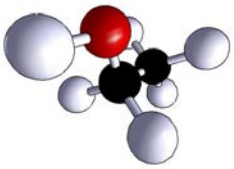
61 ALCOHOL INSIGHT



# Are You Looking at Me?

## Introduction

Alcohol is associated with a range of behaviours, including aggression, which seems to become more likely, at least in some people, following alcohol consumption. However, the mechanisms of this relationship are unclear. For example, certainly not all people become aggressive following alcohol consumption, and even those who do sometimes become aggressive do not do so all the time.

One reason why alcohol may increase the likelihood of aggressive behaviour is via the disinhibiting effects of alcohol, whereby impulses that are normally suppressed or controlled become less controlled. There is also some evidence that certain individuals are more likely to become aggressive because of their personality. However, these mechanisms alone may not be sufficient to explain the relationship completely.

The studies described here were completed by Dr Marcus Munafo and colleagues at the University of Bristol.

Some earlier experiments in our laboratory suggested that moderate doses of alcohol might modify the way in which people perceive emotional expressions in others. This could be another part of the explanation for why alcohol might sometimes lead to aggressive behaviour - emotional facial expressions in others might be more likely to be misinterpreted after consuming alcohol which, in combination with the other effects of alcohol (e.g., disinhibition) might lead to an aggressive response.

We therefore hypothesized that acute alcohol consumption might result in modifications in the processing of perceptual cues of emotional expression, and explored this possibility with a programme of experiments intended to investigate specific aspects of this relationship - the effects of low and moderate doses, the effects of alcohol on the blends of multiple emotions (i.e., misinterpreting one emotional expression as another), and the effects of alcohol on the perception of eye gaze.

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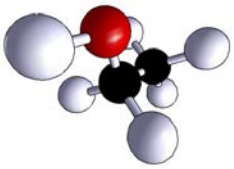
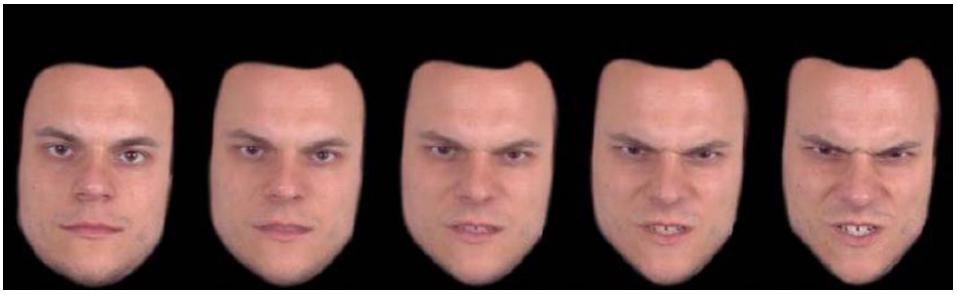


## Methods

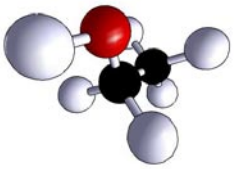
We used methods developed from an area of psychology known as psychophysics, which was originally developed to measure the lowest level at which our senses could detect a stimulus such as a noise. In a basic psychophysical procedure, a series of stimuli (e.g., auditory tones) is presented, in ascending (e.g., tones getting louder) and descending order (e.g., tones getting quieter). This allows the calculation of the loudness at which a tone can be detected with 50% accuracy (i.e., the point at which people are performing at chance level, known as the threshold).

Using pictures of faces expressing different emotions, we were able to create a sequence of faces ranging from 0% of the emotion (neutral) to 100%. This series contained a large number of individual faces, so that very subtle changes in sensitivity to emotional expressions could be detected. An example of some of the facial expressions within a range (neutral to angry) are presented below.



By using a sensitive measure such as this, we were able to give participants a relatively low dose of alcohol, and avoid the more pronounced effects of alcohol intoxication such as motor impairment (i.e., clumsiness) which might have interfered with performance on the computer-based tasks we used to assess sensitivity to the different emotional expressions we were interested in (anger, happiness, disgust and sadness).

We used different emotional expressions to assess whether any effects of alcohol



were specific to certain emotions (as opposed to a more global effect of alcohol on the ability to detect emotions, which would be less interesting). As well as using blends ranging from neutral to the emotion of interest (giving a measure of *sensitivity*), we also used blends ranging from one emotion to another (giving a measure of *misinterpretation*).

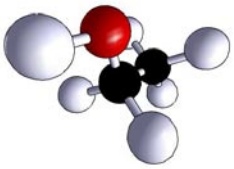
The basic study design involved giving participants a drink which either contained alcohol or did not. The dose of alcohol was tailored to the individual, by weight (0.4 grams of alcohol per kilogram of body weight), so that an average-sized male would receive around 4 Units of alcohol. This is equivalent to roughly a pint and a half of beer or two glass of wine. In some experiments we also used a lower dose (0.2 grams per kilogram) as well.

The drink was either vodka and tonic, or tonic, chilled and flavoured with lime cordial – our studies indicate that people cannot reliably tell the difference between these two drinks when they drink them. Neither the participant nor the experimenter were aware of what the drink actually contained – known as a double-blind placebo-controlled design – to avoid introducing any bias into the study.

