking VSPT. The results show that VSPT occurs spontaneously when the dot probe is presented incongruently with the participant's own perspective and this effect is more robust when the face is conveying fear. Zwickel and Müller (2010) found no significant difference in reaction times to the dot probe between the baseline and neutral face conditions but there was a difference in reaction time between neutral and fearful faces and this difference was most pronounced when the face conveyed fear. Thus for this experiment, in line with the findings of Zwickel and Müller (2010), VSPT was expected to occur when the dot probe was incongruent to the participant's perspective, and furthermore when the face was conveying fear.

In Experiment 1 the effect of alcoholism on VSPT is being investigated. This first experiment proposes the question, are alcoholics impaired in automatic perspective taking? If so, can this be added to a growing number of social tasks that alcoholics show differences in their abilities to as compared to non-alcoholics?

## 4.2 Method

### 4.2.1 *Participants*

Twenty non-alcoholic and 20 alcoholic participants were recruited as volunteers to take part. The groups did not differ significantly in age (alcoholic $M$ = 40.82, $SD$ = 13.65, non-alcoholic, $M$ = 40.10, $SD$ = 12.58, $t$ (42) = .18, $p$>.05) or gender as both groups consisted of 10 men and 10 women. Two of the alcoholic participants were of British Indian origin and three of the non-alcoholics participants were of British Black Caribbean origin; the remaining participants in both groups identified themselves as White British. The alcoholics were recruited via a charity funded treatment centre in the South East of England, all of the non-alcoholic participants were staff members (clinicians or administrational) of the same service centre.

The alcoholic participants were alcohol free at the time of testing as assessed by their key-worker using a breathalyser test. The breathalyser measures a Blood Alcohol Content (BAC), a reading of 0% was necessary for this experiment indicating that no alcohol had been recently consumed.

No participants reported current poly-drug use, dependence on other substances or psychiatric or neurological disease. However, data was not collected to ascertain whether controlled substances had been used in the past, or whether this was problematic. This is because it was considered unethical to collect data which has no bearing on the interpretation of the experimental results; furthermore, it could be argued that alcoholic samples across the literature will encounter participants with a history of drug use. No alcoholic participants were in withdrawal at the time of taking part, or currently on any medication relevant to aiding withdrawal symptoms. All participants were of British origin. The groups differed on their Fast Alcohol Screening TEST (FAST : NICE, 2002), alcoholic participants, $M$=9.95, ($SD$ = 4.13), non-alcoholic, $M$ = 1.19, ($SD$ = 2.10). This difference was significant $t(42) = 8.16$, $p<.001$.

### 4.2.2 *Apparatus and Stimuli*

Stimuli were presented on a Toshiba laptop with a 19" computer screen (85-Hz refresh rate) positioned 50cm in front of the participants (Zwickel and Müller, 2010). Also, as used by Zwickel and Müller (2010), 12 male and 12 female grey-scaled faces with hair removed and presented against a black rectangular background (4" in width x 6" in height) were used. The remainder of the screen was white. Twelve of the faces conveyed a fearful expression and 12 a neutral expression (see Figure 4.1). A black rectangle which was the same size as the facial stimuli acted as a baseline control.

All participants were asked to complete the four question FAST (NICE, 2002), a simple audit designed to detect problematic drinking. This audit was included to further differentiate the non-alcoholic and alcoholic sample. The purpose of this questionnaire is to detect alcohol misuse in a variety of healthcare screenings. The administration time is less than 20 seconds. The test consists of four questions (Appendix D), and the minimum score possible is 0, the maximum is 16. Reliability has been reported at (alpha = 0.77) and test retest reliability (after one week) at $p>.08$ (Health Development Agency, HDA, 2002). The reason for choosing this

questionnaire by which to differentiate the alcoholic participants from the non-alcoholics was that it is easy to understand, fast to complete, asks no personal questions which may have affected participants desire to take part in the experiments. The computer based trials in the experiments within this thesis are timely (20 minutes), and therefore, the researcher had to give extra consideration to the time allowed for other pieces of data collection and signing of consent forms.

Within the experiments in this thesis participants were asked to complete *all* the questions in the FAST, and not, as instructed to stop at Question 1. This is because if the answer to Question 1 indicates frequent drinking then this information should be referred to a health advisor, however, in the case of this thesis no health information was going to be offered over and above what the alcoholics are receiving in their treatment. Similarly, non-alcoholics were not to be offered health advice on their drinking. For example, in an alcoholic participant had stopped at Question 1, this would have skewed their scores negatively and therefore this measure would not serve as a good measure by which to differentiate the groups.

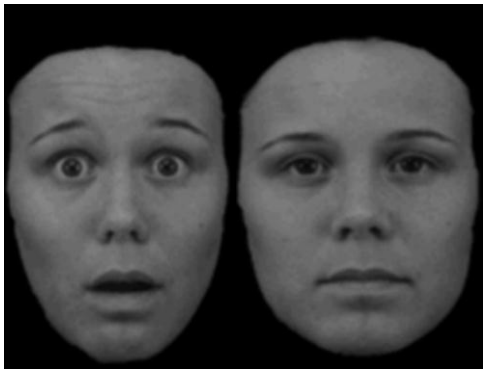

Figure 4.1: Examples of the facial stimuli used in Experiment 1: The same female face conveying fear (left) and a neutral expression (right).

### 4.2.3 *Design and Procedure*

Experiment 2 is a 3-way mixed design, there are three independent variables the first is a between subject variable, Group, with two levels,

(Alcoholics and Non Alcoholics), and two within subject variables, Perspective with two levels (Congruent and Incongruent) and Stimulus type with three levels (Fearful, Neutral and Baseline). The dependent variable was measured by RT to the stimuli.

All participants were initially greeted and then asked to take a breathalyser test to ensure they had not consumed alcohol before taking part. Instructions were given verbally to ensure all instructions were understood clearly and then participants were given a chance to ask questions about the trials if necessary. A copy of the verbal instructions given are shown in Appendix J. Trials were randomised with half of participants in the alcoholic and non-alcoholic group completing the FAST audit before the trials and the remainder after. Participants were asked to sit at a desk and asked to keep both hands fixed on the keyboard of the laptop in front of them to ensure that they could respond quickly and accurately. They were asked to respond to a dot probe which was presented to the left/right or above/below facial (experimental) or rectangle (baseline) stimulus. The left/right response indicated a perspective that was incongruent with the participants own, and the above/below response measures a response that was congruent with the participants own perspective. Participants were reminded that as well as responding to the location of the dot, they were to also note the emotion of the face. Ten practice trials were immediately followed by the experimental conditions. Trials started with the presentation of the stimuli and 500ms after was followed by a dot probe that appeared for 35ms only, and measured .5° in diameter. Reaction time was recorded from the onset of the dot probe. For the incongruent condition the dot appeared 1° to the left or right of the face/rectangle, and for the congruent condition 1° above or below the face/rectangle. During the baseline condition the dot also appeared for the same time and within these dimensions but the stimuli was a black rectangle instead of a face. Participants were asked to respond as quickly and as accurately as possible, pressing ‘s’ to indicate left, and ‘k’ for dots on the right, ‘t’ for those at the top, and ‘b’ for the bottom.

The test trials were pre-randomised into blocks of 12, consisting of: faces with the dot probe presented incongruent with the

participant's perspective; faces with the dot probe presented congruent to the participants perspective; and the baseline condition (rectangle) with a dot probe also appearing congruent or incongruent to the participant's perspective. Within the experimental condition, half the faces conveyed fear and half a neutral expression. There were a total of 144 trials.

### 4.2.4 Ethics

Ethical clearing for the experiments within this thesis was received by both London Metropolitan University and the treatment service centre which was used to recruit participants. The treatment service centre wished to remain anonymous. In line with American Psychological Associations (APA) guidelines, British Psychology Society (BPS) and London Metropolitan University's guidelines all participants' anonymity was protected throughout the experimental procedure and analysis. Participants were free to withdraw at any time during or after the experimental trials. Participants were known to the researcher by participant number only; only consent and debrief forms contained participants names and date of experimental trial. The researcher (Sharon Cox) encouraged participants to ask questions and verbally reiterated that all data will be treated confidentially and that participation was voluntary. All participants receiving therapy for alcoholism were additionally informed that taking part in these experiments was not part of their treatment program. (See Appendix I, for Ethics Application).

## 4.3 Results

### 4.3.1 *Analysis of the test conditions.*

It should be noted that the data were analysed differently within the VSPT experiments in this thesis as compared to Zwickel and Müller's study. Zwickel and Müller's (2010) calculations analysed the differences between the gender variable and the emotion variable – the gender variable was not included here. Furthermore, they also presented their data using a box plot

whereas the data throughout this thesis is presented as bar charts. Bar charts were considered the most eloquent manner in which to display the RT of two participants groups across three trials. Furthermore bar charts were the clearest way to show the disparity between the neutral and fearful RT's both between and within the participant groups. With the exception of these differences all other analysis remained the same.

Reaction times are summarised in Figure 4.2. Alcoholics responded slower than non-alcoholics in all the experimental conditions. There was a trend for slower responding in the incongruent than congruent conditions for neutral and fearful faces but not baseline stimuli. Reactions times were analysed in a 3-way mixed ANOVA with Stimulus type (Neutral, Fearful, Baseline) and Perspective (Congruent, Incongruent) as the within-participants factors and Group (Non-Alcoholic, Alcoholic) as the between-participant factor. There were main effects for Stimulus type, $F(2,84)=60.01$, $p<.001$, $R^2=.589$, Perspective, $F(1,84)=67.77$, $p<.001$, $R^2=.617$, and Group, $F(1,42)=24.82$, $p<.001$, $R^2=.371$. Interactions were then analysed using a difference score, a method which was also used in Zwickel and Müller's (2010) study. This method subtracts the congruent RT from the incongruent RT to give RT value which can be used when analysing the difference between the stimulus type. Higher RT values indicate a greater delay in responding to incongruent than congruent stimuli.

### 4.3.2 *Analysis of the RT difference score*

The effect of Perspective taking was measured by calculating a difference score between the Congruent and Incongruent conditions (Figure 4.3). These difference scores were analysed in a 2-way mixed ANOVA with Stimulus type (Neutral, Fearful, Baseline) as the within-participants factors and Group (Non-Alcoholic, Alcoholic) as the between-participant factor. There was a main effect for Stimulus type, $F(2,84)=27.94$, $p<.001$, $R^2=.339$, but no effect of Group, $F(1,42)=2.74$, $p=.105$. There was a significant interaction between Stimulus type and Group, $F(2,84)=3.95$, $p=.023$, $R^2=.086$.

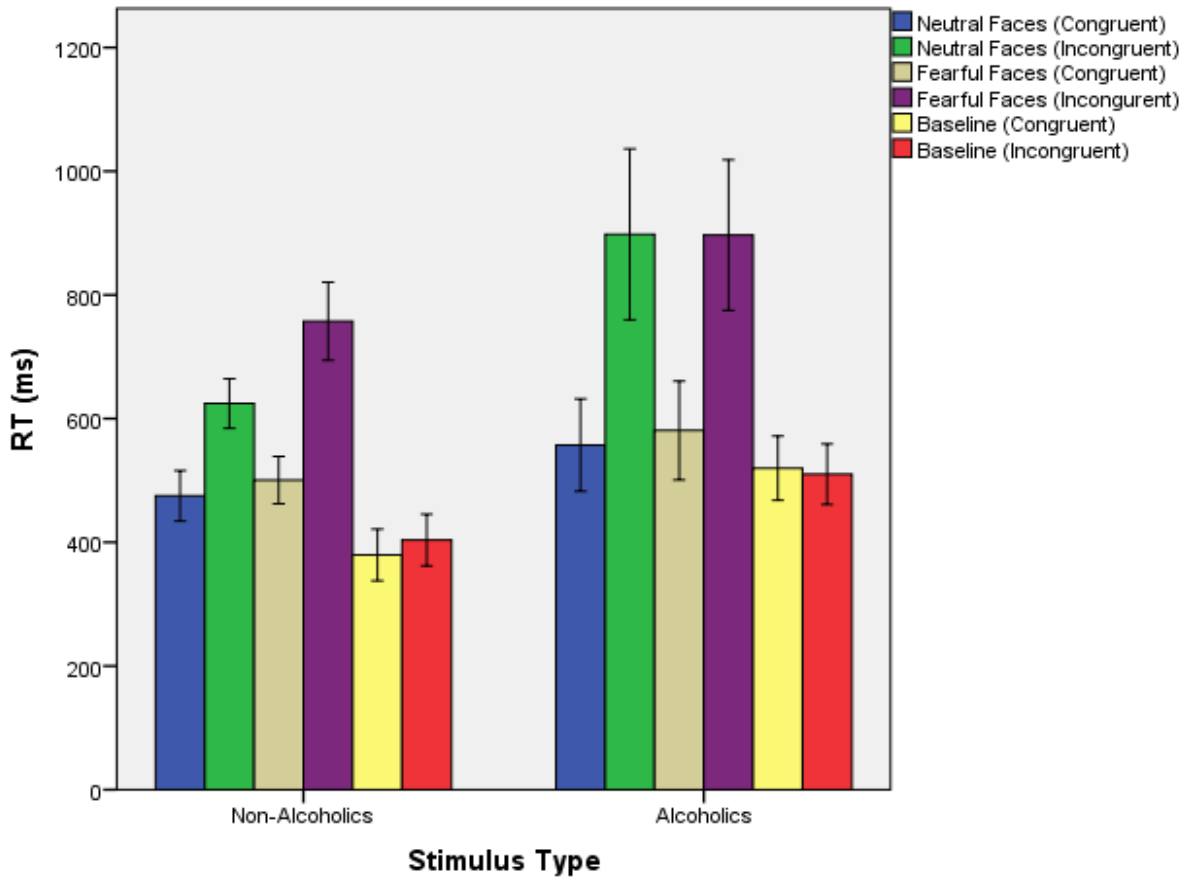


Figure 4.2: Mean RT to neutral, fearful and baseline stimuli by perspective for both non-alcoholics and alcoholics. Bars represent the 95% confidence interval.

### 4.3.3 *Analysis of the perspective*

To understand the main findings further analysis was conducted; the perspective effects were analysed using RT and not difference scores. A perspective effect was observed for both neutral (Non-Alcoholic, $t(21)=6.09$, $p<.001$, 95% CI 98 to 200ms; Alcoholic, $t(21)=4.79$, $p<.001$, 95% CI 179 to 489ms) and fearful faces (Non-Alcoholic, $t(21)=6.09$, $p<.001$, 95% CI 98 to 200ms; Alcoholic, $t(21)=5.83$, $p<.001$, 95% CI 203 to 429ms) but not the baseline stimuli (Non-Alcoholic, $t(21)=0.76$, $p=.455$; Alcoholic, $t(21)=0.30$, $p=.783$). The interaction occurred because for Non-Alcoholics the effect of Perspective taking was significantly greater for Fearful than Neutral faces ($t(21)=2.99$, $p=.007$, 95% CI 32 to 183ms), but for Alcoholics the effect of

Perspective taking was as strong for Neutral as for Fearful faces ($t(21)=0.40$, $p=.692$).

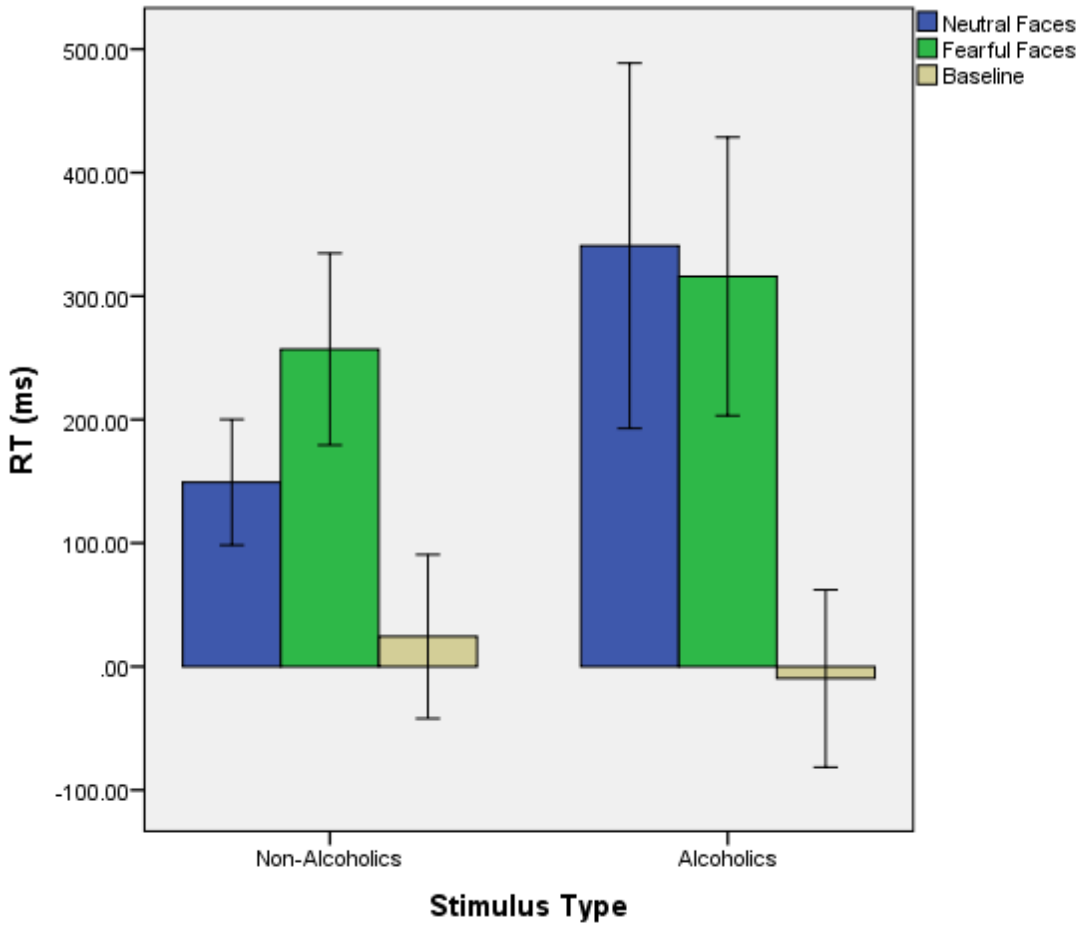


Figure 4.3: Mean RT as calculated by the difference score to neutral, fearful and baseline stimuli for non-alcoholics and alcoholics. Bars represent the 95% confidence interval.

## 4.4 Discussion

### 4.4.1 Main findings summarised

The aim of Experiment 1 was to investigate the effect of alcoholism on VSPT. Previous research has suggested that alcoholism affects social processing (Clark, et al., 2007; Maurage et al., 2008; Philippot et al., 1999; Uekermann, et al., 2005; Uekermann et al., 2006). Specifically there have been suggestions that impairments in social processing may be linked to deficits in visuo-spatial processing (Bűhler & Mann, 2011; Ellis & Oscar-Berman, 1989; Moselhy, Georgiou, & Kahn, 2001; Müller-Oehring et al., 2009). We also know that VSPT plays an important role in social processing. To date, there has been no research investigating the link between alcoholism and perspective taking, and therefore the aim of this research was to investigate whether alcoholism affects VSPT.

### 4.4.2 Non-Alcoholics' performance in the experimental and control conditions of Experiment 1

With regard to the non-alcoholics the findings are consistent with those of Zwickel and Müller (2010) who found that responses were delayed in the incongruent conditions. Thus this data adds to the growing body of evidence supporting the view that VSPT is cognitively automatic. Unlike Zwickel and Müller (2010) though, the non-alcoholics showed a perspective RT cost in the neutral as well as the fearful conditions. Non-Alcoholics also showed an increased RT to neutral faces over the baseline condition (as shown by the difference score), which is a deviation from Zwickel and Müller's (2010) study. At this point in the experimental process the reasons for this are not clear. However, there was no RT cost in the baseline condition and thus the effect in the experimental conditions cannot be attributed to a left/right response being more difficult to process than an above/below one.

With regards to RTs to the emotional valence of the facial stimuli – the element of this experiment which is regarded as having a social value – the groups' RTs did not differ significantly from each other or between conditions

when the perspective was the same as their own. The non-alcoholics strongly showed a delayed response to fearful faces, and only when the perspective was different to their own. This is evidence therefore that the emotion conveyed by the face delays the participant's response as they are adopting the face's viewpoint and acknowledging the emotion.

Overall, both groups were faster within the experimental trials within this experiment compared with the participants from Zwickel and Müller's (2010) study. This *may* be attributed to – but not fully explained by – the fact that this experimental design is a simplified version of their study. Within their study they also asked participants to observe and indicate the gender of the face, because participants were not instructed to do this within this experiment this may cause them to process the faces more rapidly, without the need to show accuracy in the gender task.

### 4.4.3 Alcoholics' performance in the experimental and control conditions in Experiment 1

Alcoholics' RTs are partly consistent with the findings of Zwickel and Müller (2010). Alcoholics' RT responses were delayed in the incongruent conditions as compared to the congruent conditions in the experimental trials. However, unlike Zwickel and Müller (2010) but consistent with the non-alcoholics in this experiment, the alcoholics also showed a perspective RT cost in the neutral as well as the fearful conditions. Alcoholics did not show a perspective RT cost in the baseline condition and thus the effect in the experimental conditions cannot be attributed to a left/right response being more difficult to process for alcoholics than an above/below one. Once more, it is not clear why these results may differ from Zwickel and Müller (2010).

The adults with alcoholism showed a significant difference between their RTs to baseline and facial stimuli and a significantly delayed reaction time in the incongruent condition compared to the baseline and congruent conditions. There was therefore no deficit in VSPT. However, what appears most significant is that, unlike the non-alcoholics, the alcoholic group showed

no *extra* stimulus RT cost to fearful faces. Thus the salience of the emotion made no difference to the reaction time towards the stimuli for the alcoholic group. This finding adds to the evidence that alcoholics show a general deficit of emotional facial processing (Maurage, Campanella, Philippot, Charest, Martin & de Timary, 2009). Why might this be the case? One possibility is that fearful faces are extremely and overbearingly salient to the alcoholic participants. So much so, that their presence creates a carry-over effect onto the neutral stimuli, so that all stimuli are perceived as more emotionally charged. Another possibility may be that all the faces, irrespective of their emotion, are highly salient for alcoholics and that the mere presence of a face is enough to create a delayed response in conditions where there is a requirement to adopt another's perspective. What this may suggest is that faces alone are highly salient, or that neutral faces are perceived as more 'emotionally charged' than non-alcoholics might otherwise see them.

### 4.4.4 Alcoholism and emotional processing

An exaggerating bias towards emotional faces has been reported before. Philippot et al. (1999) note that faces conveying neutral, moderate and weak expressions were rated as more intense by alcoholics than their control participants. Moreover, this deficit appeared to be specific for negative emotion. Also, alcoholics in their study also misinterpreted emotional expressions to a greater extent than their control participants. These errors of misinterpretation were again specific to negativity. The authors note that alcoholics were more likely to interpret a happy face as negative and, most importantly, these participants were not aware of their errors in interpretation. Clark et al. (2007) also report that alcoholics rated drawings and emotional words across valences as more intense than non-alcoholics and suggest that these processing deficits may be attributable to brain damage caused through alcoholism. Clark et al. (2007) made this analysis by comparing results with other clinical groups who suffer neurological dysfunction such as Parkinson's Disease, post-traumatic stress disorder or schizophrenia.

The overall delay in responding in the alcoholic group compared to the non-alcoholics is not unusual and supports previous evidence of a general lack of speed of detection to stimuli associated with alcoholism (Cox et al., 2002; Evert & Oscar-Berman, 1995; Maurage et al., 2007; Maurage et al., 2008; Sharma et al., 2001; Wegner, Gunthner, & Fahle, 2001). Substance abuse over a significant period, which may result in some brain damage, will invariably lead to slower cognitive and motor responses to external stimuli, and consequently this can be detected in a range of tasks. Such findings are in line with the theory of Uekermann et al. (2006) that alcoholism is linked to a general RT delay to environmental stimuli but that this effect may be more pronounced in the presence of emotional stimuli.

Experiment 2 aimed to understand the effect that fearful faces may have had on the alcoholic participant's responses to neutral faces. Experiment 1 has shown that alcoholics show no extra RT to fearful over neutral faces and the reasons why this may have been the case has been discussed above. In the next experiment fearful faces were removed from the experimental conditions to measure whether this would have an impact on alcoholics' responses to the neutral faces. Removing fearful faces from the experimental trials would enable control for the carry over effect and explore alcoholics' bias in identification of emotion.

# Chapter 5

## 5.1 Experiment 2: The need to account for fearful faces as a possible confounding variable

Results from Experiment 1 suggested that alcoholics showed no specific deficits in VSPT, compared to non-alcoholics. VSPT seemed to occur spontaneously when the perspective differed from their own. However, alcoholics' reactions to the emotional valence of the stimuli differed from that of the non-alcoholics. As with Zwickel and Müller's study (2010), the non-alcoholics showed that VSPT was triggered when the facial expression was fearful. This process of triggering VSPT shown in the first study is taken as an indication that this stimulus is socially relevant. As Zwickel and Müller (2010) state, a fearful facial expression is a socially relevant stimulus and hence the recognition and relevance of these stimuli creates a reaction time (RT) cost which is detected through longer response times to these faces. However, in Experiment 1, it was found that alcoholics showed no *extra* RT cost for fearful compared to neutral faces when the perspective of the face was different from their own. The question remains, why might this be the case?

