

Are you looking at me?

Dr Marcus Munafò, Dr Ian Penton-Voak and Dr Chris Benton  
Department of Experimental Psychology  
University of Bristol

It was hypothesised, on the basis of pilot work funded by the AERC, that acute alcohol consumption leads to modifications in the processing of perceptual cues of emotional expression, which might be a potential mechanism by which certain behaviours (e.g., aggression) become more likely after alcohol consumption.

Our research 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 categorization of complex blends of multiple emotions, and the effects of alcohol on the perception of eye gaze.

Three main studies were completed. The results of the first study have been published in the *Journal of Psychopharmacology*, and the results of the second study are under review in *Psychopharmacology*. The results of the third study are currently being prepared for submission for publication.

In addition, we were able to run a small number of pilot studies in parallel to the main experiments detailed in the grant. In particular, we extended our research to include effects of alcohol on perceived attractiveness, as well as on the processing of perceptual cues of emotional expression.

We have therefore successfully attained our goal of developing a laboratory model of the mechanisms of social interaction which are sensitive to acute alcohol consumption. This will serve to elucidate the mechanisms by which alcohol increases the likelihood of certain behaviours (e.g., unsafe sex, aggression).

Over the duration of the grant we have tested  $n = 450$  participants across nine individual experiments. In addition, the results of the pilot study which led to this grant, funded by AERC, have also been published in the *Journal of Psychopharmacology*. The two studies currently published are provided as an appendix to this report.

### *What were the outcomes and findings?*

In total, we have completed nine individual experiments, of which six addressed the primary research questions specified in our original proposal, and three collected pilot data to extend on our findings and guide the formulation of future research questions. A brief summary of each of these is presented below:

#### Study 1:

This study examined the effects of two doses of alcohol and placebo on the sensitivity of perceiving the emotional content of facial cues. Forty (50% male) social drinkers attended three sessions in a randomised order. Emotion (angry, happy, sad), target sex (male, female) and drink (0.0, 0.2, 0.4 g/kg alcohol) were within-subject factors, and participant sex (male, female) was a between-subject factor. Following the highest dose of alcohol, male participants showed decreased sensitivity in identifying sad emotional expressions compared to females.

#### Study 2a:

This study examined whether alcohol and expectancy of having received alcohol affected the categorisation of an ambiguous facial stimulus (i.e., angry-happy and angry-disgusted facial morphs). This was a balanced-placebo design in which ninety-six (50% male) social drinkers were randomised to either receive alcohol (0.4 g/kg) or placebo, and either to be told that they were receiving alcohol or placebo. Participant sex was included as a between-subject factor, and emotion (angry-happy, angry-disgusted) and target sex were within-subject factors. Participants demonstrated a bias towards categorising a disgusted faces as angry after alcohol compared to placebo.

#### Study 2b:

This study examined the effects of two doses of alcohol and placebo on the categorisation of an ambiguous facial stimulus (i.e., angry-happy and angry-disgusted facial morphs). Thirty (50% male) social drinkers attended three sessions in a randomised order. Emotion (angry-happy, angry-disgusted), target sex (male, female) and drink (0.0, 0.2, 0.4 g/kg alcohol) were within-subject factors, and participant sex (male, female) was a between-subject factor. Compared to female target faces, male target faces were more likely to be miscategorised as angry, compared to disgusted, by male participants.

#### Study 2c:

This study examined the effects of two doses of alcohol and placebo on the categorisation of an ambiguous facial stimulus (i.e., angry-disgusted, angry-sad, angry-fearful, disgusted-sad and disgusted-fearful facial morphs). Thirty (50% male) social drinkers attended three sessions in a randomised order. Emotion (angry-disgusted, angry-sad, angry-fearful, disgusted-sad, disgusted-fearful), target sex (male, female) and drink (0.0,

0.2, 0.4 g/kg alcohol) were within-subject factors, and participant sex (male, female) was included as a between-subject factor. These data are currently being analysed.

#### Study 3a:

This study examined the effects of two doses of alcohol and placebo on the perception of eye gaze in attractive and unattractive male and female targets. Thirty (50% male) social drinkers attended three sessions in a randomised order. Attractiveness (attractive, unattractive), target sex (male, female) and drink (0.0, 0.2, 0.4 g/kg alcohol) were within-subject factors, and participant sex (male, female) was a between-subject factor. After alcohol, female participants were more likely to perceive male, but not female, target faces as looking at them compared to placebo. 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.