We also manipulated expectations in some studies by explicitly telling people that they had receive a drink containing alcohol or no alcohol. This was independent of what people actually received, so that some received alcohol and were told they received alcohol, some received alcohol but were told they received placebo, and so on. This allowed us to look separately at the effects of alcohol and the effects of *expectation*.

## Main Findings

Our first experiment investigated the effects of alcohol consumption on the perception of emotional expressions, using a task designed to identify the *sensitivity* to different emotional expression (happy, sad, and angry). Following the highest dose of alcohol, equivalent to a large glass of wine or a pint and a half of beer, male participants showed decreased sensitivity in identifying sad emotional expressions compared to females. This suggests that even relatively low doses of alcohol can modify how we perceive emotional expressions in other people. However, we didn't



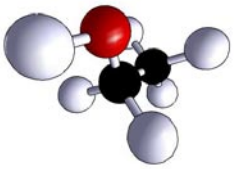
observe any effects on expressions of anger, which suggests that any effects of alcohol on aggressive behaviour do not operate via changes in *sensitivity* to anger in other people. We didn't observe any effects of manipulating what people *thought* they had drunk – the effects were only observed when we looked at what people had *actually* drunk.

Our second and third experiments investigated the effects of alcohol on the *misinterpretation* of one emotional expression as another. This is a slightly different mechanism to the sensitivity to emotional expressions, and may be more relevant in the context of any relationship between alcohol consumption and aggression if facial expressions of emotion are more likely to be misunderstood after drinking. We found that participants were more likely to misinterpret a negative but non-hostile emotional expression (e.g., disgust) as hostile (i.e., anger) after alcohol consumption. In addition, this effect seemed to be strongest when male participants were rating the emotional expression of male faces, but not female faces. These findings support our initial hypothesis and suggest that alcohol consumption modifies the perception of ambiguous emotional expressions in a way which may make a hostile response (e.g., aggression) more likely. As before, we didn't observe any effects of manipulating what people *thought* they had drunk – the effects were only observed when we looked at what people had *actually* drunk.

Our fourth and fifth experiments investigated the effects of alcohol consumption on eye gaze, in one experiment using attractive and unattractive faces, and in the other experiment using faces showing different emotional expressions. After drinking, female participants were more likely to perceive male, but not female, faces as looking at them. In addition, both male and female participants were more likely to rate attractive faces as looking towards them and unattractive faces as looking away from them after alcohol. In addition, after drinking, women rated male angry faces as looking towards them compared to placebo and rated male happy faces as looking away from them.

## Discussion

These results, across all these studies taken together, indicate that alcohol has



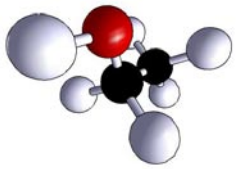
selective effects on the processing of facial expressions of emotion, and that these effects may differ between men and women, and with respect to male and females faces. In particular, we observed distinct effects for measures of sensitivity, misinterpretation of ambiguous emotional expressions, and eye gaze. This suggests that alcohol may have diverse and complex effects on how we interpret facial cues of emotional expression. Importantly, these effects do not appear to be due to expectancy effects – when we manipulated what people thought they had drink (either an alcoholic or non-alcoholic drink) this did not result in the effects we observed, suggesting that these effects are likely to be due to the pharmacological effects of alcohol.

In particular, our findings regarding the misinterpretation of ambiguous emotional expressions supports our hypothesis that these effects may contribute to increased likelihood of aggression following alcohol consumption – ambiguous negative expressions (e.g., anger-disgust) are more likely to be categorised as angry, in particular by male participants and when the target face is male. This is consistent with evidence that alcohol-related aggression occurs most frequently in males.

## Implications

Our findings suggest that alcohol may have complex effects on social interactions, via various effects on the brain. This may help us to build a more complete picture of how alcohol contributes to social behaviours, both positive and negative. As we develop our understanding of the role of alcohol in social interactions we will be better placed to develop accurate public health messages, and this understanding will inform policy regarding the availability and marketing of alcoholic drinks.

Our results broadly support our initial hypothesis, which is that part of the reason why alcohol increases the likelihood of aggression is via changes in how we perceive emotional expressions in other people. Specifically, this seems to be due to a misinterpretation of ambiguous negative expressions as threatening (e.g., displaying anger) as opposed to non-threatening (e.g., displaying disgust). These results are important because they suggest that alcohol-related aggression is not simply due to the disinhibiting effects of alcohol.



Some of these effects may also contribute to the reinforcing effects of alcohol – in other words, they may help to explain why it drinking alcohol is genuinely pleasurable. As well as the direct intoxicating effects, it may also have more subtle effects on how we process information in our environment. Our findings that men are less sensitive to sad faces after drinking alcohol fits with this possibility, and may partly explain why alcohol is more commonly used to cope with stress by men than by women, although this is still speculative at possible.

## References

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Parker LLC, Attwood AS, Penton-Voak IS, Munafo MR (2008) Effects of acute alcohol consumption on ratings of attractiveness of facial stimuli: evidence of long-term encoding *Alcohol and Alcoholism* (epub ahead of print).

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