One possibility may be that the alcoholics perceived all the faces presented as emotionally charged. This is plausible given that studies by Philippot et al. (1999), Maurage et al. (2009) and Kornreich et al., (2013) report that alcoholics rate neutral and moderate emotional stimuli as more intense than their non-alcoholic participants. Perhaps the current exaggerating bias in this study is being replicated under the conditions of VSPT. This would suggest that faces *per se*, as opposed to emotional faces only, are relevant for alcoholics and that the mere presentation of any face is enough to trigger VSPT. Thus, this adds to the evidence that alcoholics perceive neutral/moderate social stimuli as more intense than they actually are. Alternatively, fearful faces may be perceived as so extremely relevant by alcoholics that this creates a 'carry-over effect' - the extra RT to neutral faces is actually the result of the processing of the fearful stimuli**.**

The term ‘carry-over effect’ effect refers to the continual processing of one stimulus even when it is no longer in the viewer’s presence. This continual processing of one stimulus may interfere with the ability to process or acknowledge even concentrate on other stimuli. In this regard, carry-over effects are thought to occur when we have been presented with a stimulus which is highly salient to us. In the case of emotional processing, evolutionary psychology would suggest that a fearful or threatening face is highly relevant for our protection. Therefore, when presented with one stimulus which is necessary for us to attend to this causes a cognitive bias, which means our concentration is shifted towards the processing of this information at the expense of other environmental information. In terms of alcoholism for example, a study by Sharma et al., (1996) has shown that alcoholics demonstrate carry-over effects when presented with alcohol related stimulus and are therefore slower to respond to pictures which are presented subsequently (this has also been found in heroin addicts suggesting this behaviour is associated with addiction as opposed to substance specific, Waters et al., 2005). Such research may be a useful point of reference for this work, because it may explain that alcoholics within Experiment 1 are overly attending to the fearful faces and this causes interference (delayed RT) in the processing of neutral faces. Such findings are also found in anxiety disorders (Williams, Watts, MacLeod & Mathews, 1997). However why fearful faces may cause carry-over effects within alcoholic samples is unknown.

### 5.1.1 Automatic perspective taking and neutral stimuli

Zwickel and Müller’s (2010) study provided evidence that automatic visual perspective taking was triggered by facial stimuli and this effect was more robust when the facial stimuli were fearful. However in their study, automatic VSPT was also more delayed in the neutral incongruent face condition as compared to the baseline (rectangle) trials. What this means is that emotion is not necessarily a requirement for perspective taking, but when emotion is presented it does make a perspective effect more robust. Within Experiment 1 non-alcoholics showed an extra RT cost to fearful over neutral

faces which would indicate the social relevance of fearful faces for this group. However, even though non-alcoholics showed an extra RT cost to fearful over neutral faces this does not mean that neutral faces were not relevant or meaningful to this group. At the same time, because alcoholics gave equal amounts of attention to both neutral and fearful faces in Experiment 1 this may not mean that both sets of faces are equally relevant to this group.

Essentially, the results from the previous experiment seem to suggest that Level 1 VSPT (being able to identify another's visual viewpoint) is triggered spontaneously and automatically to a stimulus which is not conveying emotion. At this point in the experimental process what is known is that neutral stimuli can trigger VSPT but the meaning or motivation behind this process is not understood.

The reasons for the discrepancy between the findings of Zwickel and Müller's (2010) study and the findings in Experiment 1 are not clear; however, there are two possible, yet contradictory explanations for this finding. The first is that VSPT is only triggered in response to a facial or (human) bodily stimulus, supporting the findings of Experiment 1 but not those of Zwickel and Müller (2010). The second as Mazzarella, Hamilton, Trojano, Mastromauro & Conson, (2012), would suggest is that the mere presence of an actor is *not* enough to trigger perspective taking, but that an action is also required to trigger a participant response, such as the fearfulness expressed in the faces in Experiment 1 and Zwickel and Müller's (2010) study. Findings like Mazzarella et al. (2012) along with the ones in Experiment 1 provide evidence that neutral stimuli can trigger spontaneous VSPT albeit under experimental conditions under which are unclear as evidenced by contradictory and inconsistent research findings.

To address the difference between the findings of Zwickel and Müller's (2010) study and those of Experiment 1, Experiment 2 asks, would a perspective taking effect still be observed in the neutral condition by both the alcoholics and the non-alcoholics in the absence of fearful faces? To explore the possibilities that fearful faces are confounding the results or that the effect observed in the neutral condition were a chance finding, the previous

experiment was replicated without the fearful faces being included. Therefore any perspective effect to neutral faces can be attributed to the relevance of neutral faces only, and not because the fearful faces are causing a carry-over effect and slowing processing time. Once again baseline and congruent conditions were included thereby allowing assessment of any differences in RTs are likely due to VPST and the processing of the facial stimuli.

However, once more, the gender trials were not included in this experiment. As with Experiment 1, this experiment is not concerned with gender recognition in this clinical sample. Only performances within the VSPT trials are being explored.

## 5.2 Method

### 5.2.1 *Participants*

Twenty non-alcoholic and 22 alcoholic participants were recruited as volunteers. However, 2 of the alcoholic participants were excluded because of outlying RT (+SDs above the mean). The groups did not differ significantly in age (alcoholic $M$ = 42.55, SD = 15.92, non-alcoholic, $M$ = 38.60, ($SD$ = 12.82), $t$ (38) = 8.64, $p$>.05) or gender as both groups consisted of 10 men and 10 women. All of the participants identified themselves as White British. The alcoholic participants were alcohol free at the time of testing as assessed by their key-worker using a breathalyser test. The breathalyser had to give a reading of 0% BAC, showing that no alcohol was present in the participant's system at the time of taking part in this experiment.

No participants reported poly-drug use, dependence on other substances, psychiatric or neurological disease. No alcoholic participants were in withdrawal at the time of taking part, or currently on any medication relevant to managing withdrawal symptoms. All participants were of British origin.

The groups differed on their FAST (NICE, 2002), alcoholic participants, $M$ = 7.65, ($SD$ = 4.52), non-alcoholics, $M$ = 2.00, ($SD$ = 1.67). This difference was significant $t(38) = 5.29$, $p < .001$.

### 5.2.2 *Apparatus and Stimuli*

Stimuli were presented on a Toshiba laptop with a 19" computer screen (85-Hz refresh rate) positioned 50cm in front of the participants (Zwickel and Müller, 2010). Also as used by Zwickel and Müller (2010), 12 male and 12 female grey-scaled faces with hair removed were presented against a black rectangular background (4" in width x 6" in height). The remainder of the screen was white. All of the faces conveyed a neutral expression (see Figure 4.1). A black rectangle which was the same size as the facial stimuli acted as a baseline control. All participants were asked to complete the four question FAST (NICE, 2002).

### 5.2.3 *Design and Procedure*

Experiment 2 is a 3-way mixed design, there are three independent variables the first is a between subject variable, Group, with two levels, (Alcoholics and Non Alcoholics), and two within subject variables, Perspective with two levels (Congruent and Incongruent) and Stimulus type with two levels (Neutral and Baseline). The dependent variable was RT to the stimuli.

All participants were initially greeted and then asked to take a breathalyser test to ensure all they had not consumed alcohol before taking part. Instructions were given verbally to ensure that instructions were fully understood, participants were then asked if they had any questions regarding the instructions (Appendix J). Trials were randomised with half of participants in the alcoholic and non-alcoholic group completing the FAST audit before the trials and the remainder after. Participants were asked to sit at a desk and asked to keep both hands fixed on the keyboard of the laptop in front of them

to ensure that they could respond quickly and accurately. They were asked to respond to a dot probe which was presented to the left/right or above/below facial (experimental) or rectangle (baseline) stimuli. The left/right response indicated a perspective that was incongruent with the participants own, and the above/below response measured a response which is congruent with the participants own perspective. Five practice trials were immediately followed by the experimental conditions. Trials started with the presentation of the stimuli and 500ms after was followed by a dot probe that appeared for 35ms only, and measured .5° in diameter. Reaction time was recorded from the onset of the dot probe. For the incongruent condition the dot appeared 1° to the left or right of the face/rectangle, and for the congruent condition 1° above or below the face/rectangle. During the baseline condition the dot also appeared for the same time and within these dimensions but the stimuli was a black rectangle instead of a face. Participants were asked to respond as quickly and as accurately as possible, pressing 's' to indicate dots to the left, and 'k' for dots on the right, 't' for those above, and 'b' for the below.

The test trials were pre-randomised into blocks of 6, consisting of: faces with the dot probe presented incongruent with the participants perspective; faces with the dot probe presented congruent to the participant's perspective; and the baseline condition (rectangle) with a dot probe also appearing congruent or incongruent to the participant's perspective. Only neutral and baseline trials were presented. There were a total of 96 trials.

## 5.3 Results

### 5.3.1 *Analysis of the test conditions*

Reaction times are summarised in Figure 5.1. Alcoholics appeared to respond slower than non-alcoholics in the experimental condition, but further analysis below shows that this was not significant. Reactions times were analysed in a 3-way mixed ANOVA with Stimulus type (Neutral, Baseline) and Perspective (Congruent, Incongruent) as within-participants factors and Group (Non-Alcoholic, Alcoholic) as the between-participant factor. There

were main effects for Stimulus type, $F(1,36)=117.76$, $p<.001$, $R^2=.766$, Perspective, $F(1,36)=20.82$, $p<.001$, $R^2=.366$, but not for Group, $F(1,36)=2.76$, $p = .105$. Interactions were then analysed using a difference score (Zwickel and Müller, 2010).

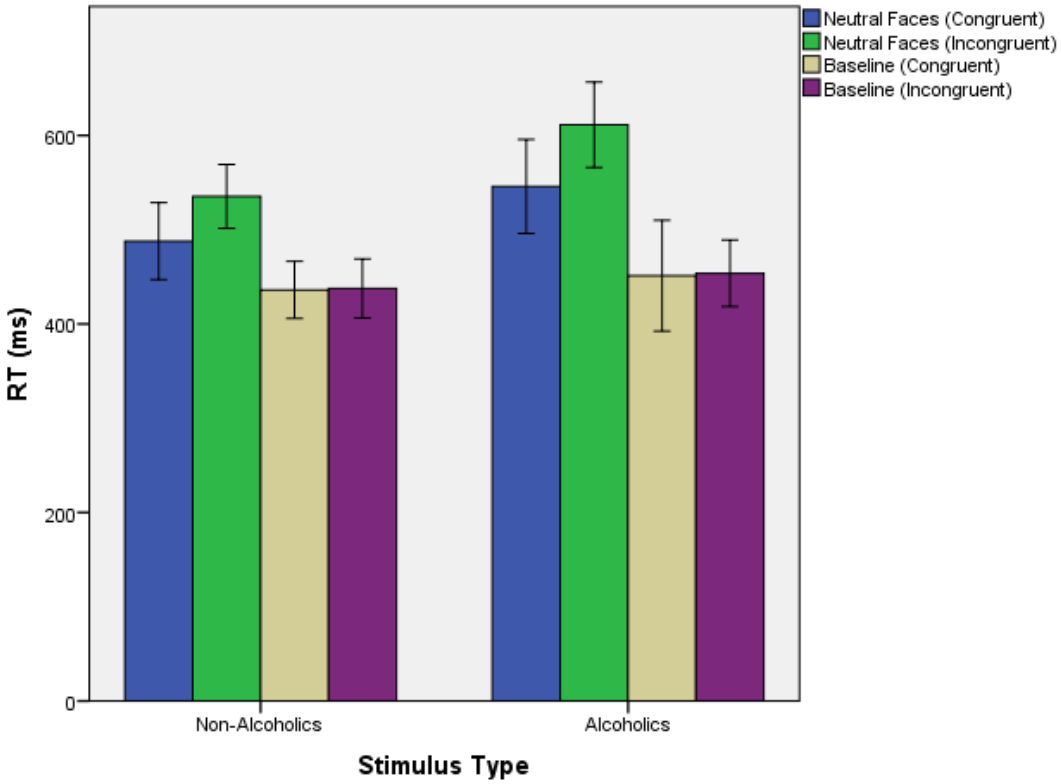


Figure 5.1: Mean RT to neutral and baseline stimuli by perspective for both non-alcoholic and alcoholics. Bars represent the 95% confidence interval.

### 5.3.2 *Analysis of the RT difference score*

The effect of Perspective taking was measured by calculating a difference score between the Congruent and Incongruent conditions (Figure 5.2). These difference scores were analysed in a 2-way mixed ANOVA with Stimulus type (Neutral, Baseline) as the within-participants factors and Group (Non-Alcoholic, Alcoholic) as the between-participant factor. There was a main effect for Stimulus type, $F(1,36)=16.33$, $p<.001$, $R^2=.312$, but no effect

of Group, $F(1,36)=.537$, $p=.468$. There was no significant interaction between Stimulus type and Group, $F(1,36)=.394$, $p=.394$.

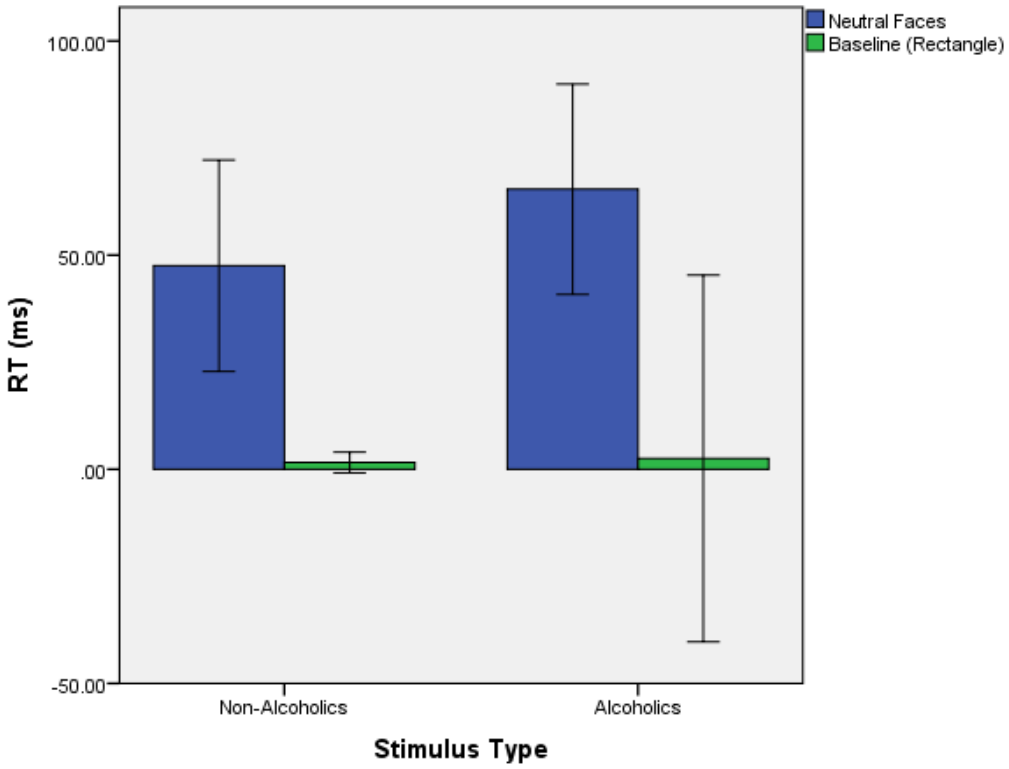


Figure 5.2: Mean RT as calculated by the difference score to neutral and baseline stimuli for both non-alcoholics and alcoholics. Bars represent the 95% confidence interval.

### *5.3.3 Analysis of the effect of perspective*

The effect of perspective was not analysed by the difference score but the RTs to the test conditions. A perspective effect was observed for the neutral (Non-Alcoholic, $t(18)=4.05$, $p<.001$, 95% CI 22 to 72ms; Alcoholic, $t(18)=5.60$, $p<.001$, 95% CI 40 to 89ms) but not the baseline stimuli (Non-Alcoholic, $t(18)=1.37$, $p=.189$, 95% CI -4 to -849ms; Alcoholic, $t(18)=.124$, $p=.903$, 95% CI 45 to 40ms). Thus there was only a delayed reaction to Left/Right responses in the neutral face condition. Collapsed between the perspective conditions there was also a further RT cost to neutral stimuli over

baseline stimuli for both groups (Non-Alcoholic, $t(18)=3.86, p=001$, 95% CI 21-71; Alcoholic, $t(18)=2.60$, $p=.018$, 95% CI 21-114).

## 5.4 Discussion

### 5.4.1 Summary of the main findings

Experiment 1 found that both groups showed a perspective effect to neutral and fearful faces. Additionally, in alcoholics there was no extra RT cost to fearful faces over neutral faces. Fearful faces were then removed from the trials in Experiment 2. The aim of removing fearful faces was to observe whether a perspective effect in the neutral condition would still be present.

A perspective effect in the neutral condition was significant for both groups and thus, this study has shown that VSPT is triggered automatically in the presence of neutral facial stimulus and that emotion is not a requirement. This finding differs from Zwickel and Müller (2010). Moreover, there was no perspective effect in the baseline condition showing that the delayed response to the left/right judgments in the neutral face condition is due to the relevance of the stimuli and not because incongruent perspective selection is a more difficult task. Once more, both the alcoholics and the non-alcoholics showed a delayed response to neutral faces over the baseline condition, which is inconsistent with the findings of Zwickel and Müller. It would be speculative at this stage in the experimental process to make suggestions as to why this might be the case. However, although this finding does differ from their original experiment it does confirm and replicate the findings from Experiment 1. It may be argued that this difference in findings is due to a methodological change in the experimental trials (removing the gender trials), but for now, there is no rational explanation as to why the removal of the gender trials would cause VSPT to be triggered by neutral faces. To address the fragility of VSPT trials across the research area and to highlight differences in findings more shall be discussed below and in the wider discussion (Chapter 10) as to why this may be the case.

### 5.4.2 Perspective taking

Perspective taking has not always been found under the conditions that Zwickel and Müller (2010) propose. A study by Loranzo, Hard and Tversky (2007) also showed when an actor moved or when participants were asked a question regarding the actor's perspective this triggered spontaneous VSPT. However, a percentage of the participants took the actor's perspective without such prompts. In Zwickel and Müller's (2010) study participants did not exhibit a RT cost in the neutral condition. This further highlights the lack of consistent explanations for the triggers of VSPT. Tversky and Hard (2009) found that one quarter of participants took an actor's perspective in a visual self/other perspective selection task without a verbal cue and in the presence of neutral stimuli. In the same study, however, the effect of allocentric perspective taking (taking another's perspective) was greatly pronounced when the actor was shown reaching for a book suggesting that action promotes automatic perspective taking.

### 5.4.3 Alcoholism and perspective taking

Taken together, the experiments presented in this thesis thus far, have shown that when another's perspective is regarded as similar to our own then this extra processing cost is effortless. However, what is questionable is why it is important to explore this apparent phenomenon. VSPT informs social comprehension in as much as the speeds at which people assimilate information in their environment points to what is salient in *that environment* for *that individual* (Tversky, Lee & Mainwaring, 1999). Linking VSPT, social processing and alcoholism, what these first two experiments appear to show is that alcoholics' speed of RT to neutral and fearful faces as compared to non-alcoholics cannot be explained by either a heightened salience to the stimulus or alternatively a complete disregard for it. Thus alcoholics' delayed RTs are not necessarily indicative of greater relevance of the stimuli to the population group as it would be for non-alcoholic populations.

In fact, in Experiment 2, alcoholics were systematically slower to respond to the neutral faces as compared with non-alcoholics, but this was not significant. Thus as within Experiment 1 alcoholics show no evidence of any deficit in VSPT. Furthermore, executive resources (presuming that alcoholics' executive resources are impaired as compared to non-alcoholics') can be limited for this type of perspective taking. This suggests that although alcoholics may suffer brain damage as a consequence of their drinking, it may not affect their VSPT abilities as it has been reported to affect other socially relevant tasks (Oscar-Berman & Marinkovic, 2003; Uekermann & Daum, 2008).

It was suggested within the discussion of Experiment 1 (see 4.4.3 – 4.4.4) that alcoholics in Experiment 1 were showing a greater RT cost to both neutral and fearful faces when the perspective was in conflict with their own because: (a) fearful faces were perceived as highly salient and this causes a carry-over effect when processing preceding stimuli which is represented by a delay in response to neutral faces; and (b) all faces regardless of emotion are highly salient to alcoholics and hence both sets of stimuli caused a RT cost. From the results of Experiment 2 it is not the case that fearful faces are causing a processing cost/carry-over effect for alcoholics. Why both groups show a RT cost in the neutral condition has been somewhat addressed and will be discussed later in more detail.

### 5.4.4 Conclusion

The next two experiments aim to understand why alcoholics showed no extra RT cost to fearful faces over neutral faces in Experiment 1. Experiment 3 aims to understand if anxiety is a confounding variable. The links between alcoholism and anxiety will be presented in more depth in Chapter 6, but there are many social (lifestyle/poverty/relationships) and physiological reasons (Gamma-aminobutyric acid – GABA – potentiating/withdrawal/depression) why alcoholics frequently experience episodes of anxiety. Furthermore, studies on anxiety and attentional bias in anxious participants are known to attribute too much attention to mild and

moderate emotional stimuli detected through rapid detection and gaze fixation, and a defining feature of anxiety is hyper vigilance of threat to mild/moderate stimuli (Williams, et al., 1997). Anxiety sufferers are also known to regard mild/moderate negative stimuli as similar to highly negative stimuli (Wilson & MacLeod, 2003) – as may be the case for alcoholics in Experiment 1. It had not been considered in the outset of this thesis that anxiety needed to be included in the experimental design but due to the results of Experiment 1 it is now being considered. Experiment 4 will ask both the alcoholics and the non-alcoholics to rate the intensity of the faces shown in these experiments as this would give an indication as to whether alcoholics perceive the neutral faces differently to the non-alcoholics and differently from the fearful faces

# Chapter 6

## 6.1 Experiment 3: Investigating anxiety as a potential confounding factor

Experiment 1 demonstrated that both fearful and neutral faces trigger spontaneous perspective taking. What was unexpected was that alcoholics also demonstrated no further RT cost to fearful faces. Experiment 2 showed that for both groups taking the perspective of another whose perspective is incongruent to your own is still delayed in the presence of neutral stimuli only. Given the uniqueness of these findings consideration needs to be given to possible confounding variables.

### 6.1.1 Cognition and affect states: how internal states can affect what we choose to see

It was Milgram (1970) who first suggested that in busy environments there is no possibility of being able to process all the visual information that one encounters. A way to avoid unnecessary processing of irrelevant information is to selectively attend to what is most salient. That is, our attention is focused on the stimuli which are most relevant to our lives, that which we consider beneficial to us and that which we feel most threatened by. This selectivity is automatic and effortless, although at the same time is reflective of our own needs, thoughts and feelings. Scherer (1984) makes the distinction between the emotional and cognitive processes that are evoked when processing relevant stimuli. He states that there are always five points to look for when considering these processes: 1) motivation, 2) physiological activation, 3) motor behaviour, 4) subjective feeling state, and 5) cognitive processing of stimuli.

These five processes are demonstrated by alcoholics who exhibit preferential attention to alcohol cues in their environment over that of non-alcohol related stimuli (Cox et al., 2002; Cox et al., 2003; Faradi & Cox, 2009; Field, 2005; Jones & Bruce, 2006; Munafo & Albery, 2006; Robinson & Berridge, 2003; Sharma et al., 2001; Tiffany, 1990). This body of research

has shown that alcoholics, similar to other addicts, demonstrate greater motivation towards seeking alcohol-related stimuli, become physiologically aroused, change/redirect their behaviour and this is in response to relevant alcohol cues which are congruent to their affect state (Khantzian, 2007; Tiffany, 1990; Robinson & Berridge, 1993). Most of what we seek out and selectively attend to in our environment is dependent on our physiological and emotional needs, and it is safe to say that if we have maladaptive needs then we will attend to stimuli which will support these needs. Thus negative affect states and erroneous cognitions – both of which occur frequently in addicts – are maintained through this process of seeking, seeing and feeling.

A healthy response to threat and negativity is anxiety (Williams, et al., 1997; Wilson & MacLeod, 2003). Anxiety creates a response to threat which serves to protect us. From an evolutionary perspective, a hyper vigilance to threatening stimuli serves to protect us from danger, and this sense of and rapid detection of danger is considered to be a trait which has remained strong throughout evolution (Gilbert, 2001; Wilson & MacLeod, 2003). What is considered abnormal is when stimuli which are not threatening are afforded attention and fear which is disproportionate to its threat content (Lees Mogg & Bradley, 2005; Mogg, Garner & Bradley, 2007; Wilson & MacLeod, 2003). Research on affective disorders (including phobias) shows that highly anxious participants (where their anxiety levels are clinically defined as abnormal) are more likely to selectively attend to visual stimuli which they perceive as significant in terms of threat for longer and with a fast rate of detection (see Williams et al., 1997 for a review of the literature). Generalised anxiety disorders are characterised by excessive worry and irrational thoughts about everyday things which are usually disproportionate to the actual source of the fear (DSM-IV, 1994). Anxiety sufferers' attentions are focused on sources of threat even if this threat level is low, because any level of threat would be regarded as salient for one's protection. This hyper-vigilance in turn serves to maintain and exacerbate the symptoms of anxiety (Williams, et al. 1997).

Studies have confirmed that anxious individuals are more likely than controls to be sensitive to all levels of threat and this is marked by a lower perceptual threshold for threatening/negative stimuli, and a hyper-vigilance of

this stimuli (Calvo & Avero, 2005; Mogg, McNamara, Powys, Rawlinson, Seiffer, & Bradley, 2000). As shown using dot-probe tasks, highly anxious populations react faster to the dot which is presented in the place of threatening stimuli compared with neutral stimuli (Holmes, Bradley, Kragh, Nielsen, & Mogg, 2009; Mogg et al., 2000; Williams et al. 1997). Whereas anxious participants are likely to disengage from neutral stimuli fairly quickly they will stay fixated upon negative stimuli (Lees, et al., 2005; Mogg et al., 2000; Williams et al., 1997). A study by Mogg, et al., (2007) found that highly anxious participants had similar trends in orienting their gaze towards both fearful and angry faces compared to controls. What this study shows is that the stimulus does not have to be just threatening to hold the attention of anxiety sufferers, but generally negative, or at least perceived as negative. We also know that depression and anxiety can mean that patients have a negative memory bias for recalling negative facial stimuli over positive faces (Rohner, 2004). In another study by Tan, Ma, Gao, Wu and Fang (2011) anxious participants showed an inability to disengage from fearful stimuli and, particularly for male participants, an avoidance of fearful stimuli.