#### Study 3b:

This study examined the effects of two doses of alcohol and placebo on the perception of eye gaze in male and female targets displaying different emotional expressions. Thirty (50% male) social drinkers attended three sessions in a randomised order. Emotion (happy, angry, sad), target sex (male, female) and drink (0.0, 0.2, 0.4 g/kg alcohol) were within-subject factors, and participant sex (male, female) was a between-subject factor. Alcohol was found to affect perception of eye gaze in female, but not male, participants. After alcohol, women rated male angry faces as looking towards them compared to placebo and rated male happy faces as looking away from them after a low dose of alcohol compared to a high dose and placebo.

Results to date across these studies indicate that alcohol has selective effects on the processing of facial expressions of emotion, and that these effects may differ between males and females, and with respect to male and females targets. In particular, we observed distinct effects for measures of threshold sensitivity, categorization of complex blends of emotion (i.e., ambiguous stimuli), and eye gaze for neutral and emotional faces. This suggests that alcohol may have diverse and complex effects on facial processing. Importantly, these effects do not appear to be due to expectancy effects.

Our results indicate that alcohol modifies the processing of perceptual cues of emotion, in support of our original primary hypothesis. In particular, our data regarding complex blends of emotion / ambiguous stimuli 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.

Any questions about these studies should be directed to Dr Marcus Munafò either by email ([marcus.munafò@bristol.ac.uk](mailto:marcus.munafò@bristol.ac.uk)) or telephone (0117 9546841).

In addition, we completed the following pilot studies in parallel to those described above:

#### Study 4:

This study examined the popular held belief that alcohol increases the perceived attractiveness of opposite sex individuals. Eighty-four (50% male) heterosexual social drinkers rated the attractiveness of 20 male and 20 female facial stimuli after either alcohol or placebo. Participants returned 24 hours later and repeated the rating task. Session one drink (0.0, 0.4 g/kg alcohol) and participant sex were between-subject factors and target sex was a within-subjects factor. All participants rated the faces as more attractive after alcohol regardless of whether the target face was male or female. These effects persisted (i.e., at session two) in male participants but only when the target was female.

#### Study 5:

This study examined the effect of glass shape on drinking rate of alcoholic and non-alcoholic beverages. Eighty (50% male) social drinkers were randomised to receive either alcohol (lager) or a soft drink (lemonade) in either a straight or curved glass in a between-subject design. Drinking topography data were collected and along with ratings of perceived half-way point of glasses (latter data collected at a separate session). These data are currently being analysed.

#### Study 6:

We examined the effects of alcohol on detection and distraction of emotional facial cues using a face-in-crowd (visual search) paradigm. Thirty (50% male) social drinkers were recruited to attend two sessions. Drink (alcohol, placebo), emotion (angry, happy, disgusted, sad) and search condition (distracter, target) were within-subject factors, with one between-subject factor of participant sex (male, female). These data are currently being analysed.

We propose to pursue these novel research directions and are currently preparing proposals to seek funding to support this.

Published / In Press:

Attwood AS, Benton CP, Penton-Voak IS, Munafò MR (2008) Effects of acute alcohol consumption on processing of perceptual cues of emotional expression. *Journal of Psychopharmacology* (epub ahead of print).

Parker LLC, Attwood AS, Penton-Voak IS, Munafò 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).

Submitted:

Attwood AS, Ataya AF, Benton CP, Penton-Voak IP, Munafò MR (2008) Effects of alcohol consumption and alcohol expectancy on the categorization of perceptual cues of emotional expression. *Psychopharmacology*.

In Preparation:

Attwood AS, Roberts RE, Benton CP, Penton-Voak IP, Munafò MR. Effects of acute alcohol consumption on the categorisation of facial cues of emotional expression.

Roberts RE, Attwood AS, Benton CP, Penton-Voak IP, Munafò MR. Effects of acute alcohol consumption and facial attractiveness on the perception of eye gaze.

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Munafò MR, Scott-Samuel NE, Attwood AS. Effects of glass shape and alcohol content on drinking topography and mood.

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Munafò MR, Renton L, Attwood AS, Penton-Voak IS, Benton CP. Effects of alcohol consumption and alcohol expectancy on the categorization of perceptual cues of negative emotional expression.