

Time and subjective intoxication

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Introduction

- Acute tolerance is a rapid decrease in the dose-effect of alcohol, occurring within the duration of a dose
- To examine changes in the dose-effect, the drug-effect at different times during a dose is compared while controlling for changes in the Blood Alcohol Concentration (BAC)
- This is done by taking measures on each 'limb' of the BAC curve when the BAC is equivalent. Once when the BAC is ascending and again when the BAC is descending
- If the dose-effect decreases within the duration of the dose, the effect of alcohol on a measure is greater on the ascending limb of the BAC curve, and less on the descending limb. This is often called the "Mellanby effect"

The aim of this study was to test for acute tolerance to alcohol in information processing and subjective intoxication

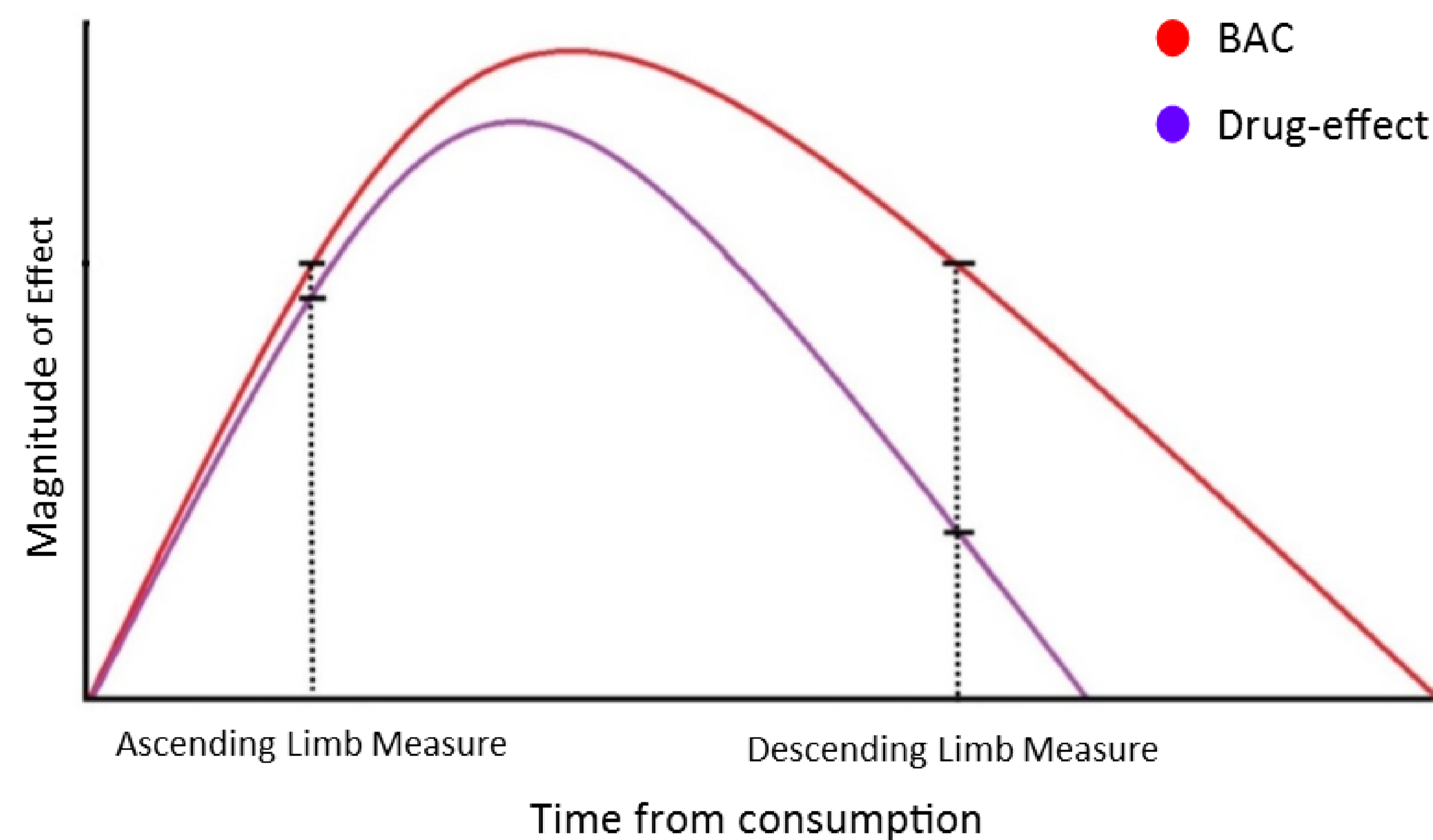


Figure 1. BAC vs Drug-effect during a single dose of alcohol showing acute tolerance