More interesting is that anxiety sufferers who have shown attentional biases to neutral stimuli and mildly negative stimuli have also exaggerated the emotional valence of neutral stimuli, perceiving it as much more intense than the control groups (Mogg et al., 2000; Williams et al., 1997; Wilson & MacLeod, 2003). This research suggests that one distinct difference between how those with and without anxiety process relevant information is their perception of all levels of emotional valence.

In Experiments 1 and 2 the main finding was that alcoholics as compared with the non-alcoholics showed a delay in attention to neutral as well as fearful stimuli and that it was suggested that the RT cost may be due to the faces being perceived as more intense/emotionally charged. Kornreich et al. (2013), Maurage et al. (2009) and Philippot et al., (1999) all found that alcoholics showed a tendency to overestimate emotions at mild and moderate levels. It is now essential to clarify whether the previous results of Experiments 1 and 2 are due to differences in alcoholic populations or anxiety.

There are several reasons to suppose that anxiety may have been responsible for the data obtained so far:

- Anxiety sufferers demonstrate enhanced selective attention to mild/moderate stimuli of interpersonal interest
- Anxiety sufferers have a low attention bias threshold for negative stimuli and/or
- Anxiety sufferers rate mild/moderate facial stimuli as more intense than perceived by control groups

### 6.1.2 The co-morbidity of anxiety and alcoholism

With regards to the research in this thesis, the relationship between problems in social processing and anxiety is important. It could just be taken as coincidence that affective disorders are all perhaps characterised by a heightened awareness of socially relevant stimuli. Given the complexities which surround both issues it does become difficult to differentiate organic mental health issues from that of self-inflicted substance abuse. By their psychoactive nature drugs and alcohol induce many of the conditions/symptoms that one would find in many psychiatric disorders, including anxiety. Throughout chronic alcoholism the brain experiences many changes in neurotransmitter activity. Through continual heavy alcohol drinking GABA levels are potentiated (meaning an increase in inhibition) and the brain can become sensitive to its sedation (Oscar-Berman & Marinkovic, 2003). However, eventually, repetitive chronic alcohol use means that the numbers of GABA receptors are reduced. Upon withdrawal (which alcoholics may experience regularly depending on in/voluntary abstinence) decreased inhibition and a deficiency in GABA receptors means that the brain experiences 'over excitation', which in turn increases psychological feelings of anxiety, and physiological symptoms of sweats and bodily tremors (Oscar-Berman & Marinkovic, 2003). Together these symptoms cause an unpleasant state of arousal which may drive an alcoholic to alleviate through continual drinking, or to be aided through by use of prescribed Benzodiazepines (which facilitate GABA activity) by a healthcare professional.

The prevalence of the comorbidity between alcohol and anxiety is complex and unclear. At the heart of this complexity is the direction of the cause-and-effect relationship. Undoubtedly whether one drinks because of one's anxiety or one's drinking causes anxiety will vary from person to person and many would probably agree that this cannot be generalised. Unsurprisingly, the empirical literature lacks professional consensus on these matters. However alcoholics that suffer with anxiety are more likely to seek treatment and be seen by health professionals because of their mental health needs; hence this has helped to identify the relationship between the two (Tambs, Harris & Magnus, 1997).

However, there are some significant points in this relationship which highlight both its common occurrence and a need for exploration within the context of this thesis:

- Affective disorders and anxiety disorders can predict the risk of harmful drug and alcohol use (Liang & Chikritzhs, 2011).
- Alcoholics are likely to experience severe and acute symptoms of anxiety during periods of withdrawal and abstinence related to their stressful living conditions (Schuckit & Hesselbrock, 1994).
- Alcohol exacerbates anxiety and phobias, and therefore symptoms become heightened and furthermore, anxiety is maintained through continued drinking.
- Alcohol treatment patients often present with a history of poly-drug use, namely a history of being prescribed anti-anxiety medication, most commonly, Benzodiazepines.
- Chronic alcohol abuse can cause neurobiological changes within the areas of the brain which are associated with anxiety and stress recovery, such that chronic and intermittent doses of ethanol can remodel the prefrontal cortical neurons and disrupt fear extinction processes. Hence alcoholism may increase one's likelihood of anxiety sensitivity and impaired recovery from stressful events, as is in the case in post-traumatic stress (Holmes et al., 2012; this recent study was

conducted on mice so any association with human recovery is speculative).

It is worth noting that Kornreich et al. (2013), did control for anxiety within their study on alcoholism and the processing of faces, words and music (and by using Analysis of Covariance ANCOVA). In their findings anxiety had no effect on the alcoholics' impaired processing, although this study by Kornreich et al (2013) does provide evidence that others have also felt the need to account for its possible effects.

Experiment 3 aims to clarify whether the results of Experiments 1 and 2 are representing the effects of alcoholism on VSPT and not that of anxiety. Research has shown that there is a robust correlation between anxiety and attention to salient stimuli and, vitally, is still robust even when the stimuli are neutral or mild. This experiment therefore aims to understand whether anxiety is confounding the results of Experiments 1 and 2, and whether the co-morbidity of alcoholism and anxiety needs greater exploration within the research area.

To test this, the same conditions as Experiment 1 will be replicated, but this time with the inclusion of the State Anxiety Inventory (STAI: Speilberger, Gorsuch & Lushene, Vagg, & Jacobs 1983). This is an effective measure for both state and trait anxiety and is currently used with research and clinical work, including the studies named above. For the purpose of this experiment the state measure of anxiety will be used. The rationale for measuring state anxiety and not trait anxiety is that participants are required not to be on psychotropic medication, as this medication could interfere with the RT in these experimental trials, possibly confounding the results, (e.g. the sedative effects of benzodiazepines). Trait anxiety increases the likelihood that participants would be taking prescribed medication of this type. Furthermore, the aim of Experiment 3 is to understand whether alcoholism effects VSPT. Therefore it seems appropriate that a simple measure of state anxiety is sufficient in order to control for the possible effects of anxiety on VSPT.

As per the literature presented within this chapter it is expected that anxiety will be related to a delayed RT to both the fearful and neutral faces, meaning that faces regardless of emotion would be salient for those who score highly on the state anxiety measure. Therefore a positive correlation is expected between RT's to the facial stimuli and score of the STAI.

## 6.2 Methods

### 6.2.1 *Participants*

Twenty two non-alcoholic and 22 alcoholic participants volunteered to take part. The groups did not differ significantly in age (alcoholic $M$ = 42.91, SD = 12.22, non-alcoholic, $M$ = 42.36, SD = 8.99, $t$ (42) = .18, $p$>.05) or gender as both groups consisted of 11 men and 11 women. Two of the alcoholic participants identified themselves as Black British Caribbean, and 18 as White British. All of the non-alcoholics participants described themselves as White British. The alcoholic participants were alcohol free at the time of testing as assessed by their key-worker using a breathalyser test. Participants had to breathe into the breathalyser for a timed period. The results had to read 0% BAC to indicate that no alcohol had been consumed before taking part in this experiment.

No participants reported poly-drug use, dependence on other substances or psychiatric or neurological disease. No alcoholic participants were in withdrawal at the time of taking part or currently on any medication relevant to aiding withdrawal symptoms. All participants were of British origin.

The groups did differ significantly on their FAST (NICE, 2002), alcoholic participants, $M$ = 9.86, (SD = 4.08), non-alcoholic, $M$ = 1.95, (SD = 1.29). This difference was significant $t$ (42) = -8.66, $p$<.001.

The STAI scores were higher in the alcoholic group, $M$ = 41.23, (SD = 8.37) as compared to the non-alcoholic, $M$ = 36.91, (SD = 11.28), but this difference was not significant $t$ (42) = -1.44, $p$>.05.

### 6.2.2 *Apparatus and Stimuli*

Stimuli were presented on a Toshiba laptop with a 19" computer screen (85-Hz refresh rate) positioned 50cm in front of the participants (Zwickel and Müller, 2010). Also, as used by Zwickel and Müller (2010), 12 male and 12 female grey-scaled faces with hair removed and presented against a black rectangular background (4" in width x 6" in height) were used. The remainder of the screen was white. Twelve of the faces conveyed a fearful expression and 12 a neutral expression (see Figure 4.1; p.g.36). A black rectangle which was the same size as the facial stimuli acted as a baseline control.

All participants were asked to complete the four question FAST (NICE, 2002), a simple audit designed to detect problematic drinking. This audit was included to further differentiate the non-alcoholic and alcoholic sample. Additionally all participants completed the STAI (Speilberger et al., 1983). This is a clinically recognised inventory for measuring anxiety. Scores (from a maximum of 80) over 40 are indicative of trait anxiety.

*STAI – State version (Speilberger et al., 1983)* – This inventory is used to identify those who are sensitive to state anxiety. The STAI consists of 20 statements (I feel pleasant), and responses are indicated on a four point agreement scale (almost never, sometimes, often, almost never). A score of 40 and above was an indication of state anxiety. This test is widely used, and renowned for its reliability and correlation with other anxiety measures.

### 6.2.3 *Design and Procedure*

Experiment 3 is a 3-way mixed design, there are three independent variables the first is a between subject variable, Group, with two levels, (Alcoholics and Non Alcoholics), and two within subject variables, Perspective with two levels (Congruent and Incongruent) and Stimulus type with three levels (Fearful, Neutral and Baseline). The dependent variable was measured by RT to the stimuli.

All participants were initially greeted and then asked to take a breathalyser test to ensure they had not consumed alcohol before taking part. Instructions were given verbally to ensure they were understood clearly and then participants were given the chance to ask questions about the trials if necessary. Trials were randomised with half of participants in the alcoholic and non-alcoholic control group completing the FAST audit and STAI before the trials and the remainder after. Participants were asked to sit at a desk and asked to keep both hands fixed on the keyboard of the laptop in front of them to ensure that they could respond quickly and accurately. They were asked to respond to a dot probe which was presented to the left/right or above/below facial (experimental) or rectangle (baseline) stimulus. The left/right response indicated a perspective that was incongruent with the participant's own, and the above/below response measures a response that was congruent with the participant's own perspective. Participants were reminded that as well as responding to the location of the dot, they were to also note the emotion of the face. Ten practice trials were immediately followed by the experimental conditions. Trials started with the presentation of the stimuli and 500ms after was followed by a dot probe that appeared for 35ms only, and measured .5° in diameter. Reaction time was recorded from the onset of the dot probe. For the incongruent condition the dot appeared 1° to the left or right of the face/rectangle, and for the congruent condition 1° above or below the face/rectangle. During the baseline condition the dot also appeared for the same time and within these dimensions but the stimuli was a black rectangle instead of a face. Participants were asked to respond as quickly and as accurately as possible, pressing 's' to indicate left, and 'k' for dots on the right, 't' for those at the top, and 'b' for the bottom.

The test trials were pre-randomised into blocks of 12, consisting of: faces with the dot probe presented incongruent with the participant's perspective; faces with the dot probe presented congruent to the participant's perspective; and the baseline condition (rectangle) with a dot probe also appearing congruent or incongruent to the participant's perspective. Within the experimental condition, half faces conveyed fear and half a neutral expression. There were a total of 144 trials.

### 6.3 Results

Reaction times are summarised in Figure 6.1. Alcoholics responded slower than non-alcoholics in all the experimental conditions. There was a trend for slower responding on the incongruent than congruent conditions for neutral and fearful faces but not baseline stimuli. Reaction times were analysed in a 3-way mixed ANCOVA with Stimulus type (Neutral, Fearful, Baseline) and Perspective (Congruent, Incongruent) as the within-participants factors and Group (Non-Alcoholic, Alcoholic) as the between-participant factor. The covariate, anxiety, had no significant effect on the RT for the test conditions, $F(3, 42) = 2.61$, $p>.05$. Thus, any effect within the test conditions of emotion and congruency can be attributed to the difference caused by the groups and not anxiety.

There were main effects for Stimulus type, $F(2,84) = 79.91$, $p<.001$, $R^2=.655$, Perspective, $F(1,42) = 73.64$, $p<.001$, $R^2=.637$, and Group, $F(1,42)=23.11$, $p<.001$, $R^2=.355$. Interactions were analysed using a difference score (Zwickel and Müller, 2010). This method subtracts the congruent RT from the incongruent RT to give RT value which can be used when analysing the stimulus type. Higher RT values in one condition indicate a greater delay in responding incongruent than congruent stimuli.

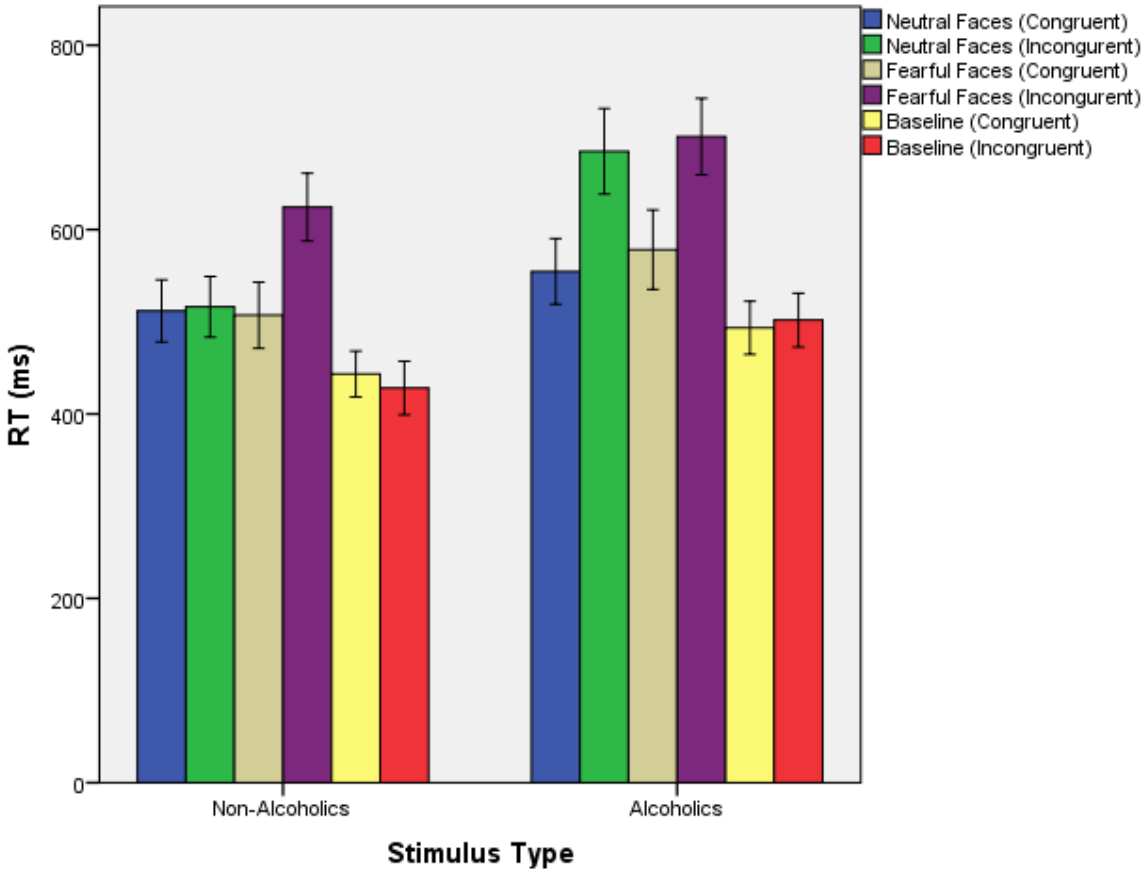


Figure 6.1: Mean RT to neutral, fearful and baseline stimuli by perspective for both non-alcoholic and alcoholics. Bars represent the 95% confidence interval.

### 6.3.1 *Analysis of anxiety*

Collapsed across the groups there was a positive correlation between scores on the STAI and RT to neutral and fearful faces, regardless of congruency, ($R$=.388, $p$<.001) ($R$=.332, $p$<.05) respectively. However this was also the case for the baseline stimuli, $R$=.308, $p$<.05, suggesting that the higher the anxiety scores the longer the RT to the all stimuli.

### 6.3.2 *Analysis by the RT difference value*

The effect of Perspective taking was measured by calculating a difference score between the Congruent and Incongruent conditions (Figure 6.2). These

difference scores were analysed in a 2-way mixed ANOVA with Stimulus type (Neutral, Fearful, Baseline) as the within-participants factors and Group (Non-Alcoholic, Alcoholic) as the between-participant factor. There was a main effect for Stimulus type, $F(2,84)=31.10$, $p<.001$, $R^2=.425$, and of Group, $F(2,42)=13.10$, p=.001, $R^2=.238$. There was also a significant interaction between Stimulus type and Group, $F(2,84)=8.56$, $p<.001$, $R^2=.169$.

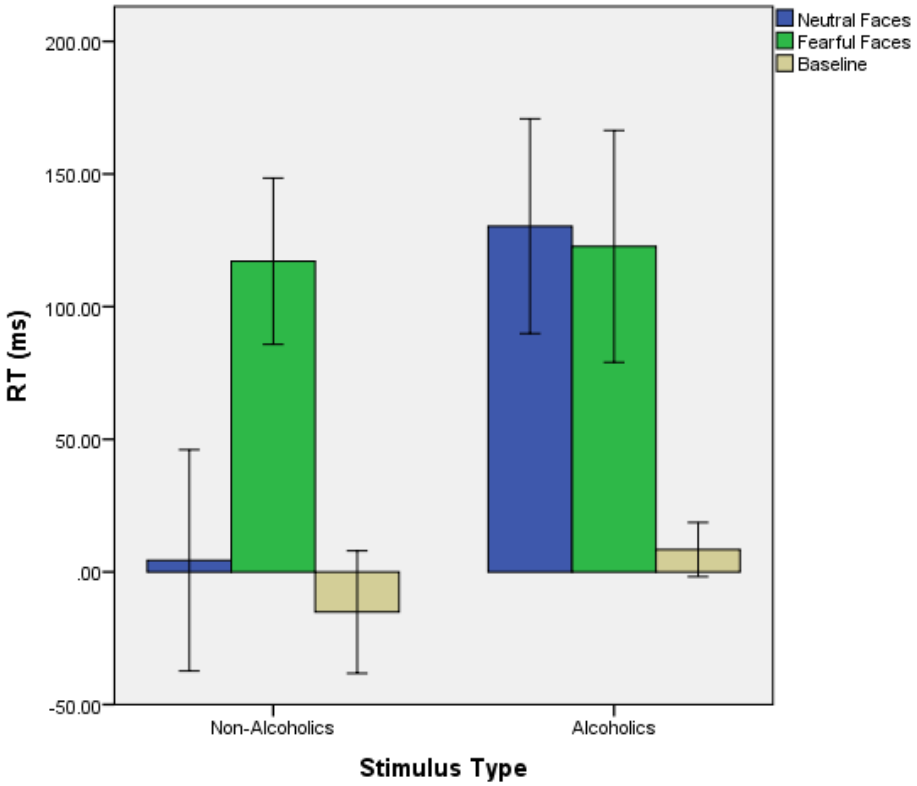


Figure 6.2: Mean RT as calculated by the difference score to neutral, fearful and baseline stimuli for both non-alcoholic and alcoholics. Bars represent the 95% confidence interval.

### 6.3.3 *Analysis of the perspective effect*

This analysis used the reaction time scores, not the difference scores. A perspective effect was observed for both neutral (Non-Alcoholic, $t(21)=44.02$, $p<.001$, 95% CI 484 to 532ms; Alcoholic, $t(21)=38.16$, $p<.001$, 95% CI 550 to 614ms) and fearful faces (Non-Alcoholic, $t(21)=33.18$, $p<.001$, 95% CI 537 to

609ms; Alcoholic, $t(21)=36.65$, $p<.001$, 95% CI 603 to 676ms), but not for baseline stimuli (Non-Alcoholic $t(21)=1.36$, $p=.189$; Alcoholic, $t(21)=1.71$, $p=.109$). The interaction occurred because for non-alcoholics the effect of Perspective taking was the significantly greater for fearful than neutral faces ($t(21)=4.31$, $p<.001$, 95% CI 58 to 167ms) but, as with Alcoholics the effect of Perspective taking was as strong for Neutral as for Fearful faces ($t(21)=.360$, $p=.722$).

## 6.4 Discussion

### 6.4.1 Summary of the main findings

The aim of this experiment was to understand whether anxiety was confounding the results in Experiment 1 and 2. Anxious participants may also be expected to demonstrate irregular VSPT to both neutral and fearful faces. Thus it was hypothesised, anxiety may be causing the delayed RT to emotional stimuli, and furthermore, a RT cost to neutral faces. However, this experiment has shown that anxiety did not confound the results. There is confidence that the results that have been presented in both this experiment and the ones before are because of the effect of alcoholism and not because of anxiety.

Due to the fact that Experiment 1 contradicted some of Zwickel and Müller's (2010) findings (a perspective effect in the neutral condition and a delay in RT between baseline and neutral faces) there was concern that the results in that experiment could have occurred by chance or due to the presence of a confounding variable. The fact that Experiment 2 also replicated the findings in the neutral condition for alcoholics and non-alcoholics has shown that fearful faces could not have been confounding the results. In *this* experiment, anxiety was considered a confounding variable, but once more these results differ from Zwickel and Müller (2010) but replicated the findings of Experiment 1 and 2 (delayed RT to neutral over baseline stimuli, and alcoholics showed no extra RT cost to fearful over neutral faces). Therefore, there is greater confidence that the results from Experiment 1 were less likely

to have arisen by chance. However, it should be noted that in *this* experiment as opposed to the Experiments 1 & 2 that the perspective effect in the neutral condition for non-alcoholics was not as pronounced although still significant (see 6.3.3). This is because non-alcoholics in this experiment were faster to react in the congruent neutral face than in Experiments 1 & 2. This may be considered as evidence for some fragility within the experimental design of VSPT studies (this has been discussed in 5.4.2 and 5.4.3) and fragility between measuring VSPT across participant groups.

### 6.4.2 The effect of anxiety on the main findings

Experiment 3 has, however, shown a correlation between anxiety scores and RT across all the trials. The higher the anxiety score, the greater the RT cost to the stimuli, but this effect was more pronounced in the neutral face condition. Thus, this study has contributed to an already well-established research area which has continually shown that anxiety is linked to longer visual processing of salient stimuli (Williams et al. 1997; Wilson & MacLeod, 2003). Moreover, anxious participants are likely to exhibit a longer RT to both neutral and fearful faces, providing more evidence that anxiety sufferers pay as much attention to neutral stimuli as they do highly emotional stimuli, which is a deviation from the normal population. These results suggest, together with the findings of Mogg et al. (2000) that an anxiety sufferer's attention to certain sources of information is over and above what is objectively regarded as necessary. This supports existing research regarding the influence of anxiety in social processing evidenced by response time (Williams et al., 1997; Wilson and MacLeod, 2003).

It should be noted that although anxiety and depression are strongly co-morbid (Clark & Watson, 1991), depression was not considered necessary for inclusion as a possible confounding variable within the experiment. That is because, although these two mental health disorders are heavily related to each other, it is exclusively anxiety that is related to an attentional bias towards neutral stimuli, and it was the attention that alcoholics in Experiment 1 were affording to neutral faces which called for the inclusion of anxiety. Depression

is linked to an attentional bias of negative stimuli (Harkness et al., 2005; Rohner, 2004) but the unusual finding in this thesis so far is alcoholics RT to neutral faces, affording fearful faces no extra RT over neutral ones.

### 6.4.3 Alcoholism, social and emotional processing

Now that anxiety has been eliminated as a possible cause of the findings reported here so far, what can now be explored is the possibility there is something unique about the way alcoholics process these stimuli. Within the main introduction research was presented showing that alcoholics overestimate the intensity of facial and emotional stimuli (Clark, et al., 2007; Duka & Townshend, 2004; Kornreich et al., 2013; Maurage et al., 2007: 2009; Philippot et al., 1999; Uekermann et al., 2005). It was also posited after Experiment 1 that alcoholics may show a RT cost to *all* facial stimuli because the stimuli are perceived as emotionally charged. The results from Experiment 2 also seem to suggest that fearful faces do not cause a 'carry-over' effect to neutral faces. This could be because neutral faces are being perceived by alcoholics as more intense than in reality, or perhaps both the neutral and fearful faces are being misread, misunderstood, or not accurately gauged. Conversely, there is also the possibility that alcoholics demonstrate a 'blunted affect' when processing fearful faces. A blunted affect, also known as a flattening affect, is a psychiatric term which refers to the lack of emotional arousal in the presence of emotive stimuli. As a consequence of this, there is little differentiation between highly emotional and mild/moderate emotional information. Blunting affects are associated with severe alcoholism (Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003). With regard to Experiments 1 and 3, the alcoholics may perceive both the fearful and the neutral faces as equally relevant/similar. To understand this more fully, and in light of the replication of the finding that alcoholics show no extra RT cost to fearful over neutral faces, the next experiment endeavored to assess just how intense/emotional the alcoholics perceive these sets of stimuli compared to non-alcoholics.

# Chapter 7

## 7.1 Experiment 4a: Ratings of fearful and neutral faces

The previous experiments within this thesis (1-3) have aimed to understand whether the confusion evidenced by alcoholics' around identifying emotions can be explained by visual-spatial deficits and/or perspective taking. Experiments 1 and 3 have shown that alcoholics do not show any extra delay in response to incongruent fearful faces over that of neutral. This may be attributed to an alcoholic's inability to differentiate between emotions.

Research has supported this theory, although alcoholics appear to be able to identify 'happiness' (Kornreich et al., 2013). Further studies have shown that alcoholics do confuse emotions (Maurage et al., 2009; Philippot et al.,1999), and moreover, alcoholics seem to demonstrate a blunted affect when viewing emotional faces (Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003) such that they regard all faces as containing a level of emotional intensity irrespective of the emotion being portrayed and the level of emotion.

However, the emotion of fear also creates varying results in studies. While alcoholics in the Philippot et al. (1999) study showed no differences in their ability to decode fearful faces compared to controls, they were likely to rate angry, sad and disgusted faces as fearful on intensity scales. Maurage et al. (2009) also showed this effect, with alcoholics rating angry faces as intensely fearful. Thus when alcoholics are asked to identify 'fear' without having to make an evaluative judgment they can (as evidenced by Philippot et al., 1999; see also RME task, Kornreich et al., 2011 and Salloum et al,. 2007). However, when asked to identify fear from a panel of emotional choices and further, when asked to quantify the level of fearfulness, they struggled and showed deficits. From this it could be concluded that alcoholics show greater levels of confusion when evaluating the emotion 'fear'. In the same studies by Philippot et al. (1999) and Maurage et al. (2009) it was shown that alcoholics are more likely to rate/perceive faces which express a weak intensity of emotion (30%) as more intense than that being conveyed; for example, in the study by Maurage et al. (2009) alcoholics rated neutral faces and postures as intense on scales of anger as compared to controls.

Such evidence supports the notion that alcoholics exhibit a general deficit in the processing of emotional information. However, Maurage et al. (2009) state that this deficit is not simply a 'labelling error' but a problem with the accurate understanding of the intensity of the emotion. In fact, in some tasks accurate identification of emotions is equal to that of controls, such as the Reading the Mind in the Eyes (RME) task administered by Kornreich et al. (2011). In this task alcoholics had to decipher the emotion conveyed from the eye region of a photograph only from a choice of four emotions. Alcoholics' performance was no worse than that of the controls. Differing methodologies highlight the weakness of emotional processing in alcoholism. Essentially, alcoholics appear to show their greatest error in emotional processing when asked to judge the intensity of material and stimuli and that this is most apparent in the rating of neutral and negative stimuli. These errors in evaluative judgment may in part be due to emotional hyperactivity in the frontal mediated lobes which are failing to rein in inhibition processes; this in turn allows greater overestimation of the stimulus (Duka & Townshend, 2004; Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003). At the same time, it may be suggested, that because alcoholics are slower to react to information because of diminished cognitive, motor and visual skills, that this increased time affords them the space/time to 'over think' the stimuli. That is to say, by virtue of the impaired and delayed cognitive and motor processes this has a direct effect on their judgments/perceptions of emotional stimuli because the extra time is takes to process this information allows more time to speculate about it.

Experiment 4 seeks to understand whether alcoholics can differentiate between fearful and neutral expressions. This will help to understand whether this is a labelling error, or as Maurage et al. (2009) suggest, this is about interpretation. The second part of this experiment offers the opportunity for alcoholics to identify the extent of the emotional content.

In the first part of Experiment 4, both the alcoholics and the non-alcoholics were asked to rate how fearful the neutral and fearful facial stimuli presented in Experiments 1 and 3 are perceived on a 7 point Likert-scale. In Part 2 of this experiment, alcoholic and non-alcoholics participants were then

asked to rate on a 7-point Likert-scale whether the facial stimulus 'contains emotion' (Clark et al., 2007). The second part of this study differs from Clark et al. (2007), as in their study, participants were asked to rate the emotion of emotional facial animations; it could argued that animations lack ecological validity. Hence the second part of this study benefits from the methods of Clark et al. (2007) but in using real facial images increases the validity and reliability of the findings.

## 7.2 Method

### 7.2.1 *Participants*

Thirty non-alcoholic controls and 30 alcoholic participants were recruited as volunteers. The groups did not differ significantly in age (alcoholic $M$ = 40.82, SD = 13.65, non-alcoholics, $M$ = 40.10, SD = 12.58, $t$ (42) = .18, $p$>.05) or gender, as both groups had equal amounts of male and female participants. All of the participants across the groups described themselves as White British. The alcoholic participants were alcohol free at the time of testing as assessed by their key-worker using a breathalyser test. The breathalyser measures BAC and the reading had to be 0% for participants to take part in this experiment.

No participants reported poly-drug use, dependence on other substances or psychiatric or neurological disease. No alcoholic participants were in withdrawal at the time of taking part, or currently on any medication relevant to alleviating withdrawal symptoms.

The groups differed significantly, $t$(42) = 8.16, $p$<.001, on their FAST screening (NICE, 2002), alcoholic participants, $M$ = 9.95, (SD = 4.13), non-alcoholics $M$ = 1.19, (SD = 2.10).

### 7.2.2 *Apparatus and Stimuli*

Stimuli were presented within questionnaires on plain white A4 paper. The facial stimuli used for the questionnaires for this experiment were those also used for Experiments 1 and 3. Thus, 12 male and 12 female grey-scaled faces with hair removed and presented against a black rectangular background (4" in width x 6" in height) were presented (see Figure 1). Twelve of the faces conveyed a fearful expression and 12 a neutral expression. Participants were asked 'How fearful is this face?', and asked to indicate their response on a 7-point Likert scale, 1 – indicated 'not at all fearful', and 7 – 'very fearful'. This likert scale was partially replicated from Clark et al. (2007).

All participants were asked to complete the four question FAST (NICE, 2002).

### 7.2.3 *Design and Procedure*

This experiment is a 2 x 2 mixed design, with Group being the between subject variable 2 with two levels (Alcoholic, Non Alcoholic) and Stimuli being a within subjects variable also with two levels (Fearful and Neutral faces), the dependent measure was the participants ratings of the faces.

Trials were randomised with half of participants completing the FAST audit before completing the rating task and half after. Participants were instructed how to complete both sets of questionnaires. All of the facial stimuli were randomised.

## 7.3 Results

Ratings are summarised in Figure 7.1. Alcoholics and Controls showed no difference in how fearful they rated the faces. There was a trend by both groups to rate the fearful faces at more fearful than neutral faces. Ratings were analysed in a two-way mixed ANOVA with Stimulus Type (Fearful, Neutral) as the within- participants factors and Group (Alcoholic, Non Alcoholic) as

the between-participant factors. There was a main effect for Stimulus Type $F$ (1,58)=1063.49, $p$<.001, $R^2$=.948. However, no main effect for Group was observed, $F$ (1,58) =1.17, $p$=.285, $R^2$=.021, there was no interaction between Stimulus Type and Group, $F$ (1,58) =.790, $p$=.381, $R^2$=.012.

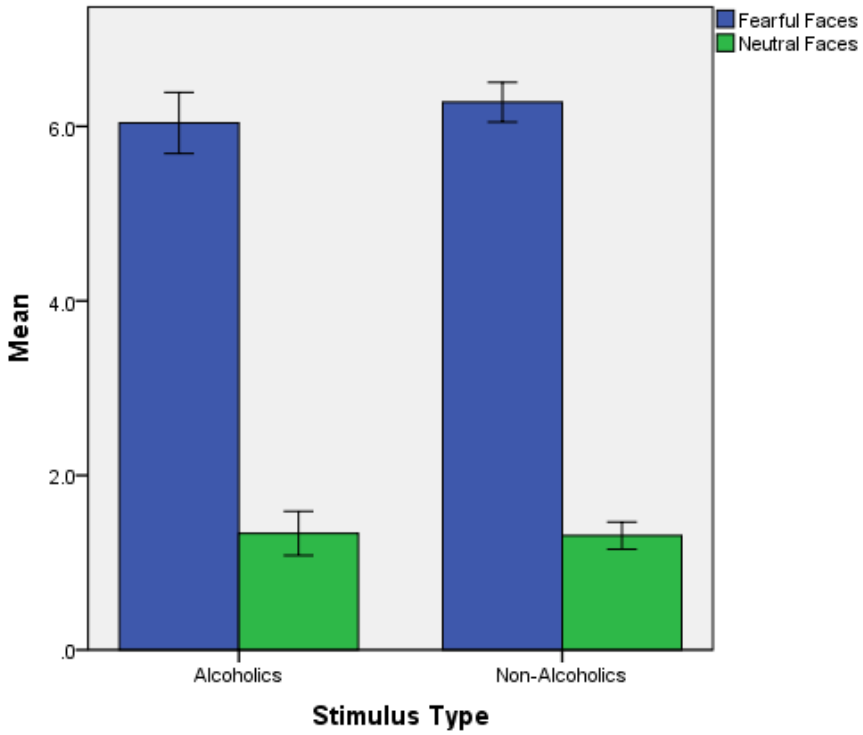


Figure 7.1: Mean fearful rating to neutral and fearful stimuli for both non-alcoholics and alcoholics. Bars represent the 95% confidence interval

## 7.4 Discussion

### 7.4.1 Summary of the main findings

The aim of this experiment was to assess ratings of fearful and neutral faces in alcoholic and non-alcoholic participants. This in turn allows inferences to be made about the findings in Experiment 1-3. Experiments 1 and 3 have shown that alcoholics exhibit no extra RT cost to fearful faces over neutral ones, whereas non-alcoholics participants' do. However, both groups showed a RT cost in the neutral as well as the fearful condition in Experiments 1 and 3, and this effect remained in the absence of fearful faces in Experiment 2.

Such findings as this are in line with those of Maurage et al. (2009) who state that an alcoholic's deficits in emotional processing is not simply a labelling error. Hence, alcoholics' misperceptions of emotions are not at all clear. However, this task was a much simpler version than others which have detected emotional processing confusion and error (Philippot et al., 1999; Kornreich et al., 2002; Maurage et al., 2007; Maurage et al., 2009).

Experiment 2 somewhat excluded the possibility that fearful faces were causing a carry-over effect onto the neutral face condition. To further exclude this as a possibility, and to understand the lack of extra RT cost to neutral faces shown by the alcoholics the first part of this experiment required both groups of participants to rate how fearful they believed the stimuli were. The results show that neither the alcoholics nor the non-alcoholics rated the neutral faces as fearful. Thus neither group processed these faces as containing fear. There was a similar rating trend shown by both groups and the alcoholics did not exhibit any great differences in their ratings compared to non-alcoholics. In this experiment there was a ceiling effect for rating the fearful faces as fearful. Once again there were no significant differences in ratings between the groups and thus the alcoholics showed no impairment in the ratings of the fearful faces.

In order to further understand the nature of alcoholics' reaction and perception of the neutral and fearful stimuli used within this thesis, the second

part of this experiment employs the methods of Clark et al. (2007). By asking alcoholics a less 'leading' question, for example, 'contains emotion' rather than 'how fearful', thus allowing alcoholics wider scope to rate the faces without the restriction of rating them as only fearful.

## 7.5 Experiment 4b: Rating faces as containing emotion

In the second part of this study, alcoholics will be asked how much they believe the fearful and neutral stimuli presented in Experiments 1 and 3 contain emotion. Asking the question this way allows a wider scope for interpretation of the results, and may indicate differences in the perception of these facial stimuli.

## 7.6 Method

### 7.6.1 *Participants*

The same participants were used as was in the first part in this experiment. For details see 7.2.1. Participants were approached for this study 6 weeks after the first.

### 7.6.2 *Apparatus and Stimuli*

Stimuli were presented within questionnaires on plain white A4 paper. The facial stimuli used for the questionnaires for this experiment were those also used for Experiments 1 and 3. Thus, 12 male and 12 female grey-scaled faces with hair removed and presented against a black rectangular background (4" in width x 6" in height) were presented (see Figure 1). Twelve of the faces conveyed a fearful expression and 12 a neutral expression. Participants were asked please rate 'how much you believe this face contains emotion?', and asked to indicate their response on a 7-point Likert scale, 1 – indicated 'not at all emotional', and 7 – 'very emotional'. All participants were asked to complete the four question FAST (NICE, 2002).

### 7.6.3 *Design and Procedure*

This experiment is a 2 x 2 mixed design, with Group being the between subject variable 2 with two levels (Alcoholic, Non Alcoholic) and Stimuli being a within subjects variable also with two levels (Fearful and Neutral faces), the dependent measure was the participants ratings of the faces.

Trials were randomised with half of participants completing the FAST audit before completing the rating task and half after. Participants were instructed how to complete both sets of questionnaires. All of the facial stimuli were randomised. Participants were asked to view the faces one at a time and indicate on the 7-point Likert scale how much they believed the faces shown to 'contain emotion'. Participants were asked to indicate by circling a number 1 through to 7. If participants did not perceive the face as emotional then they could select number 1, and numbers 2-7 worked on an intensity continuum with 7 being 'very emotional'.

## 7.7 Results

Ratings are summarised in Figure 7.2. There was a trend to rate the fearful faces as more emotional than neutral faces. A ceiling effect was observed by both the Alcoholics and Controls in how emotional they rated the fearful faces. Ratings were analysed in a two-way mixed ANOVA with Stimulus Type (Fearful, Neutral) as the within- participants factors and Group (Alcoholic, Non-Alcoholic) as the between-participant factors. There was a main effect for Stimulus Type $F$ (1,58) =1424.23, $p$<.001, $R^2$=.961, and for Group, $F$ (1,58) =77.02, $p$=<.001, $R^2$=.570. There was also an interaction between Stimulus Type and Group, $F$(1,58)= 93.46, $p$=<.001, $R^2$=.617.

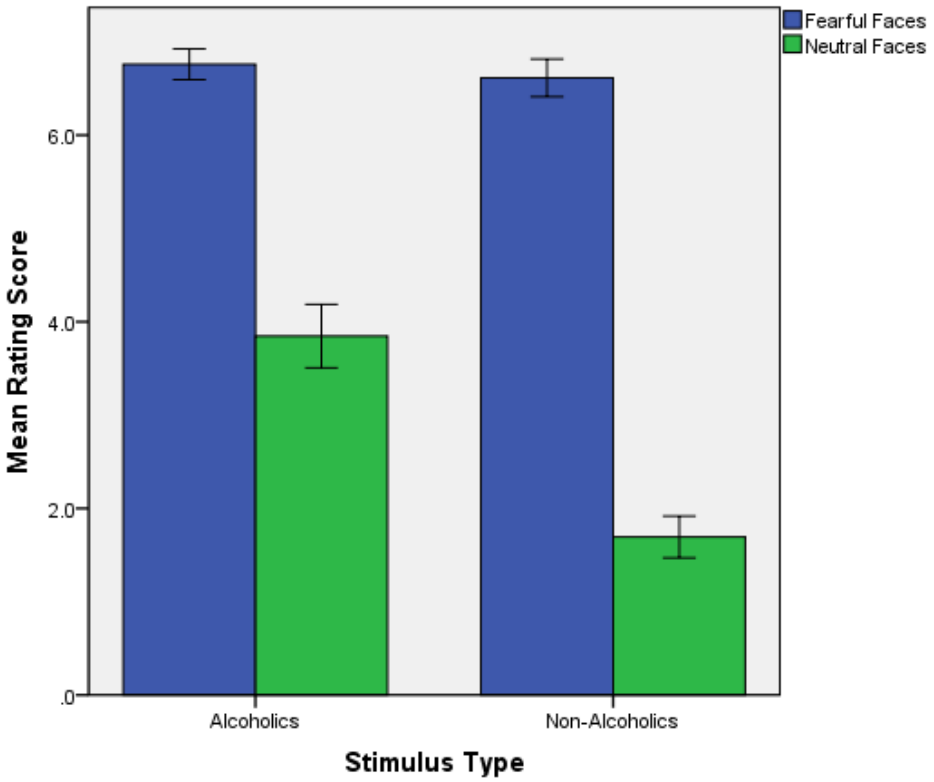


Figure 7.2: Mean emotion rating to neutral and fearful stimuli for both non-alcoholics and alcoholics. Bars represent the 95% confidence interval

The interaction was observed because Alcoholics rated neutral faces as significantly more emotional than Non-Alcoholics, $t(58)=10.82$, $p<.001$, CI -.109 - .402. There was no difference between the Alcoholics and the Non-Alcoholics in their emotional rating of fearful faces $t(58)=1.15$, $p=.255$.

## 7.8 Discussion

The aim of Experiment 4 was to understand if there were detectable differences in how alcoholics and non-alcoholics perceived the facial stimuli presented in the first three experiments of this thesis. In Experiments 1 and 3 alcoholics exhibit no extra RT cost to fearful faces over neutral ones, whereas non-alcoholic participants do. Thus the questions are: do alcoholics perceive these faces differently to non-alcoholics? Is a difference in perception causing this difference in response times between the groups?

The second main finding in Experiments 1 and 3 is that both groups showed a RT cost in the neutral as well as the fearful condition in Experiments 1 and 3, and this effect remained in the absence of fearful faces in Experiment 2. This raised the questions, are neutral faces relevant to the non-alcoholics, even if they are not as relevant as fearful faces? Moreover, how do alcoholics and non-alcoholics differ in their perceptions of neutral faces? These findings strongly indicated that a further experiment should be undertaken to ask participants to rate the faces in Experiments 1 and 3 for both fear and emotion.

Part one of Experiment 4 provided alcoholics and the non-alcoholics with a scale of 1-7 on which to rate how fearful the neutral and fearful faces were. The aim of the first part of the experiment was to understand whether, specifically, the alcoholics could differentiate between the fearful and neutral faces, and whether they perceived neutral faces as fearful, and lastly, whether there were any difference between the groups in their ratings of these stimuli. Findings showed that alcoholics did not perceive the neutral faces as fearful, nor did they rate the neutral faces as fearful (indicating their ability to differentiate between the two). In fact, the alcoholics showed a similar rating response as the non-alcoholics. Therefore, whatever the alcoholics perceived in the neutral faces within Experiments 1 and 3, it was not fear.

In view of this finding, in the second part of Experiment 4 both groups were given a broader definition by which to rate the faces. This experiment asked both groups to rate the neutral and fearful faces for the level of unspecified emotion they contained. Asking the question in this way offered a broader scope for interpretation by the participants and also a wider

interpretation of the results. It is in this part of the experiment that the alcoholics and non-alcoholics showed differences in their ratings. While both the alcoholics and non-alcoholics rated the fearful faces as highly fearful (once again a ceiling effect was observed), alcoholics perceived the neutral faces as more emotional than the non-alcoholics. The reasons and implications are discussed below.

### 7.8.1 Alcoholics' ratings of fearful and neutral faces

The similar response rating between the groups regarding the fearful faces would indicate the alcoholics show no deficits in their ability to correctly identify the emotion 'fear'. However, as outlined within the introduction (see section 7.1), previous evidence has also shown that alcoholics do not consistently show problems with emotional identification in facial stimuli unless asked to quantify the level of emotion the face is expressing. When the alcoholics are given a greater scope for interpreting the faces, such as 'contains emotion', and/or there are no direct cues as to what emotion the faces may be expressing, alcoholics show processing differences as evidenced by their greater level of inaccuracy as compared with non-alcoholics (Clark et al., 2007). As both groups showed a ceiling effect for rating fearful faces as containing emotions we know that this is a face which is 'obviously' emotional. The neutral face however was perceived as 'neutral' or perhaps more specifically as 'non-emotional' to the non-alcoholics (their ratings were low). However, unlike in the first part of this experiment where alcoholics were given a choice to rate the neutral faces as fearful or not, in this second part they had to decide if the face were emotional and if so, how emotional. In making this decision alcoholics show a difference in their ratings of neutral faces as compared to non-alcoholics, rating them as containing more emotion.

It is not clear why alcoholics rated the neutral faces emotional, although this is consistent with others in the literature (Kornreich et al., 2013; Philippot et al., 1999; Maurage et al., 2009) who show that alcoholics overestimate the emotion contained in neutral stimuli. For the purpose of interpreting the findings in Experiments 1 and 3 (no extra RT cost to neutral

faces over fearful) it may be the case that alcoholics show no extra RT cost to neutral over fearful faces because although they are not perceiving the faces as 'fearful', they are perceiving a level of emotion within the neutral faces which is not perceived by non-alcoholics. Thus, alcoholics are not misidentifying neutral faces as fearful, and as Maurage et al. (2009) identify, this is not simply a labelling error. Furthermore, fearful faces are not causing a carry-over effect that alcoholics continually process in the presence of neutral faces (Experiment 2 also excluded this). At this point in the experimental process within the context of this thesis, alcoholics are showing a significant and identifiable processing difference compared to non-alcoholics. Namely, participants within the alcoholic group show no differences in their reaction times to neutral and fearful faces. This may be because they perceive both faces as equally relevant – although not similar or exact – and although they did not conflate emotions, the lack of differentiation evidenced by the similarity in response times may suggest the alcoholics simply perceive neutral faces as similarly relevant as fearful faces.

From this point, of particular relevance are some of the comments that the alcoholic participants offered regarding their perceptions of the faces shown throughout the experimental trials in this thesis. *It should be noted this information was offered voluntarily and was delivered spontaneously, there was no prior intention of this thesis to capture this type of information and therefore it is not scientific in approach.* However, three of the alcoholic participants commented that the neutral faces (not knowing they were neutral) appeared negative, describing the faces as angry, disaffected, menacing and cruel. While these comments are casual in approach, together with other research as mentioned in this chapter, they call for a greater need for qualitative research within the area of social processing and alcoholism. Such research may allow for a greater discussion into what alcoholics perceive in their environment, as opposed to researchers just recording perception differences.

Philippot et al. (1999) have also shown that alcoholics estimate neutral and mild (0% - 30%) emotional faces as containing more emotion than portrayed. What is more informative is that when asked, the alcoholics

reported no problems with regards to their performance within their tasks in the Philippot et al. (1999) study, suggesting that alcoholics do not perceive or recognise the problems they encounter estimating the emotional content. This fault in the processing of this information may be caused by (although not limited to) three factors. Firstly, perhaps alcoholics are not motivated by the task, that is, they experience a lack of engagement in the experimental procedure and therefore the relevance of the stimuli is somewhat irrelevant. Secondly, alcoholics may perceive faces in studies as abstract and therefore perhaps these experimental stimuli lack ecological validity and meaning. This would also therefore link to a lack of motivation in engaging with the stimuli, and may also perhaps be the result of regarding the faces as no more relevant to them than 'other' environmental stimuli. It may be that this is a cognitive heuristic that serves a specific purpose and this will be explored in a later discussion. Lastly, it is possible that for alcoholics these faces do have meaning and relevance but processing is impaired. The fact they are unaware of their faults when processing these stimuli further suggest a metacognition problem in the perception of processing. This last factor may be linked to a neurobiological response which is caused by brain defects due to alcoholism. Alcoholism is associated with a blunting effect (Oscar-Berman & Marinkovic, 2003) whereby environmental stimuli are processed as flat and devoid of meaning; alcoholics may be attempting to overcome or compensate for such defects by enhancing or amplifying the content of the stimuli around them, although these defects and the compensatory effects may be outside of their awareness. Such a rationale would explain both higher intensity ratings within this experiment and the alcoholics' lack of awareness of their performance in the Philippot et al. (1999) task.

Whatever the reasons for alcoholic's deficits in emotional processing, it does seem that they may be making judgements on a social world and perceiving it in a way which is inaccurate. This is eloquently expressed by Philippot et al (1999) who describe alcoholics as "… living in a world in which they perceive more emotional signals from their interaction partners, emotional signals that they tend to misinterpret, without noticing their deficit in this domain" (pp. 1035-1036).

Khantzian's (2007) self-medicating hypothesis stipulates that addiction is intimately tied to an individual's attempt to regulate and cope with their environment and that their motivation to use drugs and alcohol is born from their inability to deal with interpersonal and intrapersonal problems. Drugs and alcohol in this sense are sought in order to bring relief from painful affect states. Notwithstanding the reason why people become alcoholics, given this hypothesis and the findings in this thesis so far, it could be argued that continued self-medication is driven by distorted perceptions of emotion, both their own and other peoples.'

Although speculative, this overestimation of emotion in neutral faces may be evidence of a hyper-vigilance of 'all faces', as alcoholics are anticipating the faces to be emotional based on previous experiences. In this sense, alcoholics may be overestimating the emotion conveyed in the neutral faces, perceiving them negatively and in turn automatically treating them with pessimism. Such behaviour would serve to reinforce previous negative experiences which in turn maintain maladaptive schemas about the world around them and be a driving force for continued alcohol use. Similar patterns of behaviour are evidenced in clinically depressed populations, who also show an attentional bias for negative stimuli, a negative perception of stimuli and negative memory bias for past events (Rohner, 2004). Perhaps suggesting that they links between alcoholism and depression need greater exploration.

While we can speculate about the reasons alcoholics show deficits in their emotional processing; the fact remains that facial processing is complex, the stimuli are multi-dimensional and require cognitive effort. These processes involve temporal, orbital frontal cortex functioning and projections from the amygdala, all of which become disrupted and damaged through alcohol abuse (Oscar-Berman & Marinkovic, 2003; Uekermann & Daum, 2008). There is evidence which has shown that damage to these areas is linked to deficits in basic cognitive processes in alcoholics (Parsons, 1987). What remains an active research question is how relationships between basic cognitive functioning affect emotional processing and how alcoholism is involved with the two (Uerkermann & Daum, 2008). What is known is that patients with prefrontal cortex damage (lesions) also show signs of deficits in identifying

facial expression and demonstrate inappropriate social behaviour (Hornack, Rolls & Wade, 1996). The frontal lobes are also compromised because of alcoholism (brain atrophy), and their ability to mediate activity from the amygdala is impaired, resulting in brain hyperactivity and in turn an overestimation of emotional content seen in stimuli (Duka & Townshend, 2004).

### 7.8.2 Conclusion

Neurological explanations, and the rationale provided within this discussion as to why alcoholics may conflate facial expressions have been presented to highlight the range of explanations for alcoholics' deficits in social processing. As highlighted earlier, the links between alcoholism and emotional processing remain speculative. Therefore greater research is needed to explore the consequences of alcohol abuse on social processing.

The next experiment (Experiment 5) aimed to explore the range of deficits in emotional processing that alcoholics may experience. Happy faces are introduced as experimental stimuli to understand whether happy faces have an effect on alcoholics VSPT skills, and whether their performance in this task would differ from non-alcoholics. Furthermore, Experiment 6, asked alcoholics to rate happy faces, in order to assess their ratings of positive stimuli.

# Chapter 8

## 8.1 Experiment 5: The impact of happy faces on VSPT

The previous experiments have shown that spontaneous VSPT occurs when the perspective is in conflict with the participants' own and this effect is more pronounced when the face is conveying fear. This has been the demonstrated in both the alcoholic and the non-alcoholic participants. Alcoholics have also shown no extra RT delay to fearful faces over neutral faces, which has twice been found in this set of experiments. So, although both groups show a perspective RT effect to neutral and fearful faces it is only the alcoholics that showed a no extra RT cost to fearful over neutral faces. These findings build upon previous research showing that alcoholics have problems processing negative emotions, namely, fear as well as anger and disgust. Yet no studies to date have investigated the impact of happy faces on VSPT in clinical or non-clinical populations. However, in order to experience empathy to the fullest extent it is important to recognise and evaluate positive as well as negative non-verbal cues.

The conditions under which perspective taking is triggered remains unclear. What is important for perspective taking to be automatic and effortless is the presence of salient stimuli. Studies have shown that perspective taking is triggered in response to an agent, an object representing an agent (Abell et al., 2000; Zwickel, 2009), emotions (Zwickel & Müller, 2010), verbal cues, and actions (Loranzo et al., 2007; Mazzarella et al., 2012; Tversky & Hard, 2009). Taken together with the findings presented in Experments 1, 2 and 3, if perspective taking is triggered in both neutral and fearful conditions, it is plausible that it would also occur if a face was conveying happiness and that this perspective effect would be demonstrated by both non-alcoholics and alcoholics.

With regard to alcoholics, studies that have shown deficits in processing happiness have concentrated on accurate identification and ability to accurately rate the level of intensity of emotion (Clark et al., 2007;

Kornreich et al., 2013; Maurage et al., 2009; Philippot et al., 1999). There has also been no consistent finding on how alcoholics react to positive emotions but this is perhaps due to variation in measures and populations. For example, in a recent study by Kornreich et al. (2013), alcoholics were significantly impaired when it came to recognising happiness in voices, but accurately rated the level of intensity of a happy voice. In the same study, alcoholics' accuracy scores for recognising happy faces and how much intensity they attributed to them did not differ significantly from the control group. In an earlier study by Philippot et al. (1999) detoxified alcoholics were compared with controls for accuracy of decoding and rating of levels of intensity of emotional faces at four levels of intensity, 0%, 30%, 70% and 100%. For happy faces they found alcoholics' scores for accurately identifying this emotion was systematically worse than controls for all levels of intensity, but this was not significant. Similarly, alcoholics rated happy faces as more intense than controls but this was not significant. Of interest however is that alcoholics would also misattribute negative emotions to a happy face. In another study, alcoholics' performance in accurately identifying levels of intensity of happiness in faces, voices, body postures and written scenarios was preserved compared to their impaired performance for negative emotions -sadness, fear and disgust (Maurage et al., 2009). Another study by Maurage et al. (2007) revealed that both the non-alcoholic participants and the alcoholic participants took longer to react to angry faces and voices than they did happy ones. Such findings suggest that the relevance of the stimulus has an effect on RT for non-alcoholics and alcoholics alike. However, delayed RT to relevant stimuli becomes pronounced in alcoholics arguably due to the effects of substance abuse on social cognition (Oscar-Berman & Marinkovic, 2003; Uekerman & Daum, 2008).

Therefore this experiment aims to extend research and investigate whether happy faces would also trigger spontaneous VSPT. The same faces/actors were used but expressing happiness from the Karolinska faces database, thus the same actors were used as have been used in the fearful/neutral conditions in the previous experiments.

## 8.2 Methods

### 8.2.1 *Participants*

Twenty two non-alcoholics and 22 alcoholic participants were recruited to take part. The groups did not differ significantly in age (alcoholic $M$ = 42.73, SD = 10.51, non-alcoholics, $M$ = 41.68, SD = 14.07, $t$ (42) = .28, $p$>.05) or gender as both groups consisted of 11 men and 11 women. One alcoholic participant identified themselves as British Indian, the remaining as British White. Two non- alcoholics described themselves as British Indian and the remaining as British White. The alcoholic participants were alcohol free at the time of testing as assessed by their key-worker using a breathalyser test. The breathalyser measures BAC and a reading of 0% was necessary to take part.

No participants reported poly-drug use, dependence on other substances or psychiatric or neurological disease. No alcoholic participants were in withdrawal at the time of taking part or currently on any medication relevant to aiding withdrawal symptoms.

The groups differed significantly on their FAST screening (NICE, 2002), alcoholic participants, $M$ = 8.14, (SD = 4.05), non-alcoholics, $M$ = 1.59, (SD = 1.30). This difference was significant $t$ (42) = 7.22, $p$<.001.

### 8.2.2 *Apparatus and Stimuli*

Stimuli were presented on a Toshiba laptop with a 19" computer screen (85-Hz refresh rate) positioned 50cm in front of the participants (Zwickel and Műller, 2010). The happy faces were sourced from the same set of Karolinska faces, using the same actors - 12 male and 12 female grey-scaled faces with hair removed and presented against a black rectangular background (4" in width x 6" in height) were used (see Figure 8.1.). The remainder of the screen was white. Twelve of the faces conveyed a happy expression and 12 a neutral expression. A black rectangle which was the same in size as the facial stimuli acted as a baseline control.

**Figure 8.1:** Examples of the facial stimuli used in Experiment 5: The same female face conveying happiness (left) and a neutral expression (right).

All participants were asked to complete the four question FAST (NICE, 2002).

### 8.2.3 *Design and Procedure*

Experiment 5 is a 3-way mixed design, there are three independent variables the first is a between subject variable, Group, with two levels, (Alcoholics and Non Alcoholics), and two within subject variables, Perspective with two levels (Congruent and Incongruent) and Stimulus type with three levels (Happy, Neutral and Baseline). The dependent variable was measured by RT to the stimuli.

All participants were initially greeted and then asked to take a breathalyser test to ensure they had not consumed alcohol before taking part. Instructions were given verbally to ensure all the instructions were understood clearly, and participants were given the opportunity to ask questions about the trials if necessary. Trials were randomised with half of participants in the alcoholic and non-alcoholic control group completing the FAST audit before the trials and the remainder after. Participants were asked to sit at a desk and asked to keep both hands fixed on the keyboard of the laptop in front of them to ensure that they could respond quickly and accurately. They were asked to respond to a dot probe which was presented to the left/right or above/below

facial (experimental) or rectangle (baseline) stimuli. The left/right response indicated a perspective that was incongruent with the participant's own, and the above/below response measured a response that was congruent to the participant's own perspective. Participants were reminded that as well as responding to the location of the dot, they were to also note the emotion of the face. Ten practice trials were immediately followed by the experimental conditions. Trials started with the presentation of the stimuli and 500ms after was followed by a dot probe that appeared for 35ms only, and measured .5° in diameter. Reaction time was recorded from the onset of the dot probe. For the incongruent condition the dot appeared 1° to the left or right of the face/rectangle, and for the congruent condition 1° above or below the face/rectangle. During the baseline condition the dot also appeared for the same time and within these dimensions but the stimuli was a black rectangle instead of a face. Participants were asked to respond as quickly and as accurately as possible, pressing 's' to indicate left, and 'k' for dots on the right, 't' for those at the top, and 'b' for the bottom.

The test trials were pre-randomised into blocks of 12, consisting of: faces with the dot probe presented incongruent with the participant's perspective; faces with the dot probe presented congruent to the participant's perspective; and the baseline condition with a dot probe also appearing congruent or incongruent to the participant's perspective. Within the experimental condition, half the faces conveyed happiness and half a neutral expression. There were a total of 144 trials.

## 8.3 Results

### 8.3.1 *Analysis of the test conditions*

Once more, alcoholics responded slower than non-alcoholics (Figure 8.2). There was a trend for slower responding on the incongruent than congruent conditions for Neutral and Happy faces but not Baseline stimuli. Reactions times were analysed in a 3-way mixed ANOVA with Stimulus type (Neutral, Happy, Baseline) and Perspective (Congruent, Incongruent) as the

within-participants factors and Group (Non-Alcoholic, Alcoholic) as the between-participant factor. There were main effects for Stimulus type, $F(2,84)=67.75$, $p<.001$, $R^2=.617$, Perspective, $F(1,42)=6.20$, $p=.017$, $R^2=.129$, and Group, $F(1,42)=31.07$, $p<.001$, $R^2=.425$. Interactions were then analysed using a difference score, a method which was also utilised in Zwickel and Müller's (2010) study.

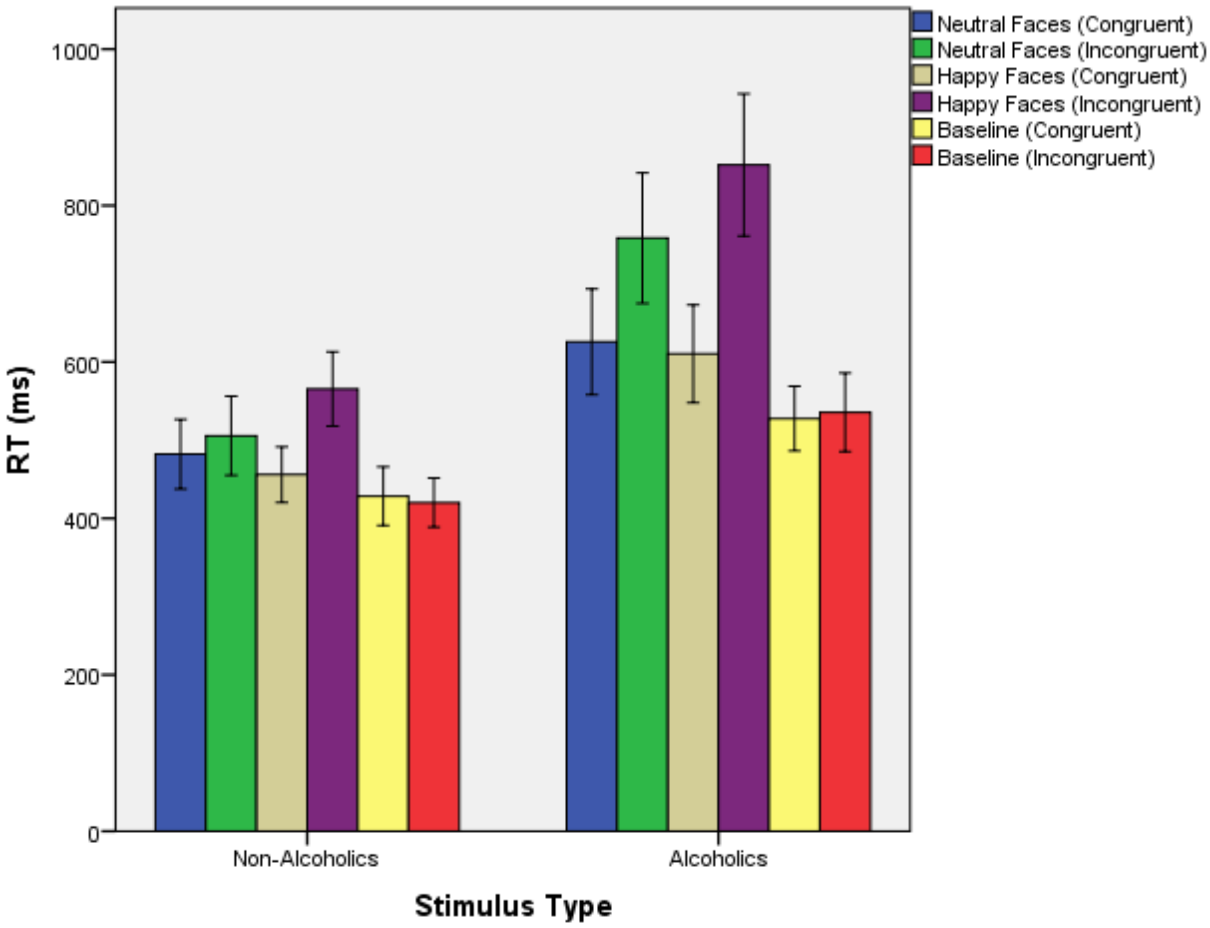


Figure 8.2: Mean RT to neutral, happy and baseline stimuli by perspective for both non-alcoholics and alcoholics. Bars represent the 95% confidence interval.

### 8.3.2 *Analysis by the RT difference value*

The effect of Perspective taking was measured by calculating a difference score between the Congruent and Incongruent conditions (Figure 8.3, below). These difference scores were analysed in a 2-way mixed

ANOVA with Stimulus type (Neutral, Happy, Baseline) as the within-participants factors and Group (Non-Alcoholic, Alcoholic) as the between-participant factor. There was a main effect for Stimulus type, $F(2,84)=51.43$, $p<.001$, $R^2=.550$, and of Group, $F(2,42)=17.37$, $p<.001$, $R^2=.293$. There was also a significant interaction between Stimulus type and Group, $F(2,84)=6.21$, $p=.005$, $R^2=.129$.

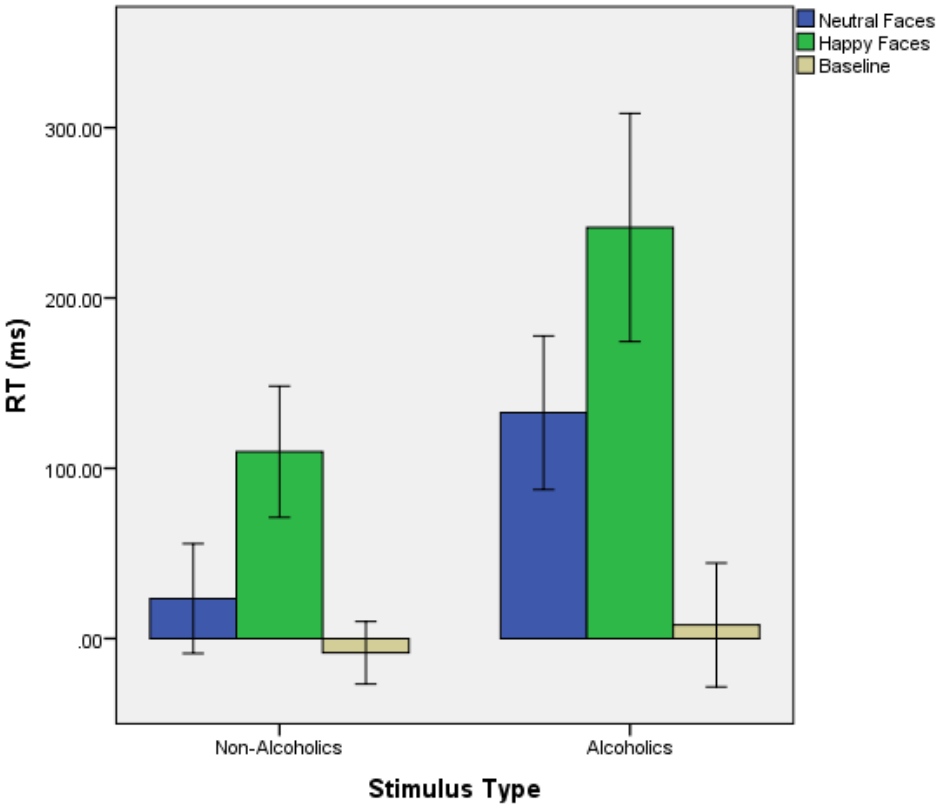


Figure 8.3: Mean RT as calculated by the difference score to neutral, happy and baseline stimuli for both non-alcoholics and alcoholics. Bars represent the 95% confidence interval.

### 8.3.4 *Analysis of the effect of perspective*

A perspective effect was observed for both neutral (Control, $t(21)=22.93$, $p<.001$, 95% *CI* 450 to 539ms; Alcoholic, $t(21)=19.85$, $p<.001$, 95% *CI* 620 to 765ms) and Happy faces (Non Alcoholic, $t(21)=28.41$, $p<.001$, 95% *CI* 473 to 538ms; Alcoholic, $t(21)=21.57$, $p<.001$, 95% *CI* 661 to 802ms), but not in the baseline condition (Non Alcoholic $t(21)=.943$, $p=.356$;

Alcoholic, $t(21)=.457$, $p=.652$. For both Non-Alcoholics and Alcoholics the effect of Perspective taking was significantly greater for Happy than Neutral faces, $t(21)=5.90$, $p<.001$, 95% *CI* -116 to -55ms, $t(21)=5.09$; $p<.001$, 95% *CI* -153 to -64, respectively.

## 8.4 Discussion

### 8.4.1 Main findings of Experiment 5

The aim of the study was to investigate the effect of happy faces on VSPT in alcoholics and non-alcoholics. Past research has strongly suggested that alcoholism affects social processing (Clark et al., 2007; Kornreich et al., 2013; Maurage et al., 2007; Maurage et al., 2009; Uekerman et al., 2006; Uekerman & Daum, 2008), but the effect happy stimuli have on these processes is not clear.

For both non-alcoholics and alcoholics these findings are again only partly consistent with those of Zwickel and Müller (2010), both groups showed a delayed RT when the perspective was incongruent to their own, supporting the view that VSPT is cognitively automatic. However, unlike their study, but consistent with the findings in the previous experiments here, perspective taking did occur with neutral faces. Importantly, the relevance of the facial stimuli caused this perspective effect and not because making a left/right decision was more cognitively effortful than a top/bottom decision in any of the tasks. We know this because within this experiment as within the previous experiments here there is no difference in RTs between the incongruent and congruent perspective in the baseline condition, demonstrating that it is the relevance or presentation of the facial stimuli which causes this RT difference. The reasons for this are again unclear but the replication of this findings from Experiments 1, 2 and 3 provides confidence that the results in these sets of experiments are not because of chance and that neutral stimuli can trigger VSPT. This finding can therefore add to the literature on perspective taking showing that VSPT is automatically triggered

in the presence of a salient facial stimulus but that this may be devoid of an identifiable emotion.

With regards to reactions times to happy faces both groups showed a delayed reaction to the faces when the perspective was the same as their own. However, both groups demonstrated greater delayed responses to happy faces when the perspective was incongruent to their own. Thus this experiment provides evidence that neutral, fearful and now also happy faces convey an emotion which is socially salient and in turn contributes to VSPT.

### 8.4.2 Alcoholism, happy and neutral faces

With regard to the adults with alcoholism, the results identify a significant difference between their reaction times to baseline and facial stimuli. They also showed a significant delayed RT in the incongruent condition compared to the baseline and congruent perspectives. Thus alcoholics in this experiment showed no deficit in VSPT. However, most importantly, within *this experiment* alcoholics only showed a greater delayed response to happy faces, as compared to the findings in Experiments 1 and 3 where they showed no extra RT cost to the fearful faces. It is not clear why this may be the case, it may be suggested that the presence of happy faces, or the absence of fearful faces, made a difference to the stimulus effect for the alcoholic group. However this is speculative, and there is known differences in how alcoholics process happy stimuli as compared to negative stimuli, which shall be discussed in more detail.

Indeed, Experiment 4 has already shown (consistent with Clark et at., 2007), that alcoholics perceive neutral faces as containing more emotion compared to non-alcoholic participants. Maurage et al. (2008) and Philippot et al. (1999) have also found a similar effect and speculate that certain emotions trigger delayed RT because these are most relevant to the alcoholic's interpersonal feelings and conflicts. This was also found in the Maurage et al. (2009) study on prosody and posture. While alcoholics demonstrated a lack of ability in decoding negative prosodic and body postures their ability to do the

same in the happy conditions was matched with controls. Thus previous research suggests alcoholics show a specific deficit in the processing of negative emotional stimuli. The experiments in this thesis cannot support the notion that alcoholics demonstrate a generalised deficit in processing emotions. Given alcoholics' performance in this task and their matched RT response trend with non-alcoholics this gives rise to evidence (as seen within Kornreich et al., 2013) that alcoholics do not consistently show problems or differences from non-alcoholics in their processing of social and/or emotional information. In fact, it may be considered a 'healthy response' that alcoholics are showing differences in reactions to various emotional stimuli.

### 8.4.3 Alcoholism and VSPT

The results from this experiment, taken together with those from Experiments 1, 2, and 3 show that alcoholism cannot be associated with any problems with VSPT, and that the deficits alcoholics face in other areas of social processing (facial recognition, emotional understanding, prosodic and vocal evaluation) are not linked with perspective taking. This adds to other evidence (Uekermann et al., 2005) which shows that despite alcoholics' poor performances in many others areas of social comprehension and processing, some areas remain undiminished and hence performance on tasks preserved. This gives more need for a 'unifying model' which would help to present the most common and researched deficits that alcoholics exhibit when processing social information. At this point in the research process what requires focus is the delineation between the cognitive processes which disrupt emotional processing in alcoholics and those which are simply slowing it. Neuroimaging would provide the most accurate evidence for such research in being able to tease out the causal mechanisms which are disrupted due to alcoholism (Oscar-Berman, & Marinkovic, 2003).

Once more alcoholics showed an overall delay in responding to all the stimuli as compared to non-alcoholics. However, the RT trends for both groups were similar. Thus providing more evidence that over time significant alcohol abuse will invariably lead to slower cognitive and motor responses to

external stimuli and consequently this can be detected in a range of tasks (Evert & Oscar-Berman, 1995; Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003). These results are consistent with those of Kornreich et al. (2013) whose results also showed alcoholics are systematically slower but that the end results for accurate identification - or in this case – perspective taking – were not impaired.

### 8.4.4 Conclusion

Future research, beyond the scope of this thesis, should also seek to understand the processes which are causing inaccuracy in the detection of emotional stimuli and those which are simply slowing it. Certain regions of the brain (N170: an electrode negative potentiation site consistent with right lateralization found in the fusiform and inferior-temporal gyri) have been implicated with regards to the delayed processing of negative stimuli which are not indicated when processing positive ones (Maurage et al., 2006). Such evidence as provided by Maurage et al., (2006) calls for a deeper and more neurologically informed inquiry into the cognitive processes which are simply slowing emotional processing and those which are causing deficits in emotional identification and evaluation. The issue of delayed processing, which has been shown across all VSPT trials throughout this thesis, does not equate to poor social processing *per se* and the inaccuracies of detection of emotions are increasingly becoming a separate issue. That is to say, these studies have only found a deficit in social processing when rating the faces for emotion; with regards to VSPT, the time delay did not cause any inaccuracies for the alcoholics. Once more, the implications of such delays in processing cannot be surmised and the impact of such delays on alcoholics' functioning would be a matter for other research.

Effective social skills have been linked with better treatment outcomes (Philippot et al., 1999). So with this in mind and given the problems that alcoholics have shown when accurately rating the faces in these and other studies, one more study on rating faces is warranted. As before, the alcoholics and the non-alcoholics were asked to rate the faces presented from this study.

Although there have been no differences in VSPT found here it was considered a possibility that alcoholics would perceive happy and neutral faces as containing more/less emotion and/or happiness.

# Chapter 9

## 9.1. Experiment 6a: Ratings of happy and neutral faces

Experiment 4 has shown that alcoholics to do not confuse fearful and neutral faces, although they do perceive a higher level of emotion with the neutral faces than non-alcoholics. In the following two experiments (6a & 6b) the aim is to assess alcoholics and non-alcoholics ratings of happy and neutral stimuli, as per the rating method of Experiment 4.

With regard to alcoholics' performance in emotional processing tasks involving happiness, studies have concentrated on accurate identification and ability to accurately rate the level of intensity of this emotion (Clark et al., 2007; Kornreich et al., 2013; Maurage et al., 2009; Philippot et al., 1999). There has been no consistent finding on how alcoholics react to positive emotions but this is perhaps due to variation in measures and populations. For example, in a recent study by Kornreich et al. (2013), alcoholics were significantly impaired when it came to recognising happiness in voices, but accurately rated the level of intensity of a happy voice. In the same study, alcoholics' accuracy scores for recognising happy faces and how much intensity they attributed to them did not differ significantly from the control group. In an earlier study by Philippot et al. (1999), detoxified alcoholics were compared with controls for accuracy of decoding and rating of levels of intensity of emotional faces at four levels of intensity, 0%, 30%, 70% and 100%. For happy faces they found alcoholics' scores for accurately identifying this emotion was systematically worse than controls for all levels of intensity, but this was not significant. Similarly, alcoholics rated happy faces as more intense than controls but this was not significant. Thus the

emotion happiness produces unclear and contradictory results in emotional processing tasks in alcoholic samples.

The current experiment seeks to understand whether alcoholics confuse happy and neutral faces, although this is not expected given the findings in Experiment 4, and as per the predictions of Maurage et al (2009). There is no expectation that alcoholics would demonstrate a labelling error in the first part of this experiment. However in the second part of this experiment, both groups will be once more asked to quantify the level of emotion the facial stimuli contains and it is here that alcoholics – as per the findings of Experiment 4 – may show a difference, rating neutral faces as containing more emotion than non-alcoholics. Thus this study is important to validate the reliability of the findings of Experiment 4.

## 9.2 Method

### 9.2.1 *Participants*

The same participants that took part in Experiment 4, providing ratings of fearful and neutral faces also took part in this experiment one month after. See Section 7.2.1 for details of participants.

Importantly, however once more all the alcoholic participants were alcohol free at the time of testing as assessed by their key-worker using a breathalyser test. The breathalyser measures BAC and the reading had to be 0% for participants to take part in this experiment.

### 9.2.2 *Apparatus and Stimuli*

Stimuli were presented within questionnaires on plain white A4 paper. The facial stimuli used for the questionnaires for this experiment were those also used for Experiment 5. Thus, 12 male and 12 female grey-scaled faces with hair removed and presented against a black rectangular background (4” in width x 6” in height) were presented (see Figure: 8.1). Twelve of the faces

conveyed a happy expression and 12 a neutral expression. Participants were asked 'How happy is this face?', and asked to indicate their response on a 7-point Likert scale, 1 – indicated 'not at all happy', and 7 – 'very happy'. This Likert scale was partially replicated from Clark et al. (2007).

All participants were asked to complete the four question FAST (NICE, 2002).

### 9.2.3 *Design and Procedure*

This experiment is a 2 x 2 mixed design, with Group being the between subject variable 2 with two levels (Alcoholic, Non Alcoholic) and Stimuli being a within subjects variable also with two levels (Happy and Neutral faces), the dependent measure was the participants ratings of the faces.

Trials were randomised with half of participants completing the FAST audit before completing the rating task and half after. Participants were instructed how to complete both sets of questionnaires. All of the facial stimuli were randomised. Participants were asked to view the faces one at a time and indicate on the 7-point likert scale how fearful the face was. Participants were asked to indicate by circling a number 1 through to 7. If participants did not perceive the face as fearful then they could select number 1, and numbers 2-7 worked on an intensity continuum with 7 being 'very happy'.

## 9.3 *Results*

Ratings are summarised in Figure 9.1. Alcoholics and Non-Alcoholics showed a similar trend for rating. Overall, happy faces were rated as much happier than neutral faces. Ratings were analysed in a two-way mixed ANOVA with Stimulus Type (Happy, Neutral) as the within- participants factors and Group (Alcoholic, Non-Alcoholic) as the between-participant factor. There was a main effect for Stimulus Type $F(1,58)=3425.61$, $p<.001$, $R^2=.983$, due to the happy faces being rated more happy than the neutral faces.

However given the similarity in ratings by both groups, no main effect for Group was observed, $F(1,58)= 2.99$ $p=.089$. Hence, there was also no interaction between Stimulus Type and Group, $F(1,58)=1.07$, $p=.305$.

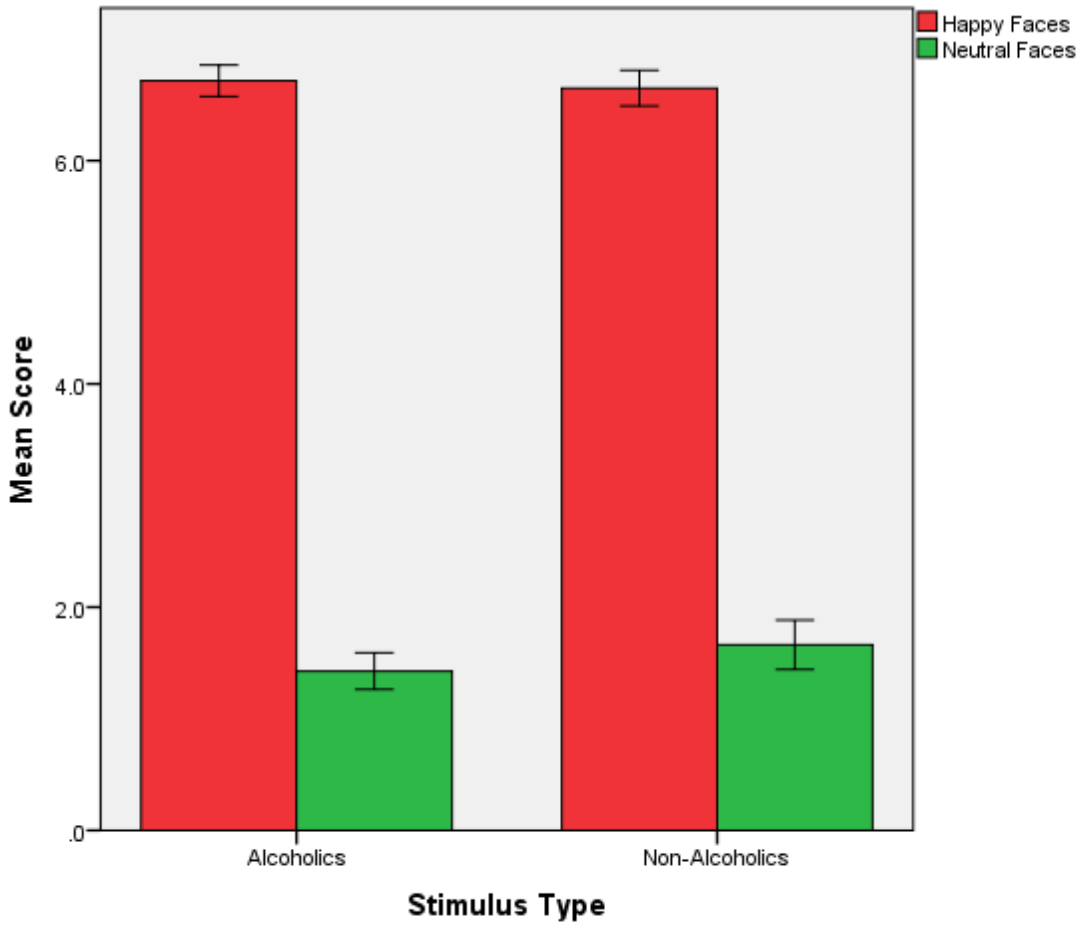


Figure 9.1: Mean happy rating to neutral and happy stimuli (from a total of 7) for both alcoholics and non-alcoholics. Bars represent the 95% confidence interval

## 9.4 Discussion

### 9.4.1 Summary of the main findings

The aim of this experiment was to understand whether there are any processing differences of happy and neutral faces, as presented within Experiment 5, between alcoholics and non-alcoholics. Experiment 5 had shown that alcoholics and non-alcoholics both show an extra RT cost to happy over neutral faces. However, in Experiment 4, alcoholics rated neutral faces as containing more emotion than non-alcoholics. Therefore would this finding from experiment 4 be replicated? Would alcoholics show any differences in how they perceive happy faces?

The results show that neither the alcoholics nor the non-alcoholics rated the neutral faces as happy. Thus neither group processed these faces as containing happiness. Such findings as this are in line with those of Maurage et al. (2009) who state that an alcoholic's deficits in emotional processing is not simply a labeling error. There was a similar rating trend shown by both groups and the alcoholics did not exhibit any great differences in their ratings compared to non-alcoholics. There was a ceiling effect for rating the happy faces as happy. Once again there were no significant differences in ratings between the groups and thus the alcoholics showed no impairment in the ratings of happy faces.

In order to further understand the nature of alcoholics' reaction and perception of the neutral and happy stimuli used within this thesis the second part of this experiment employs the methods of Clark et al. (2007) as described in Chapter 7.

## 9.5 Experiment 6b: Rating faces as containing emotion

Within the second part of this study, alcoholics will be asked how much they believe the happy and neutral stimuli presented in Experiments 4 contain emotion. Asking the question this way allows a wider scope for interpretation of the results, and may indicate differences in the perception of these facial stimuli between the two groups.

## 9.6 Method

### 9.6.1 *Participants*

The same participants were used as was in the first part in this experiment. For details see 9.2.1. Participants were approached for this study 6 weeks after part A of this experiment.

### 9.6.2 *Apparatus and Stimuli*

Stimuli were presented within questionnaires on plain white A4 paper. The facial stimuli used for the questionnaires for this experiment were those also used for Experiment 5. Thus, 12 male and 12 female grey-scaled faces with hair removed and presented against a black rectangular background (4" in width x 6" in height) were presented (see Figure 8.1). Twelve of the faces conveyed a happy expression and 12 a neutral expression. Participants were asked to rate how much they believed the face to 'Contain emotion?', and asked to indicate their response on a 7-point Likert scale, 1 – indicated 'not at all emotional', and 7 – 'very emotional'. All participants were asked to complete the four questions FAST (NICE, 2002).

### 9.6.3 *Design and Procedure*

Trials were randomised with half of participants completing the FAST audit before completing the rating task and half after. Participants were

instructed how to complete both sets of questionnaires. All of the facial stimuli were randomised. Participants were asked to view the faces one at a time and indicate on the 7-point likert scale 'contains emotion'. Participants were asked to indicate by circling a number 1 through to 7. If participants did not perceive the face as emotional then they could select number 1, and numbers 2-7 worked on an intensity continuum with 7 being 'very emotional'.

### 9.7 Results

Ratings are summarised in Figure 9.2. There was a trend to rate the happy faces as much more emotional than neutral faces. A ceiling effect was observed by both the Alcoholics and Non Alcoholics in how emotional they rated the happy faces. Ratings were analysed in a two-way mixed ANOVA with Stimulus Type (Happy, Neutral) as the within-participants factors and Group (Alcoholic, Non Alcoholic) as the between-participant factor. There was a main effect for Stimulus Type $F(1,58)=1538.15$, $p<.001$, $R^2=.964$, and for Group, $F(1,58)=102.04$, $p=<.001$, $R^2=.628$. There was also an interaction between Stimulus Type and Group, $F(1,58)=.95.82$, $p=<.001$, $R^2=.623$.

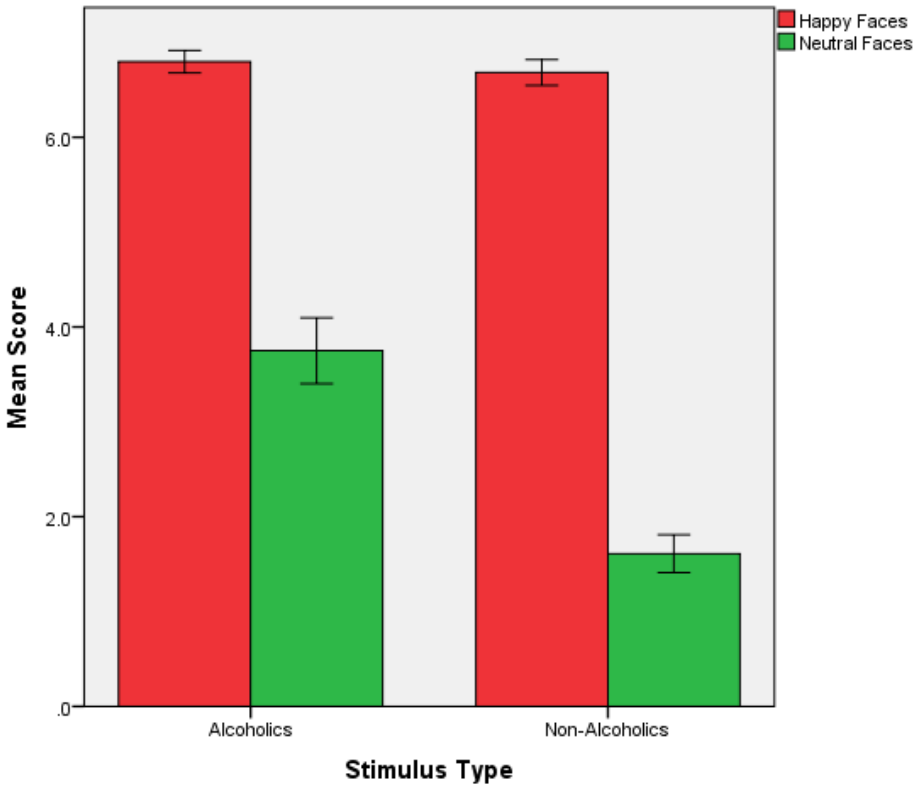


Figure 9.2: Mean happy ratings to neutral and happy stimuli (from a total of 7) for both alcoholics and non-alcoholics. Bars represent the 95% confidence interval

The interaction was observed because Alcoholics rated neutral faces as significantly more emotional than Non Alcoholic, $t(58)=10.91$, $p<.001$, CI -1.75 - 2.53. However, this difference did not extend to happy faces, $t(58)=1.15$, $p=.255$

## 9.8 Discussion

The aim of this experiment was to understand whether there were differences in how alcoholics and non-alcoholics perceived the facial stimuli presented in Experiment 5. Furthermore, Experiment 4 has shown that alcoholics do not confuse the emotions presented but that they do perceive a level of emotion in the neutral faces that non-alcoholics do not. Thus the aim of this current experiment was to see if those results could be replicated. Findings suggest that alcoholics do perceive a level of emotion in the neutral faces within these experimental trials that non-alcoholics do not.

Given that this is a replication of the findings of Experiment 4, and at this point in the experimental process no other conclusions are apparent. However, it is noteworthy once more that the similar response rating between the groups regarding the happy faces indicate the alcoholics show no deficits in their ability to correctly identify the emotion 'happiness'. However, as outlined within the introduction of Experiment 4 (see section 7.1); previous evidence has also shown that alcoholics do not consistently show problems with emotional identification in facial stimuli unless asked to quantify the level of emotion the face is expressing. When alcoholics are given a greater scope for interpreting the faces, such as 'contains emotion', and/or there are no direct cues as to what emotion the faces may be expressing, alcoholics show processing differences as evidenced by their greater level of inaccuracy as compared with non-alcoholics (Clark et al., 2007). As both groups showed a ceiling effect for rating happy faces as containing emotions we know that this is a face which is 'obviously' emotional – this point was alluded to in Chapter 7. The neutral face however, was perceived as 'neutral' or perhaps more specifically as 'non-emotional' to the non-alcoholics (their ratings were low). However, unlike in the first part of this experiment where alcoholics were given a choice to rate the neutral faces as happy or not, in this second part they had to decide if the face were emotional and if so, how emotional. In making this decision alcoholics show a difference in their ratings of neutral faces as compared to non-alcoholics, rating them as containing more emotion, this finding supports the ratings given by alcoholics in Experiment 4. It is reassuring that this result has been found once more, it gives credit to the

previous findings from Experiment 4, it also provides a platform for greater exploration in future studies into what it is that alcoholics are actually seeing with these neutral faces.

However, it is not clear *why* alcoholics rated the neutral faces as emotional, although this is consistent with the literature in which alcoholics overestimate the emotion contained in neutral stimuli (Kornreich et al., 2013; Philippot et al., 1999; Maurage et al., 2009). The answer as to why alcoholics' perceive emotion in neutral faces may be neurologically mediated.

Although speculative, this overestimation of emotion in neutral faces may be evidence of a hyper-vigilance of 'all faces', as alcoholics are anticipating the faces to be emotional based on previous experiences. In this sense, alcoholics may be overestimating the emotion conveyed in the neutral faces, perceiving them negatively and in turn automatically treating them with pessimism. Behaviour of this type would serve to reinforce previous negative experiences, which in turn maintain maladaptive schemas about the world around them and be a driving force for continued alcohol use. This idea that alcoholics perceive the world with a negative bias has been alluded to throughout this thesis so far (see section 7.8.1 for comments on participants' perceptions). It was noted in this section and is again of relevance that a qualitative inquiry into the effects that alcoholism has on perceptions of their social world warrants consideration in future research.

At this point in the research processes, both in this thesis and in the larger research area, we do not know why alcoholics are processing emotional stimuli differently to non-alcoholics, and whether this is because of complex neurological damage or whether this is also an issue caused by the environment, personality and/or social issues, or all of these factors. This lack of clarity necessitates future enquiry and allows for an interpretation of the results that is only speculative. The following discussion of the results from the thesis is placed in the context of the research field and with a view to future inquiry.

# Chapter 10: Discussion

## 10.1 Summary of the main findings

The introduction to this thesis presented a review of the evidence of links between impaired social processing and alcoholism. While the research discussed did not identify or evidence the reasons why any one person may drink it highlighted the range of social processing problems which are linked to alcoholism. Research demonstrates that alcohol abuse in adults may compromise social processing and shows that basic emotion recognition tasks and estimation of emotional stimuli is impaired (Clark et al., 2007; Kornreich, et al., 2013; Maurage**,** et al., 2007; Maurage et al., 2008; Townshend & Duka, 2003b**).** This body of research asserts that impaired social processing and deficits in nonverbal communication play a crucial role supporting and maintaining the maladaptive coping mechanisms of alcoholics (Philippot, et al., 2003; as cited in, Philippot, et al., 2003). This literature was presented in order to highlight the damaging effect alcoholism has on social functioning and how this may impact on treatment outcomes**.** This thesis sought to extend understanding of these links.

Presented below in Table 10.1, is a summary of the experiments and the main findings from this thesis. What follows from this is an examination of the main findings in light of their relation to relevant empirical research and the ramifications of these findings for future research and treatment. The implications of the findings on alcoholics' daily lives will also be discussed.

Table 10.1: The main findings summarised from Experiments 1, 2, 3, 4, 5 and 6 for the research in this thesis.

| Experiment and Aims | Findings |
|---|---|
| **Experiment 1 - to investigate the impact of alcoholism on VSPT. Do alcoholics automatically perspective take?** | The non-alcoholic and the alcoholics' responses were delayed when the perspective differed from their own.<br><br>Both groups showed a perspective RT cost in the neutral and fearful conditions.<br><br>The non-alcoholics showed an extra RT delay to fearful faces only.<br><br>The alcoholics showed no extra RT to fearful over neutral faces. |
| **Experiment 2 - to understand whether the removal of fearful faces would have an effect on either groups' RT to the neutral faces.** | The non-alcoholics and the alcoholics showed a delayed response to neutral faces when the perspective differed from their own.<br><br>Alcoholics' RT remained slower overall.<br><br>The removal of fearful faces from the experimental trials did not affect either the non-alcoholic or the alcoholics' reaction in the neutral face condition. |
| **Experiment 3 - to re-run the experimental conditions of Experiment 1, but to include an anxiety measure to investigate whether anxiety was confounding the results found in the previous two experiments.** | The results from Experiment 1 were replicated.<br><br>The covariate, anxiety, had no significant effect on the RT for the test conditions.<br><br>Collapsed across the groups there was a positive correlation between scores on the STAI and RT to neutral and fearful faces. Higher scores correlated with longer RTs. |
| **Experiment 4 - to understand how alcoholics perceived the fearful and neutral faces as compared** | Alcoholics and non-alcoholics did not differ in their ratings on how fearful they perceived the experimental stimuli.<br><br>Both groups did significantly differ on how |

| | | |
|---|---|---|
| | **to non-alcoholics.** | emotional they perceived the neutral faces to be. Alcoholics rated the neutral faces as containing more 'emotion' than the non-alcoholics. |
| | **Experiment -to investigate the impact of happy faces on VSPT.** | As in Experiments 1, 2 and 3, both groups showed a delayed RT when the perspective was incongruent to their own.<br><br>Happy faces did trigger VSPT for both the alcoholic and non-alcoholics.<br><br>Alcoholics showed an extra RT cost in the happy face condition as compared to neutral faces. |
| | **Experiment 6-to understand how alcoholics perceived the happy and neutral faces as compared to non-alcoholics.** | Alcoholics and non-alcoholics did not differ in their ratings on how happy they perceived the experimental stimuli.<br><br>As in Experiment 4, both groups did significantly differ on how emotional they perceived the neutral faces to be. Alcoholics rated the neutral faces as containing more 'emotion' than the non-alcoholics. |

## 10.2 VSPT and Alcoholism

The aim of the research in this thesis was to understand the effect that alcoholism would have on a specific social process, namely, VSPT. The reason for choosing VSPT as opposed to any other social-cognitive process is there is evidence that alcoholics show visual spatial deficits in non-social tasks. Furthermore, it has been shown that alcoholics have deficits in processing emotional facial stimuli. It is possible therefore that VSPT is a contributing factor to the deficits in emotional processing. As stated in Chapter 2, this thesis does not seek to explore the antecedents to alcoholism therefore the assumption underpinning the experimental conditions is that deficits in VSPT would be a 'consequence' of alcoholism.

The results from Experiments 1, 2, 3 and 5, have shown that alcoholism is not associated with any clear or obvious deficits in VSPT. Alcoholics within the experiments in this thesis were able to automatically take the perspective of the facial stimuli, and this effect was stronger – and more delayed – when the perspective was incongruent to their own. This extra RT to incongruent perspectives is evidence of processing the relevance of the facial stimuli. Alcoholics did not show any RT cost within any of the baseline conditions when the perspective differed from their own. Hence, facial stimuli automatically triggered VSPT. The research in this thesis has shown that problematic VSPT is not one of the many consequences of alcoholism; although given the lack of any relevant studies in this area it may be premature to make so bold a statement. In Experiments 1, 2, 3 and 5, alcoholics – like the non-alcoholics – demonstrated that VSPT was automatically triggered and therefore cognitively effortless; this is in line with previous findings of Zwickel and Müller (2010). Therefore research on alcoholism can add to the research literature that shows that VSPT is a cognitively automatic process which is triggered spontaneously and this effect is stronger when the perspective differs from one's own.

However, it is with caution, given the lack of research in this area, that it can be concluded that alcoholism is not associated with any deficits in visual perspective taking. Across all of the VSPT experiments in this thesis, alcoholics have shown processing differences as compared to non-alcoholics, albeit a difference that is not clearly understood. It could be argued that there is some fragility in an alcoholic's ability to take another's perspective given their longer RT's to facial stimuli and their bias towards all faces regardless of emotion. Therefore greater exploration into the processes underpinning VSPT in alcoholics is needed; exploration by means of other VSPT trials which may highlight the differences which *may* exist or indeed help to conclude that problems in this domain are non-existent in this clinical group. From here it could be suggested that VSPT trials, which do not include emotion or indeed faces may be the most reliable method to capture whether VSPT is diminished in alcoholics. If a full-bodied avatar were to be used in future studies (as per the methods of Quershi et al., 2010) this would help to establish whether

VSPT is fragile in alcoholics or whether emotional processing is causing RT differences. That is to say, in removing emotion from the VSPT trials, this may help to understand whether emotion is confounding social processing in alcoholism or if it is a cognitive deficit. One study that could therefore be carried out with an alcoholic population is the perspective taking task by Quereshi et al., (2010), in this study participants are presented with a full bodied avatar with a neutral expression standing within a room (presented 3 dimensionally). Participants are asked to identify the location of a series of dots from either their own of the avatars perspective. This is a crude test of perspective taking from one's own or another's perspective without the interference of emotion, thus competence in this task shows that one can objectively take on the visual perspective of another in relation to the participant's own perspective. Such an experimental design would help to understand whether alcoholics ability to take on another's perspective in basic (emotionless) conditions in relation to their own perspective.

Furthermore, although alcoholics were slower overall this was not indicative of any problems with VSPT, and alcoholism is associated with a general slowing of visuo-motor processes (Evert & Oscar-Berman, 1995). It would be speculative at this stage in the research process to suggest that alcoholics' slow performance compared to non-alcoholics across the task would be problematic. As highlighted with the Bosco study (2013) what the results from the VSPT trials in this thesis show only provide evidence for impairment in conscious processing. They do not provide evidence that alcoholics have deficits in their ability to take another's visual viewpoint in real time which facilitates successful social interaction.

The day to day ramifications of this delayed RT are not fully known or understood. What seems more important at this stage is the clarification that perspective taking is not adding to the list of social processing issues with which alcoholism is becoming associated. Thus, a deficit in VSPT cannot be included in the range of impaired social processes alcoholics' experience (Philippot, Feldman & Coats, 2003). Similarly, alcoholism is strongly associated with visuo-spatial processing problems (Bűhler & Mann, 2011; Butters et al., 1977; Clark, et al., 2007 Ellis & Oscar –Berman, 1989;

Moselhy, et al., 2001; Müller-Oehring et al., 2009; Oscar-Berman, 2000; Oscar-Berman & Marinkovic, 2003), and this has been linked with right hemisphere damage caused through continual alcohol misuse, but while it may be the case that these visuo-spatial issues are linked with the processing of emotional information, the evidence from this research shows that it is not linked with perspective taking.

Kornreich et al. (2013) press that a unifying theory that takes into account all of the deficits that alcoholics experience while processing emotional information needs to be presented, but the experiments in this thesis can show that perspective taking, and more so VSPT, cannot be included in such a theory. Hence, more research needs to be done, which understands the nature and extent of social processing problems alcoholics face. Kornreich et al. (2011) have also shown that alcoholics exhibit a preserved performance (matched with controls) for emotional recognition in a ToM based task, and also in their abilities to accurately rate happiness in written excerpts and vocals (Kornreich et al. 2013) which means that alcoholics deficits in emotional processing are complex and require more understanding.

Thus, such evidence provided by others and from these experiments in this thesis show that to categorise alcoholics as experiencing problems with social processing *per se* would be a gross over simplification of the issues at hand. In turn, this would also be generalisation which is neither warranted nor accurate. While alcoholics have repeatedly demonstrated deficits in understanding and/or perceiving emotional information, specifically that which is negative (Philippot, Kornreich & Blairy, 2003), these problems appear to be with the interpretation of emotion and that these problems are not being caused or confounded by an alcoholic's ability to take on another's visual perspective. Hence, the cognitive processes involved in perspective taking may be slowed by alcoholism, but are not impaired; the fault therefore appears to be the evaluative component in this information processing.

Anxiety is comorbid with alcoholism and anxiety itself has been shown to correlate with delayed visual processing of neutral and emotional stimuli (Calvo & Avero, 2005; Mogg et al., 2000; Williams et al., 1997; Wilson &

MacLeod, 2003). Of interest therefore, is that anxiety did not confound the results and did not affect VSPT for either the non-alcoholics or alcoholics. The results in Experiment 3 are important as, like alcoholism, anxiety is linked with the abnormal processing of social information. Those scoring highly on the anxiety measure did exhibit greater RT costs but the fact remains they were still able to take the perspective of the facial stimuli and again this effect was strongest when the perspective differed from their own. Kornreich et al. (2013) also included anxiety as a covariate in their study on emotional processing of words, music and voices and, like the research in this thesis, found that it did not confound the results. Thus it would seem that anxiety may not interfere with the processing of social stimuli to a degree which is concerning and the inference is that the effect of alcoholism alone is enough to cause social processing problems. However, it needs to be stressed that Experiment 3 and Kornreich et al. (2013) have eliminated anxiety as a confounding factor in a sober alcoholic population, but it is safe to say that alcoholics will be negotiating their social world when intoxicated, and this temporary state, along with the long term effects of chronic alcoholism are themselves triggers for state anxiety and the depression of GABA.

It is worth noting wider implications of such findings for alcoholics and how such results may be interpreted with respect to their day to day lives. Being able to take another's visual viewpoint is a necessary part of daily interaction, and any faults with this could cause problems in making oneself understood and understanding the behaviour of others. Given that alcoholics already face many problems in the processing of emotional information is it somewhat good news their VSPT skills remain undiminished. Within Chapter 1, the need for alcoholics to understand and be understood by those around them in a treatment forum was pressed upon, and being able to take another's visual view point may make this process somewhat easier; from being able to accurately gauge your surroundings and to having the ability to rapidly assimilate the information which is necessary. Furthermore, understanding the visual perspective of another is essential for self-protection and the protection of those around you from threat and harm.

Emotional processing in alcoholism has deliberately been left out of the discussion in this section because it seems important to separate out the process of VSPT and the processing of the facial stimuli – the emotion. VSPT is essentially the mechanics of *one* part of perspective taking and, while this is slow but unimpaired in alcoholics in these experiments, the emotional processing of the facial stimuli gives rise to another discussion which shall follow below.

### 10.3 Alcoholism and emotional processing within the experimental conditions

Experiments 1 and 3 have shown that alcoholics afford as much attention to neutral faces as they do fearful faces – showing no extra RT to fearful faces as compared to non-alcoholics when the perspective differed from their own. Experiments 4 and 6 may provide an explanation for this finding. Alcoholics rated neutral faces as containing more emotion than non-alcoholics. Hence the lack of extra RT to fearful faces in Experiments 1 and 3 may – in part – be a consequence of alcoholics regarding these facial expressions as equally relevant and worthy of attention. Meaning, alcoholics may regard these faces as similar although not exact. Experiments 4 and 6 have shown that alcoholics do *not* believe the neutral faces to be fearful or happy, simply that they have more emotional content as evidenced in the second part of these experiments which show that alcoholics *do* regard the neutral faces as more emotional than non-alcoholics. Such findings are in line with those of Clark et al. (2007), Kornreich et al. (2013), Maurage et al. (2009) and Philippot et al. (1999). Perhaps of equal importance, in the study by Philippot et al. (1999) alcoholics were not aware of their processing problems. In reviewing the research area Philippot, Kornreich and Blairy (2003) conclude that within their social experiences alcoholics perceive more emotional signals than those they interact with, signals which are misinterpreted with a negative and hostile bias, without noticing the problems they encounter within this domain. The rating experiments in this thesis (Experiments 4 & 6) provide evidence which can agree with their conclusions

– alcoholics do perceive emotion in neutral stimuli, thus increasing their perception of 'emotional signals'. However, the experiments in this thesis cannot concur with the conclusion that these are interpreted as negative or hostile, and there was no collection of data which questioned their belief on their performance – which would be advisable for future studies.

This issue has been pressed upon before by Philippot et al. (1999) and Maurage et al. (2008), who state that any deficit in processing negative emotions may be because these emotions are relevant to alcoholic's interpersonal interests and cause intrapersonal conflict. Alcoholics are frequently challenged about their lifestyle choices by their interaction partners, and the nature of these interactions are often reported to contain more violence than non-alcoholics social experiences (Philippot, Kornreich & Blairy, 2003). Of relevance to the conclusions of Philippot et al. (2013) are the perceptions that some of the alcoholic participants offered in Experiment 4 (Chapter 7, 7.8.1) regarding the neutral faces used with the experimental trials in this thesis. Three of the alcoholics commented (again this was not captured for analytical use but it is noteworthy) that the faces were generally negative, using adjectives such as cruel, menacing and disaffected. Terms which some could argue are linked to negative social interactions, intrapersonal interest and could lead to violence – as per the review of the literature by Philippot et al. (2003). It is not the intention of this thesis to answer *why* alcoholics may perceive their social interactions with a negative bias, but to highlight that social processing difference may be due to such a bias and this calls for greater exploration.

In Experiment 5, alcoholics and non-alcoholics both performed as per the predictions of Zwickel and Müller's (2010) study in that both groups showed an RT cost to happy over neutral faces. What is notable about this is that with the exception of the predicted slower response by the alcoholics it runs contrary to the findings of Experiments 1 and 3. In seeking an explanation for this, a study in electrophysiology by Maurage et al., 2007 found that a specific brain region (N170) associated with the perceptual processing of faces shows delays in an alcoholic group in responding to sad and fearful faces as compared to happy and neutral ones. This may suggest

that there is a unique – yet not fully understood – difference, which may be neurologically rooted and explains why alcoholics are responding differently to emotional stimuli and differently from non-alcoholics on some occasions but not others. An area for further investigation could be to determine whether the delay in the processing time allows for a negative bias in social judgment such that the alcoholic misinterprets the emotional state of another. Alternatively it may be that the alcoholic's slower response time is just a mechanism to avoid such eventualities. Ultimately the question could be asked whether there is any conscious cognition in the time lapse.

### 10.4 Neurological explanations for deficits in emotional processing in alcoholics

The above mentioned neurological explanations and those referred to in Chapter 2 may provide the most accurate information about brain regions which are most vulnerable to the cumulative effects of alcohol abuse and which affect social and emotional processing. It is known that right hemisphere damage, brain atrophy, abnormal projections from the amygdala and premature aging all provide evidence for cortical damage associated with emotional, cognitive deficits and inappropriate behaviour (Ellis & Oscar-Berman, 1989; Evert & Oscar-Berman, 1995; Uekermann & Daum, 2008; Oscar-Berman & Marinkovic, 2003).

However, while neurological expertise can provide explanations for emotional processing flaws in alcoholics, it is still very much dealt with by professionals and families alike as a social issue which tends to rely on a person to person resolution. That is to say, there are no direct neurological interventions to address this. However, research has shown that when people become abstinent and the longer they remain abstinent, their social processing skills do improve (for a review see Philippot, Kornreich & Blairy, 2003). This would indicate that a chronic level of alcoholism is associated with greater deficits in social processing (Clark, et al., 2007; Ellis & Oscar-Berman, Oscar-Berman & Marinkovic, 2003). The earlier someone chooses to give up alcohol in their life and the longer they maintain this, the better the outcome.

Therefore a worthwhile medical approach would be one that supports abstinence and withdrawal such as pharmacological interventions, as currently available, used in conjunction with cognitive behavioural approaches. This would indicate that current treatments are an effective way of remediating those social effects of alcoholism potentially underpinned by neurological explanations.

While the remit of this thesis does not extend to neurological investigation, it is worth noting that those who have suffered the most severe levels of brain damage through alcoholism are those for whom the extent of deficits in emotional processing has been linked to treatment outcomes, relapse, and treatment drop-out, as well as interpersonal problems (Berking et al., 2011; Philippot et al., 1999; Philippot et al., 2003 Uekermann & Daum, 2008). This evidence shows the deficits in emotional processing, caused by alcohol addiction may serve as a trigger for continuous drinking and an avoidance of treatment. It is in this sense that alcoholics are in a maladaptive and continuous cycle of drinking alcohol which damages their social and emotional skills, and then drinking to find relief and a way of coping with these (See Figure 10.1. below).

The model presented by Philippot et al. (2003) elegantly describes the complex and reinforcing interaction between alcohol consumption and difficulties in areas of social functioning. This model argues that these are mediated by non-verbal deficits. While this is not new to research the experiments included in this thesis, one cannot fully conclude that VSPT is or is not one of the non-verbal deficits that can be identified in this model. Interestingly where this model contributes to this body of research is in identifying the effect of direct alcohol consumption on social functioning; the findings in these experiments and other research are based on alcoholics' emotional processing when they are sober. Furthermore this research has shown that alcoholics are showing emotional processing differences as compared to non-alcoholics; differences which may equate to both non-verbal and social competence deficits as highlighted within this model. Other research, which is presented throughout this thesis, shows that alcoholism is associated with emotional processing differences and it is the evidence from

this body of research that is the backbone to this model (Philippott et al., 2003).

There are some important and pivotal points regarding how the experimental evidence provided in this thesis can be explained by and contribute to this model. Firstly, whilst one may accept that VSPT is not completely abolished in alcoholics as evidenced by the VSPT task, these trials do show differences between the groups. Although subtle, alcoholics' reactions to the stimuli both in terms of attention to the emotional valence of the stimuli and the RT differences do show that alcoholics are showing social processing differences. As mentioned, there can be no firm assertions on how this would affect an alcoholic's day to day living but these differences do show a fragility in alcoholics' social processing abilities, fragilities which may affect non-verbal processing as shown in the figure below, and fragilities which may affect social competency. The question is therefore; how can these processing differences effect alcohol consumption? One answer may be that these small but significant differences (slower reaction times and an exaggerated salience to neutral stimuli) may not be enough to reinforce maladaptive drinking cycles. However, if the findings from this thesis are included to emotional processing deficits that have been evidenced by other research discussed throughout this thesis (misidentification of emotions, exaggeration of emotional intensity, inappropriate behavior and a lack of humor comprehension) then the differences found within these experiments contribute to a wider issue of social processing deficits in alcoholism. Pieced together, all these flaws in an alcoholic's social cognition and in turn, interactions, may prove unpleasant and overbearing; it is these sorts of negative feelings triggered by a lack of social competency that is the general school of thought for why an alcoholic continues to drink, as shown within the cycle of non-verbal deficits. Research also shows (Clark, et al., 2007; Ellis & Oscar-Berman, 1989; Oscar-Berman & Marinkovic, 2003) that continual alcohol abuse will further damage nonverbal deficits and thus the cycle continues – shown below. Therefore, in future experiments within VSPT or any other social processing task, the years that an alcoholic has been abusing

alcohol needs to be captured – and that is perhaps a weakness within this data collection.

The findings in this thesis contribute to the wider picture that there alcoholism is associated with social processing flaws, that need greater exploration and the ramifications need to more understood. Cycles such as the one presented by Philippot et al. (2003) can help to separate out the elements which need attention in future research and to clarify the meaning of findings such as those within the thesis (Figure 10.1).

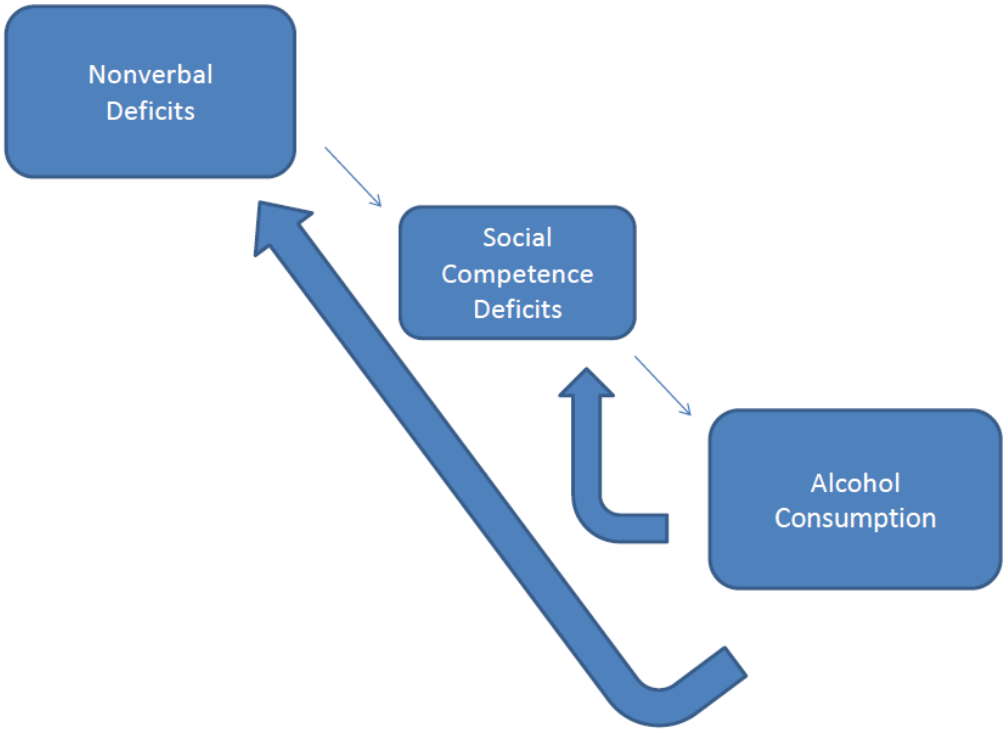


Figure 10.1: The cycle of non-verbal deficits, social competence deficits and alcohol consumption (Philippot et al., 2003, pg. 218).

### 10.5.1 Emotional processing, family life and alcoholism

In childhood, emotional understanding is an essential part of personality formation. It is through our perception of experiences of how our

caregivers and important figures interact with us that schemata on emotional understanding (empathy) and reciprocity are developed (Bowlby, 1988). Childhood is a sensitive phase, which needs to be nurtured and supported by the caregiver through secure un-ambivalent attachments. Such attachments should support growth, development and security (Bowlby, 1988). There is anecdotal evidence which supports the notion that children who are neglected or being sexually abused are more likely to misuse alcohol as an adult, especially women (Widom & Hiller-Sturmhöfel, 2001). Moreover, effects of prenatal alcohol exposure (foetal alcohol syndrome) are associated with a negative effect on social behavior in human and animal species (Kelly, Day & Streissguth, 2000). Widom and Hiller-Sturmhöfel (2001) also, and perhaps controversially suggest, that alcoholic parents are more likely to abuse their children because the long-term neurological damage to the brain is such that inhibition processes fail to stop socially inappropriate behavior. On a more short term and day to day basis because alcohol directly affects cognitive functioning, intoxication leads to less reasonable and more violent conflict resolutions, resulting in increased abuse and tension within relationships (Caetano, Field & Nelson, 2003). In this sense, the literature presented throughout this thesis shows that alcoholics are more likely to misinterpret the emotional content around them and this would include children as well as adults, suggesting children and family units are just as vulnerable to the possible consequences of an alcoholic's misinterpretation of social interactions.

Moreover, children who witness violence within a domestic environment are more likely to abuse alcohol themselves as adults. In a study Brennan and Shaver (1995), adults whose attachments in adult relationships had been identified by an experimental measure as anxious-avoidant and ambivalent were more likely than securely attached adults to report having an alcoholic parent during childhood or be the adult child of a problem drinker. The results of which indicate parental alcoholism mediates the inability of the child to develop secure adult relationships. All of which shapes and influences their future and all of which may contribute to stressors within their adult life

which may led to drinking alcohol or taking drugs themselves to fill emotional voids (as per the self-medicating hypothesis; Khantzian, 2007).

In terms of alcoholism and the impact of family communication, it has been suggested that families with an alcoholic member demonstrate greater levels of conflicts, criticisms and avoidance than families without an alcoholic member (Gabarino & Strange, 1993). Similarly, in a study by Jones and Houts (1992) young adults with an alcoholic family member reported greater negative communication within the family unit (7.8.1. has already discussed the negative comments afforded by alcoholics regarding the neutral faces but this is also relevant here), including denial of their own feelings and needs from caregivers, negative perceptions of their family and also reported difficulties in decoding both verbal and nonverbal emotional cues.

In summary, although more evidence is needed, the effects of alcoholism on social environments for children and family units are negative. Of greater relevance within the context of this thesis, is that the misattribution and misinterpretation of emotions (by facial expression or any other emotional communication) by parents towards their children will likely contribute to the further damaging of an already dysfunctional relationship. While this thesis cannot firmly conclude that VSPT is/is not abolished in alcoholics the ratings experiments do show that alcoholics do perceive neutral stimuli as more emotional than non-alcoholics. Although we do not know *what* alcoholics perceive in these neutral faces, we do know that they are misinterpretations and that in terms of family dynamic these misinterpretations will be directed towards family (including children) as well as the stranger on the street. It is therefore important for family life, and safe care of children and the well-being of alcoholics that if negative biases towards social/emotional information exist then more research is done to help.

### 10.5.2 Emotional processing, intimate relationships and alcoholism

In this section the issue of communication problems in couple relationships is highlighted, with an overview of the importance of social processing problems which mar the quality of the relationship.

One study which has eloquently highlighted communication issues in a relationship where one partner is an alcoholic is that of Sferrazza et al., (2002; as cited in Philippot et al., 2003). Within this questionnaire-based study they asked alcoholic and non-alcoholic couples to describe their relationship issues with particular focus on the intensity of, ruminations about and control of both their own and their partner's emotions. The results suggested a significant difference between the groups, with non-alcoholic couples demonstrating more positive relationship styles. Intriguingly, within the alcoholic couple group (despite one of the partners not being an alcoholic) there were very little differences reported in their experiences of guilt, anger, shame and sadness. Alcoholic couples reported more guilt intrapersonally but experienced more anger towards their partners. When asked to consider a recent emotional event, alcoholic couples also experienced greater difficulty expressing their thoughts on this, and reported ruminating more about the event – although they did not share these thoughts with their partners – instead choosing to share them with a professional. Importantly for the conclusions which have come beforehand (section 7.8.1), alcoholic couples reported more negative effects as a consequence of expressing their emotions, perhaps once more providing evidence that alcoholics are more likely to treat emotional information pessimistically as this is reflective of their own state (Philippot, 1999) and an automatic disregard as a means of self-protection. Overall, this study reports alcoholic couples as experiencing more negative emotions in intimate relationships, emotions which both partners experience as intense and out of control.

Explaining this lack of communication in alcoholic relationships, Brennan and Shaver's (1995) study shows that alcoholics are more likely to display avoidant romantic relationship attachments which correlated with

drinking to cope, jealousy, self-reliance and conversely, clinginess. However they also report that drinking to cope negatively correlated with trust.

These studies show that alcoholic adults tend to be insecure and demonstrate maladaptive coping styles (turning to alcohol). Bowlby (1988) introduced the notion that our attachments in early life would 'take us from cradle to grave', acting as a blueprint for future relationships. The evidence is that alcoholic parents diminish and hinder emotional development in their children, a developmental deficit which is not recovered in adult life and serves to continue a family cycle of alcohol abuse, although this is not a predetermined path.

### 10.5.3 Emotional processing and treatment

With regards to how alcoholism affects treatment, a difficulty with the processing of emotion is problematic. A study by Berking, Margraf, Edbert, Wupperman, Hofmann and Junghanns (2011) reports that alcoholics' deficits in emotional regulation skills predict alcohol use during and after treatment, specifically an inability to tolerate negative emotions. While the experiments in this thesis may provide good news that alcoholics' responses are not impaired in VSPT it does add to the growing body of evidence that alcoholics show specific differences to non-alcoholics when processing negative and neutral stimuli. This issue is rather pertinent with regards to treatment, because it is exactly in a therapeutic setting that alcoholics will experience negative emotions, their own and those of others in the group settings. Although it would not be the intention of a professional in this capacity to make their client feel uneasy, the empirical research reported throughout this thesis can explain how an alcoholic may misinterpret social information in a hostile or negative way. Thus alcoholics in treatment are liable to misread social exchanges and to exaggerate the intensity of the emotion conveyed by others (therapist or fellow alcoholic). Furthermore, if alcoholics cannot rely on accurate interpretation of facial expressions then their responses and behaviours are more likely to be inappropriate and undermine interpersonal relationships leading to poor social outcomes, including in treatment which

occurs in a social domain, (Kornreich et al., 2002; Uerkermann & Daum, 2008). A negative perception of treatment (which may be based on erroneous perceptions on that social world) may cause them to drop out of treatment and also not wish to reengage in the future. However, there are also issues with alcoholics' deficits in emotional processing which are relevant to the therapist conduct within the treatment setting and these shall be discussed.

First and foremost, the aim of treatment for any dysfunctional behaviour is to identify the problem (diagnosis), and the second is to tailor a treatment for that problem. For these two functions of this special and unique social interaction to happen, communication is key. Thus communication between the therapist and the client is the main source of information, especially in the instance of psychotherapy (Kappas & Descôteaux, 2003). Of course, background information and other professional reports may be relevant but ultimately the therapist needs to rely on the information of the alcoholics' experience. Obviously, there are times and cost restraints on national treatment services and thus this treatment needs to be effective. In this regard it becomes important for a therapist to utilise all of the sources of information available to them from the client, both verbal and non-verbal. It takes a holistic approach to be sensitive to the non-verbal but highly relevant cues of the client, and to appreciate the misunderstanding the client may have regarding the therapists own behaviour. Kappas and Descôteaux (2003) write 'non-verbal behaviours not only serve as signs or symptoms, but also are likely to have regulatory effect in a complex feedback system with the individual and within the dyad or group' (pg: 47). Non-verbal cues can serve to maintain relationships through reciprocity and synchronization; it is vital therefore to hone in on to the non-verbal emotional signals of an alcoholic to understand their perspective, because our usual form of theorising about another's mind may fail us when alcoholics hold a unique and negative view of the world around them. Kappas and Descôteaux (2003) explain, 'given that (emotional) communication in interaction forms a complex dynamic system, it is possible that even a seemingly insignificant and singular event becomes significant in shifting the state of the system in one or another direction' (pg: 47). Kappas and Descôteaux (2003) make the analogy that it is in this sense that a laugh or

frown may resemble the flapping of the wings of butterfly which theoretically could trigger a whole shift in the weather system. In the sense of an alcoholic and his/her therapist then, one singular and meaningless reaction by the therapist may be misread by the alcoholic and escalate into a position of mistrust and contempt (of course it can also be used to win confidence and trust). This is an elegant illustration that it is those clients who show the most social impairments as evidenced through emotional processing tasks that are the most likely to experience problems in treatment (for a review see Uekermann & Daum, 2008).

### 10.6 Non-alcoholics and VSPT

As has been discussed throughout (section 5.1.1.-5.4.2), Zwickel and Müller's (2010) study provided evidence that automatic VSPT was triggered by facial stimuli and this effect was more robust when the facial stimuli were emotional and hence socially relevant. However, perspective taking has not always been found under the conditions that Zwickel and Müller (2010) propose. In the VSPT trials within this thesis non-alcoholics and alcoholics showed a RT cost within the neutral face condition which is not consistent with the findings or predictions of Zwickel and Müller (2010). This may mean that emotion is not necessarily a requirement for perspective taking, only that when emotion is presented it does make a perspective effect more robust. Within Experiment 1 non-alcoholics showed an extra RT cost to fearful over neutral faces which would indicate the social relevance of fearful faces for this group. However, even though non-alcoholics showed an extra RT cost to fearful over neutral faces this does not mean that neutral faces were not relevant or meaningful to this group.

Essentially, the results from Experiments 1,2,3 and 5, appear to suggest that Level 1 VSPT (being able to identify another's visual viewpoint) is also triggered spontaneously and automatically to a stimulus which is not conveying emotion. At this point in the experimental processes what is known is that neutral stimuli can trigger VSPT but the meaning or motivation behind this process is not understood.

The reasons for the discrepancy between the findings of Zwickel and Müller's (2010) study and the findings in Experiment 1,2,3, and 5 are not clear; however, there are two possible, yet contradictory explanations for this finding. The first is that VSPT is only triggered in response to a facial or (human) bodily stimulus. The second as Mazzarella, et al., (2012), would suggest is that the mere presence of an actor is *not* enough to trigger perspective taking, but that an action is also required to trigger a participant response, such as the fearfulness expressed in the faces in Experiment 1. Findings like Mazzarella et al. (2012) along with the ones in Experiment 1,2,3 and 5 provide evidence that neutral stimuli can trigger spontaneous VSPT albeit under conditions under which are unclear as evidenced by contradictory and inconsistent research findings.

## 10.7 Limitations

There are some important methodological limitations that will be highlighted within this section.

The participants in the ratings experiments (4 & 6) took part in both the first part of the experiment (rating faces for fearf and happiness) and then the second phase of the experiment (ratings faces as emotional). It could be argued that the participants were desensitised to the facial stimuli on the second phase of data collection and that a habitation bias could exist. Participants may also have felt in the second part of the experiment that they were 'expected or obliged' to record responses that would be desirable for the research. Therefore in future experiments of this nature, independent, randomised-sampling should be employed. However, it is important to stress, that there is no adequate explanation why the methods used within this thesis would have created the difference in ratings between the alcoholic and non-alcoholics participants as shown in Experiments 4 & 6.

Throughout the VSPT trials in this thesis the participants were overall faster than the participants from Zwickel and Müller's (2010) study. This *may* be attributed to – but not fully explained by – the fact that this experimental

design is a simplified version of their study. Within their study they also asked participants to observe and indicate the gender of the face, because participants were not instructed to do this within the experiments in this thesis may cause them to process the faces more rapidly, without the need to show accuracy in the gender task. It may be speculated that the full version of Zwickel and Müller's study would highlight any fragilities that alcoholics do have with emotional and visual processing.

The participants throughout the experiments in this thesis are older than the participants in Zwickel and Müller's (2010) study. However, the alcoholic participants were recruited in these experiments before the non-alcoholics, recruiting this way meant the groups could be matched for age. It was more important in terms of age and cognition to match the alcoholics and the non-alcoholics for age than it was to Zwickel and Müller's study.

However, there are therefore limitations as to the degree the non-alcoholics in this thesis can be compared to their study.

Age should also be considered a factor for future research. No analysis on age was carried out within this research, but Oscar-Berman & Marinkovic (2003) state that the evidence also supports the possibility that older adults (50+) are especially vulnerable to the cumulative effects of heavy alcohol consumption. The symptoms of this damage within the over 50 year old population (slow responses/recognition tasks) is disproportionably expressed because it is also this population that would through the natural ageing process also become slower and show more signs of error in cognitive tasks. However, consideration also needs to be given to the prospect that many years of not processing emotional stimuli, because of limited experience caused through possible social isolation and a limited range of social experiences may also have diminishing effect on social processing skills, thus alcoholics may become socially de-skilled. Therefore future studies should differentiate between older and younger alcoholics. It may the case that social processing differences are actually a consequence of diminished cognitive differences caused through older age and alcoholism and that these deficits are not present or not as evident in younger alcoholics.

With regard to diminished cognitive resources, one key improvement of the VSPT trials would be to record participants perspective selection error rate. Only correct reactions were analysed for the VSPT data in this thesis, but the rates of errors would also be an interesting point of comparison between the groups. It may be speculated that alcoholics are making more errors. If alcoholics are making more perspective selection errors this would provide evidence that VSPT is a fragile cognitive process for this clinical group.

The alcoholic participants in these experiments were not explicitly diagnosed by the DSM-IV, so some may speculate how far can we generalise these results to the wider alcoholic population? However because the treatment centre does not explicitly classify their alcoholism by this measure this does not mean that many of their needs would not have met DSM criteria. Furthermore, it is axiomatic that alcoholics throughout are a heterogeneous clinical group with unspecified aetiologies; so having a representative group in terms of aetiology and life events is unlikely. However, all the alcoholics within this set of experiments are all engaged in treatment, because they volunteer for treatment, and they do meet the criteria for alcoholism via the FAST.

Past drug use may also be seen a limitation of the findings. However the service centre used as a source of recruitment does not recommend that clients be seen for alcohol treatment if they are currently using illegal substances. Past drug use was not recorded, and this may be argued that this is not a reliable source of data collection anyway given the psychotropic nature of illegal drugs. In keeping with the literature in this area a number of pieces of information were not obtained, including past drug use, and maybe this is a flaw across the research area. It may be pertinent in future studies to include a wider group of measures to eliminate other variables or to determine factors that score highly on a regression analysis.

One recommendation for future studies in light of the results of the VSPT trials in this set of experiments in this thesis is that of cognitive assessment and data collection on years of drinking. Had data on years of drinking been collected then a greater interpretation of the results could have

been made in terms of cognitive ability. Currently, the results do not tell us if those who showed the greatest differences within the trials (higher emotional ratings/slower RT) were also those who may have the greatest cognitive impairments caused by alcoholism. To this end, a test of cognitive assessment could also have been used, as per Uekermann et al. (2006) who also tested cognitive competence through memory tasks and mental arithmetic (set shifting) and non-mentalistic questions (general comprehension).

Diet was not considered an important confounding variable within this thesis. Once more literature within alcoholism and social processing area does not include studies that highlight diet as an issue. Although, thiamine deficiency, is a problem and likely among alcoholics, as it is caused through acute alcohol withdrawal and a poor diet. Thiamine deficiency severely affects cognition, causing brain damage and can lead to Korsakoff Syndrome. However, none of the participants throughout these experiments within this thesis were diagnosed with Korsakoff's Syndrome and therefore this is not considered to be a major factor. However, as with Clark et al., (2007) it may contribute to the research area if more social processing studies *do* include Korsakoff patients, as this provides a wider picture as to the extent of social processing problems in alcoholism.

Finally, the facial stimuli should be representative of an ethnically diverse group. All of the facial stimuli within these trials were Caucasian, thus the Karolinska faces are not representative of the British public. Furthermore, the participants were predominantly white British and the wider research used within this thesis include participants from various parts of Europe and the United States. Therefore it should be recommended that future studies seek as ethnically diverse population as is possible.

### 10.8 Concluding thoughts and future research

The research presented in this thesis (Experiments 1-6) demonstrates that alcoholics show no deficits in VSPT. It was important to separate visuo-perspective taking from emotional processing, and the experiments in this

thesis show that alcoholics, like non-alcoholics, are capable of taking another's visual viewpoint, and thus any differences between the two groups are not due to errors in VSPT.

However, alcoholics show processing differences due to the emotional content of the facial stimuli as compared to non-alcoholics. These processing differences are evident in the ratings experiments (4-6) and in the literature presented throughout. It is these processing differences (perceiving intensity on emotional and neutral stimuli, misidentification of emotions, and a lack of social comprehension) which highlight the major differences between alcoholics and non-alcoholics social experiences. It is these very experiences which seem to predict behaviour. Thus, understanding non-verbal communication in alcoholism and how alcoholics perceive their social world is important in helping them – and treatment providers - to work through and develop and understand the alcoholics' feelings. It would also help them to understand that their social world is being distorted by their drinking behaviour which in turn is both enabling and maintaining that distortion. If developing a greater understanding of why and how alcoholics experience deficits in emotional processing contributes to a reduction in relapse, the importance of emotional and social processing in the maintenance of alcoholism cannot be underestimated.

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Fast Alcohol Screening Test:
http://www.nice.org.uk/niceMedia/documents/manualfastalcohol.pdf

Accessed: 05/05/2014

**Appendix**

A: Consent form (Participant copy)

B: Participant debrief form

C: Consent form (Researchers copy)

D: FAST Alcohol Questionnaire

E: Speilberger Anxiety Inventory (Trait)

F: Questionnaire – Happy and Neutral Faces

G: Questionnaire – Fearful and Neutral Faces

H: DSM (5) Diagnostic Criterion

I: Copy of Ethics application to London Metropolitan University

J: Verbal Instructions for VSPT trials

# CONSENT FORM (copy for participant)

**Title of Project: The effect of alcoholism on visuo-spatial perspective taking.**

**Name of Researcher: Sharon Cox**

**Please tick box**

1. I confirm that I have read and understand the information sheet for the above study, and that I have had the opportunity to ask questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐

3. I agree to take part in the above study. ☐

| _____ | _____ | _____ |
|---|---|---|
| Name of Participant | Date | Signature |

Sharon Cox

| _____ | _____ | _____ |
|---|---|---|
| Name of Researcher | Date | Signature |

Researchers details:
Sharon Cox
PhD Student
Department of Psychology
London Metropolitan University
Tower Building
166 – 220 Holloway Road
London N7 8DB
*Please retain this copy for your records*

If you have any serious concerns about the ethical conduct of this study, please inform the Chair of the Psychology Ethics Committee (via the Psychology Department Office) in writing, providing a detailed account of your concern.

Participant Information Number for Study

# Participant Debrief Form

**Title of Project: The effect of alcoholism on visuo-spatial perspective taking.**

**Name of Researcher: Sharon Cox**

**Name of Supervisor (if applicable): Dr. Chris Chandler – chris.chandler@londonmet.ac.uk**

Thank you for taking part in this study. Please read the following information carefully. If there is anything you would like to discuss in relation to this study, please feel free to do so.

The aims of this study were to investigate the potential effects of alcoholism on visuo-spatial perspective taking. You are reminded that this study is not part of any treatment programme for alcoholism and does not contribute towards treatment.

You have the right to withdraw your data from this experiment at any time. If you wish to withdraw please e-mail [redacted]. You do not have to provide a reason.

Thank you again for taking part. If you would like to obtain a summary of the results please contact the researcher.

If you have any serious concerns about the ethical conduct of this study, please inform the Chair of the Psychology Research Ethics Committee (via the Psychology Departmental Office) in writing, providing a detailed account of your concern.

Researchers details:
Sharon Cox
PhD Student
Department of Psychology
London Metropolitan University
Tower Building
166 – 220 Holloway Road
London N7 8DB

# CONSENT FORM (copy for researcher)

**Title of Project: The effect of alcoholism on visuo-spatial perspective taking.**

**Name of Researcher: Sharon Cox**

**Please tick box**

1. I confirm that I have read and understand the information sheet for the above study, and that I have had the opportunity to ask questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐

3. I agree to take part in the above study. ☐

| _____ | _____ | _____ |
|---|---|---|
| Name of Participant | Date | Signature |

Sharon Cox

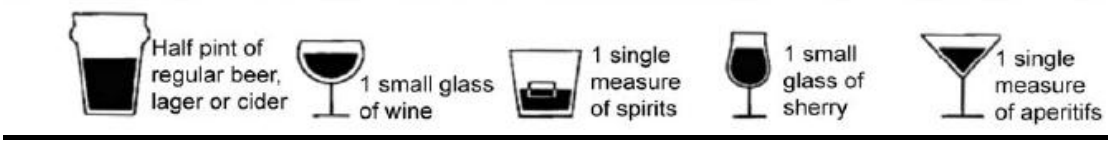
| _____ | _____ | _____ |
|---|---|---|
| Name of Researcher | Date | Signature |

Researchers details:
Sharon Cox
PhD Student
Department of Psychology
London Metropolitan University
Tower Building
166 – 220 Holloway Road
London N7 8DB
*Please retain this copy for your records*

If you have any serious concerns about the ethical conduct of this study, please inform the Chair of the Psychology Ethics Committee (via the Psychology Department Office) in writing, providing a detailed account of your concern.

Participant Information Number for Study

# This is one unit of alcohol...




# ...and each of these is more than one unit


| FAST | Scoring system | | | | | Your score |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | |
| How often have you had 6 or more units if female, or 8 or more if male, on a single occasion in the last year? | Never | Less than monthly | Monthly | Weekly | Daily or almost daily | |
| **Only answer the following questions if the answer above is Never (0), Less than monthly (1) or Monthly (2). Stop here if the answer is Weekly (3) or Daily (4).** | | | | | | |
| How often during the last year have you failed to do what was normally expected from you because of your drinking? | Never | Less than monthly | Monthly | Weekly | Daily or almost daily | |
| How often during the last year have you been unable to remember what happened the night before because you had been drinking? | Never | Less than monthly | Monthly | Weekly | Daily or almost daily | |
| Has a relative or friend, doctor or other health worker been concerned about your drinking or suggested that you cut down? | No | | Yes, but not in the last year | | Yes, during the last year | |

Participant score:

Participant No:

# State Trait Anxiety Inventory

**Read each statement and select the appropriate response to indicate how you feel right now, that is, at this very moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.**

| **Not at all** 1 | **A little** 2 | **Somewhat** 3 | **Very Much So** 4 |
|---|---|---|---|
| 1. I feel calm | 1 | 2 | 3 | 4 |
| 2. I feel secure | 1 | 2 | 3 | 4 |
| 3. I feel tense | 1 | 2 | 3 | 4 |
| 4. I feel strained | 1 | 2 | 3 | 4 |
| 5. I feel at ease | 1 | 2 | 3 | 4 |
| 6. I feel upset | 1 | 2 | 3 | 4 |
| 7. I am presently worrying over possible misfortunes | 1 | 2 | 3 | 4 |
| 8. I feel satisfied | 1 | 2 | 3 | 4 |
| 9. I feel frightened | 1 | 2 | 3 | 4 |
| 10. I feel uncomfortable | 1 | 2 | 3 | 4 |
| 11. I feel self-confident | 1 | 2 | 3 | 4 |
| 12. I feel nervous | 1 | 2 | 3 | 4 |
| 13. I feel jittery | 1 | 2 | 3 | 4 |
| 14. I feel indecisive | 1 | 2 | 3 | 4 |
| 15. I am relaxed | 1 | 2 | 3 | 4 |
| 16. I feel content | 1 | 2 | 3 | 4 |
| 17. I am worried | 1 | 2 | 3 | 4 |
| 18. I feel confused | 1 | 2 | 3 | 4 |
| 19. I feel steady | 1 | 2 | 3 | 4 |
| 20. I feel pleasant | 1 | 2 | 3 | 4 |

**Please rate how happy this face is**

**Not at all happy 1 2 3 4 5 6 7 Very Happy**

**Please rate how happy this face is**

**Not at all happy 1 2 3 4 5 6 7 Very Happy**

**Please rate how emotional this face is**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Not at all emotional** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **Very emotional** |

**Please rate emotional this face is**

**Not at all emotional 1 2 3 4 5 6 7 Very emotional**

DSM-5
Alcohol Use Disorder - Diagnostic criteria

A. A problematic pattern of alcohol use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12 month period:

1. Alcohol is often taken in large amounts or over a longer period than was intended.
2. There is a persistent desire or unsuccessful efforts to cut down or control alcohol use.
3. A great deal of time is spent in activities necessary to obtain alcohol, use alcohol, or recover from its effects.
4. Craving, or a strong desire or urge to use alcohol.
5. Recurrent alcohol use resulting in a failure to fulfil major role obligations at work, school, or home.
6. Continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol.
7. Important social, occupation, or recreational activities are given up or reduced because of alcohol use.
8. Recurrent alcohol use in situations in which it is physically hazardous.
9. Alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problems that is likely to have been caused or exacerbated by alcohol.
10. Tolerance as defined by either of the following:
    a. A need for markedly increased amounts of alcohol to achieve intoxication or desired effect.
    b. A markedly diminished effect with continued use of the same amount of alcohol.
11. Withdrawal, as manifested by either of the following:
    a. The characteristic withdrawal syndrome for alcohol
    b. Alcohol is taken to relieve or avoid withdrawal symptoms.

**Project Proposal Form**

**Please fill in the Grey Fields and Save As on a diskette. All fields are limited in space.**

Name: Sharon Cox
Student number: [redacted]
Supervisor: Dr. Chris Chandler, Dr. Kevin Riggs
Email: [redacted]

Title: **Abnormal processing of social information in alcoholics**

**Ethics**
Who will be your participants (e.g. children or patients or students)?
Patients

Has your project been rated A☐ B☐ C ☐

Are there any health and safety issues: Yes ☐ No ☐

This project proposal has been approved by:

Technical Staff Yes☐ No☐ …….

Supervisor Yes☐ No☐ ……

Staff Signature and date

**Date received by support services ……..**

**SUMMARY/ABSTRACT (A statement of the problem to be investigated and methods of investigation employed. Max 250 words.**

Whilst it is understood that alcohol abuse is detrimental for pro-social behaviour, the specific effects that alcoholism has on a range of socially important behaviours is relatively unknown. Research currently available on addiction and socialisation seems to have focused mostly on negative behaviours, and this is understandable, given the aversive effects addiction has on society, including a strong link with violence and crime, and the break-down of the family unit. Therefore positve and healthy socialisation is not only a consequence of - and necessary for - one's own affect regulatory state, but also for maintaining cohesion within society.

Recent research has acknowledged that alcoholism leads to irregular socialisation both in the outward behaviour of the alcoholic and also the way in which social information is understood by the alcoholic. Emotional information appears to be greatly misunderstood by alcoholics compromising their ability to react in sync with the situation. However, although social information may be misunderstood – in the case of both emotional faces and words – this does not tell us whether a number of other socially relevant tasks are also compromised and what effect this would have of ones ability to theorise about another's mind. Therefore the aim of this research is to use theory of mind, and more specifically, perspective taking tasks to discover what functions which are socially important may be compromised due to repetitive alcohol abuse.

# Number of words in summary: 224

## INTRODUCTION

**Give a full description of the problem to be investigated, outlining the background to the problem and stating clearly the *original* contribution made by your study and the hypotheses (Max 750 words). TAB to next page.**

Alcohol abuse is major problem facing the UK today, divided into binge drinking and alcohol addiction both test the social and health services to their limits. Alcoholism is related to chronic physiological problems. More recently the effects of alcohol have been highlighted to have a profound effect on the brain, especially the pre-frontal cortex and herein effecting executive functioning and motor ability (Moselhy, Georgiou, Kahn, 2001; Parsons, 1994). We know that the pre-frontal cortex has immediate effects on our behaviour and social skills, and that temporary or permanent damage here can lead to irregular behaviour.

The lasting and equally problematic effects of alcohol on personality and socialisation are still being unearthed. Brain trauma caused through severe alcohol abuse may be leading to problematic and maladaptive social competency. We do know that alcohol has an effect on ones ability to estimate emotions in pictorial tasks, and participants show an exaggerating bias in their opinions of how emotional a face appears as compared with controls (Clark, Oscar Berman, Shagrin & Pencina, 2007; Maurage, Campanella, Martin & de Timary, 2008; Philipott et al., 1999). We also know that alcoholics and those temporarily intoxicated misconstrue and confuse emotions, such as fear and anger – which some believe may cause them to act inappropriately and out of sync. However, those who are intoxicated may reveal a lot about how social processing is impaired when one experiences the effects of alcohol, but this may reveal very little about the longer term effects that alcohol addiction has on social processing. The latter requires good scientific evidence as the effects of alcoholism can be lifelong and deleterious – hence this may be linked to rates of recovery and maladaptive social behaviour.

## INTRODUCTION (continued)

There have been some investigations which have tried to establish to what degree social cognition is compromised because of alcohol addiction. Overall this research leads to the conclusion that social cognition is compromised due to repetitive and harmful substance abuse, thus leading to less established social interactions and also an impaired understanding of emotions. The main findings of this body of research suggest addiction and poor social cognition may be explained by –

- visuospatial deficits,
- *The right hemisphere is accepted as playing a major role in visuospatial abilities and is also recognised as one fundamental area which experiences trauma from substance abuse. Misidentification of emotions – especially negative emotions – may be because of disruptions within this area ( Clark, Oscar –Berman, Shagrin & Pencina, 2007).*

- abnormal processing of social information,
  *As detected through slow response time and high rates of error in emotional processing tasks, also see above and below.*

- a lack of inhibitory control,
  *As the frontal lobes are compromised in functioning because of substance abuse, their ability to mediate activity from the amygdala is minimal and thus possibly relates to a bias in exaggerating emotions (Duka & Townshend, 2004)*

- interpersonal feelings and stress.

  *Linked with abnormal processing. For various reasons, ones own stress may not be dealt with well, and may be compounded by sub-cortical damage, which may explain exaggerated or blunt responses to emotional stimuli.*

To date, there is no real emphasis on empathy or deeper psychological mindedness of others or oneself relating to alcoholism. Research has tended to concentrate on the recognition and evaluation of emotional stimuli only. There is no known research which has examined any of the four conclusions above and their possible impact on perspective taking, or empathy. With the exception of Uekermann, Channon, Winkel, Schlebush and Daum (2006), whose study investigated whether theory of mind and social processing may be affected by alcoholism, based on conclusions noted. They also hold support for the right hemisphere hypothesis, and they argue that certain social functions will become impaired in execution – namely that of humour processing. Their study suggests that humour processing – a task for which theory of mind is necessary – is impaired in alcoholics as compared to healthy controls, even when executive functioning is controlled for within the analysis. Suggesting that alcoholism is associated not only with impairments in emotional recognition but also – beyond this - some type of impairment in the processes of understanding others mental states. They too note that this literature has not extended beyond recognition of affective stimuli and further investigations in social processing and theory of mind are required and justified.

The aim of this research is to investigate the effects of alcoholism on perspective taking – a skill which is relevant to the understanding of others visual viewpoint - in order to fully appreciate the perspective and hence forth thoughts of others. This will not only contribute to the understanding of alcoholism and its effects but also to visuo-spatial perspective taking (VSPT) and theory of mind research. The guiding research will initially be a replication of the study of VSPT by Zwickel and Muller (2010), but with the inclusion of an alcohol sample.

**Number of words: 787 inc refs**

## METHOD (as much detail as possible must be provided)

**Design:** This study is planned as a (2 x 2 x 2 ) mixed design, with control v alcoholics as a between subjects factor – as defined through recruitment processes and further by the Fast Alcohol Screening Test (FAST) a clinical tool for screening alcoholism. The within subjects factors are the task, emotional avatar v non-emotional avatar and perspective selection, congruent v incongruent. The dependent variable is measured by RT's of the congruent condition minus the incongruent condition, producing an absolute RT value for VSPT, as recommended by Zwickel and Muller, (2010). For the first experiment an estimated 20-30 participants will be recruited per condition.

**Participants.** ***If you intend to sample from special populations, e.g. school children, indicate what arrangements you have made (or will be making) to gain access to the participants. Please give estimated sample size.***

Participants for the alcohol condition will be recruited via CRI – East Kent Alcohol Service. This is a community based alcohol treatment service with an abstinence based consultation approach – meaning all clients must be sober at the time of treatment. This community project is based throughout East Kent and participants will be collected throughout this area. Participants will be reminded that taking part is voluntary and does not form part of their treatment. All participants will be invited to take part via their keyworker. As the researcher, I have experience of working for CRI and therefore with this client group. I have made arrangements for rooms and have sought permission from CRI which has been given with my ethics checklist.

The control condition will be sourced as an opportunistic sample.

**Risk Assessment**. If collecting data from outside the university you must assess the risk with you supervisor.
Is there a risk involved YES ☐ NO ☐
If YES give details

I will not be lone working at anytime therefore the risk is very minimal. I also have experience of collecting data from both opportunistic and clinical samples. All participants will be asked to attend testing alcohol free and this will be further tested by breath alcohol detection test, hence, the research will not be carried out with participants who may be vulnerable or unsafe.

**Measures.** *Please give detailed information on the tools you are using in the project. For example if you are using questionnaires then provide a full summary of the validity and reliability of these measures. You need to have appropriate referencing for this section.*

Information repeated in apparatus, see below.

**Apparatus.** *Detail all equipment, test material, computer programs etc. that you will require and the approximate length of time for which these are needed. Also indicate what kind of accommodation you need for running experiments etc., and for how long it will be required.*

Stimuli will be presented to participants by a university provided laptop, with a 19'' computer screen. Participants will be asked to respond via standard keyboard selection. The programme has been designed to match that of that of Zwickel and Muller (2010), and these original authors have also provided the researcher with the twenty-four facial stimuli which was utilised in their study. This stimulus consists of twelve female and twelve male faces, all grey-scaled and presented against a white background. Half of the faces are fearful and half neutral in expression. A black rectangle measuring the same size as the faces (4'' width and 6'' height) will also be presented to serve as a base line for perspective selection.

The FAST is a clinically designed tool which measures ones risk to alcohol abuse. This brief four question measure is designed to give an indication of the likelihood of dangerous drinking and is commonly used within alcohol and health services as a screening tool. The FAST is noted National Institute of Health and Clinical Excellence (NICE, 2009) as a valid a robust measure which is able to measure alcohol abuse and risk of alcoholism successfully.

**Supervisor's comments on equipment etc.**

**Technician's Comments**

**Procedure:**

All participants will start with running through the consent procedures. Half of the participants within each condition will complete the FAST Audit first and then the computer task and then vice versa for the other half of participants.

The computer task starts with instructions and 20 practise trials. Within the computer task all trials are pre-randomised, ensuring all participants receive all trials in different orders. Instructions before every trial are given, which indicates which keyboard selection they should press to make their choice and also to try and take account of the faces gender and expression at the same time of dot detection. When the stimulus is presented a dot probe is also flashed 500ms into the trial and participants need to indicate where they believe the dot is from the perspective of the stimulus. They must press t(top), b(bottom), s(right) and k(left), and j(don't know), all other keys on the keyboard are locked out so that wrong keys cannot be pressed, the screen will remain present until one of the appropriate keys has been pressed. This is then followed by questions asking either if the face was male or female or fearful or neutral. In all there are 120 experimental trials, which measure

- 24 trails of congruent fearful and neutral
- 24 trials of congruent male and female
- 24 trails of incongruent fearful and neutral
- 24 trials of incongruent male and female
- 12 trials of baseline – rectangle – incongruent
- 12 trials of baseline – rectangle – congruent.

After each trial the screen will appear blank and a trial will start with repeated/new instructions. RT is measured from the onset of the dot probe.

After completing all tasks participants will be thanked for their time and fully debriefed.

**Analysis:** Please provide details on the proposed analysis for the project. If using qualitative measures you need to provide a brief description on what these entail. For quantitative research you need to provide detail on the statistical test to be used and why.

RT will be measured from the onset of the dot, as recommended by Zwickel and Muller (2010). Also as per their recommendations, all trials which are responded to incorrectly should be removed, as should those which have RT less than 150ms and those over 1500ms. The remaining should be filtered once more to within 3 standard-deviations of the mean.

To gain an absolute VSPT score, the scores of the congruent condition (top and bottom) should be subtracted from the incongruent condition (left and right), and this score can be analysed within fearful, neutral and baseline conditions. Done this way, one can compare the absolute RT of fearful and neutral, and so forth, for a clear indication as to the effect of neutral and fearful faces on perspective selection. Within subjects ANOVA's will be utilised for comparisons within the emotional category and between subjects ANOVA's for the analysis between the controls and experimental samples.

Detailed program/hardware specifications
**Please state clearly any requirement for computer programs etc.**

ETHICAL CONSIDERATIONS AND PROPOSAL: MSc PROJECT/ EMPIRICAL STUDY – Student's Report

**Briefing & Consent** Specify the **content** of what you plan to say to participants at the consent stage. If you intend to omit anything important (beyond explicit specification of your focus), or if you plan not to include a consent form, say why. If your questions touch on sensitive issues, please attach questionnaires, interview schedules, or examples of questions, unless instruments are well known.

All participants will be asked to complete two consent forms, one which they will keep and the other for the researcher to submit with the final work. The consent forms will have both the researcher's details and those of Dr. Chris Chandler, Supervisor of this project. All participants will also be given a verbal briefing, and will be told that

-'all participation is voluntary. The information you provide me with today, wil be treated sensitively and you will only be known to me by participation number after this point. My study looks as results as a whole and not individual scores. You are free to leave the study at any time without giving a reason. If you feel that you would like to withdraw your data after the experiment then you can contact me or my supervisor on the details given in your consent form. If you have any questions then please ask.'

**Confidentiality** Are there provisions for informing participants of confidentiality and protecting data from infringements of privacy? If not, please explain.

All participants are to be informed that their information is to be treated confidentially at that once the study has started their data is known to be by participant number only.

**Debriefing** Briefly say what you plan to tell participants afterwards. If your study could identify vulnerabilities, what do you plan to do (e.g., plans to inform of risk-status or/ & give participants details of potential sources of help) ?

All participant will be thanked for taking part in the study and given a debrief form which will contain a brief description of the research aims. Participants will be asked if they have any further questions and also if they are concerned with participation.

**Deception** If your study involves intentional deception, give details, or write 'none'. For these purposes, deception is defined as withholding details that could, if they were known, seriously diminish the likelihood of cooperation. It doesn't include harmless omissions of aims or content for the sake of scientific objectivity.

None

**Special protection of participants** Specify any currently forseeable physical or mental harm or discomfort that your participants could experience as a consequence of participation. If there's no risk, say 'none'. Where there are risks, say what you plan to do to minimise risks (e.g., suggest sources of help, attach information sheet).

None

**Any other ethical issues** Specify any other ethical issues raised by your proposal (e.g., specific issues relevant to vulnerable populations; use of new untested methodologies), and say how you plan to address these (continue on a separate page, if required).

I have read, understood, and agree to abide by the Ethical Principles for Conducting Research with Human Subjects set out by the relevant ethics policies by either the London Metropolitan University or the British Psychological Society.

Signed: Date:

ETHICAL CONSIDERATIONS AND PROPOSALS:
EMPIRICAL STUDY – **Supervisor's** Report

**Title of study:**

**Student name:** **Student number:**

**Supervisor:**

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Please give your overall judgement of the ethical considerations and proposals described by the student using one of the following categories. Circle the letter A., B. or C. as appropriate.

A. Routine ethical issues raised and the proposal addresses all of these adequately.

B. Major ethical issues raised and the proposal addresses all of these adequately.

C. Ethical issues not addressed adequately by the proposal.

In the case of C., please outline what you see to be the problem and, if appropriate, any guidance you would offer to the Ethics Committee from your area of expertise.

Signed:

**VERBAL INSTRUCTIONS**

**During this experiment you are going to be presented with a series of faces via the laptop. I am asking that you keep your hands on the laptop keyboard as so (researcher demonstrates). When a face is presented it will be followed by a dot, this may appear, above or below or to the left or right of the face. This will appear quickly. I am asking that use the keys indicated to respond as quickly as you can to the dot.**

**The dots will appear in sets of trials, either above or below, or left or right. So the left/right and above/below trials are not mixed. You will be instructed when to move your hands to get ready for the next trials by the instructions on the computer.**

**There will be a set of practice trials to begin. Do you have any questions?**