Method

- The *Inspection Time task* (ITT) measured visual information processing speed from the minimum stimulus exposure duration needed to discern which side of an asymmetrical target symbol is shorter (Figure 2)
- Subjective intoxication was measured using a 100mm visual analogue scale labelled "level of felt intoxication", anchored from "not at all" to "very much"
- Forty-two participants were randomly allocated to either an active dose or placebo-control condition
- After baseline measures, those in the alcohol group were given vodka mixed with orange juice, calculated to produce a peak BAC of 0.07%
- The placebo group received an equal volume of juice with a less than effective dose of alcohol floated on the surface to give the impression of an active dose
- BAC measures were taken repeatedly to track the course of the BAC
- When BAC reached .05% participants completed the SART and ITT for the second time
- Each participant in the placebo-control group was anchored to a participant in the dose group and tested at equivalent times
- Once BAC had peaked and then declined back to .05% participants were again tested on the SART and ITT

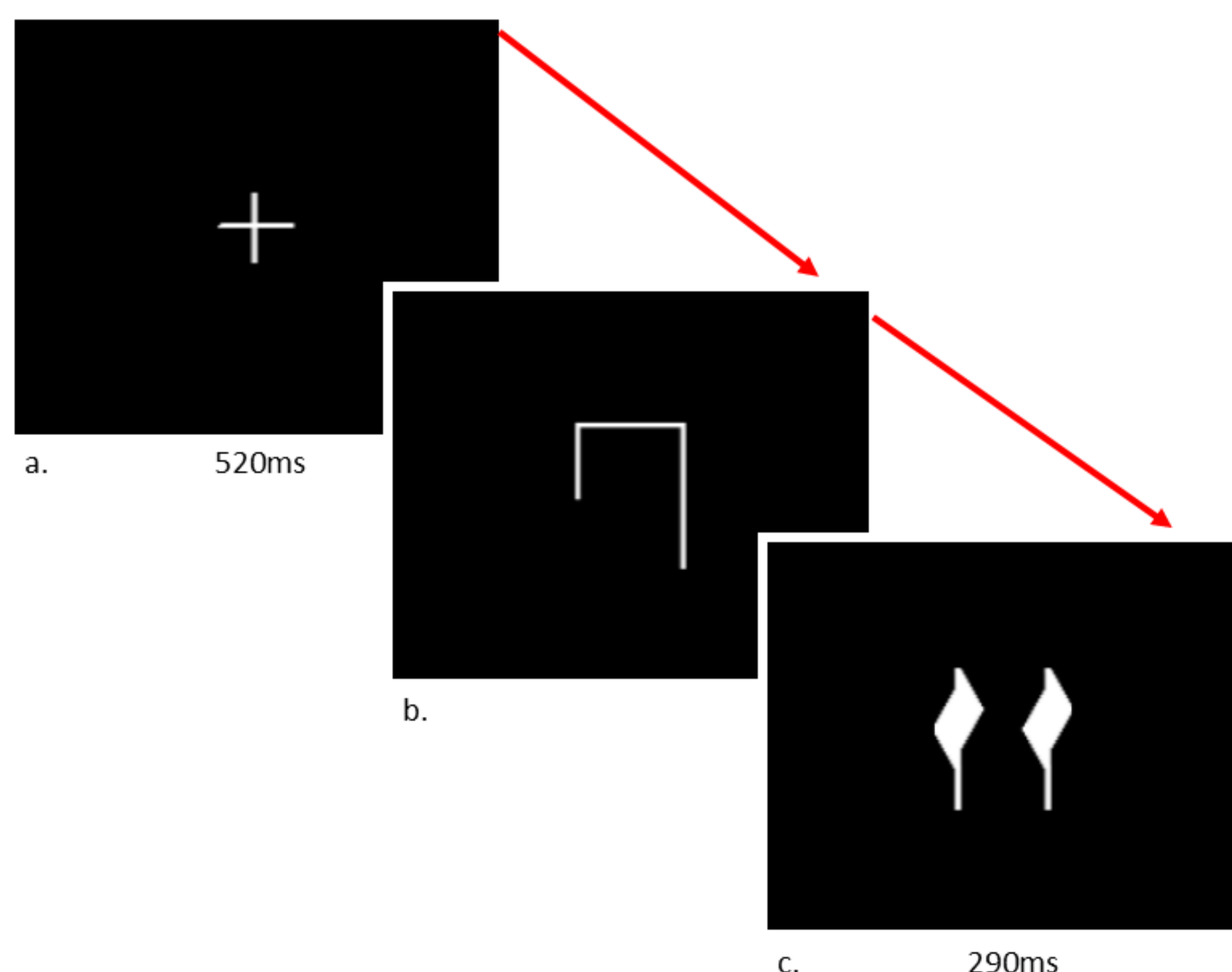


Figure 2. Inspection Time Task (a) warning cue (520ms), (b) target symbol (variable), (c) mask (290ms)

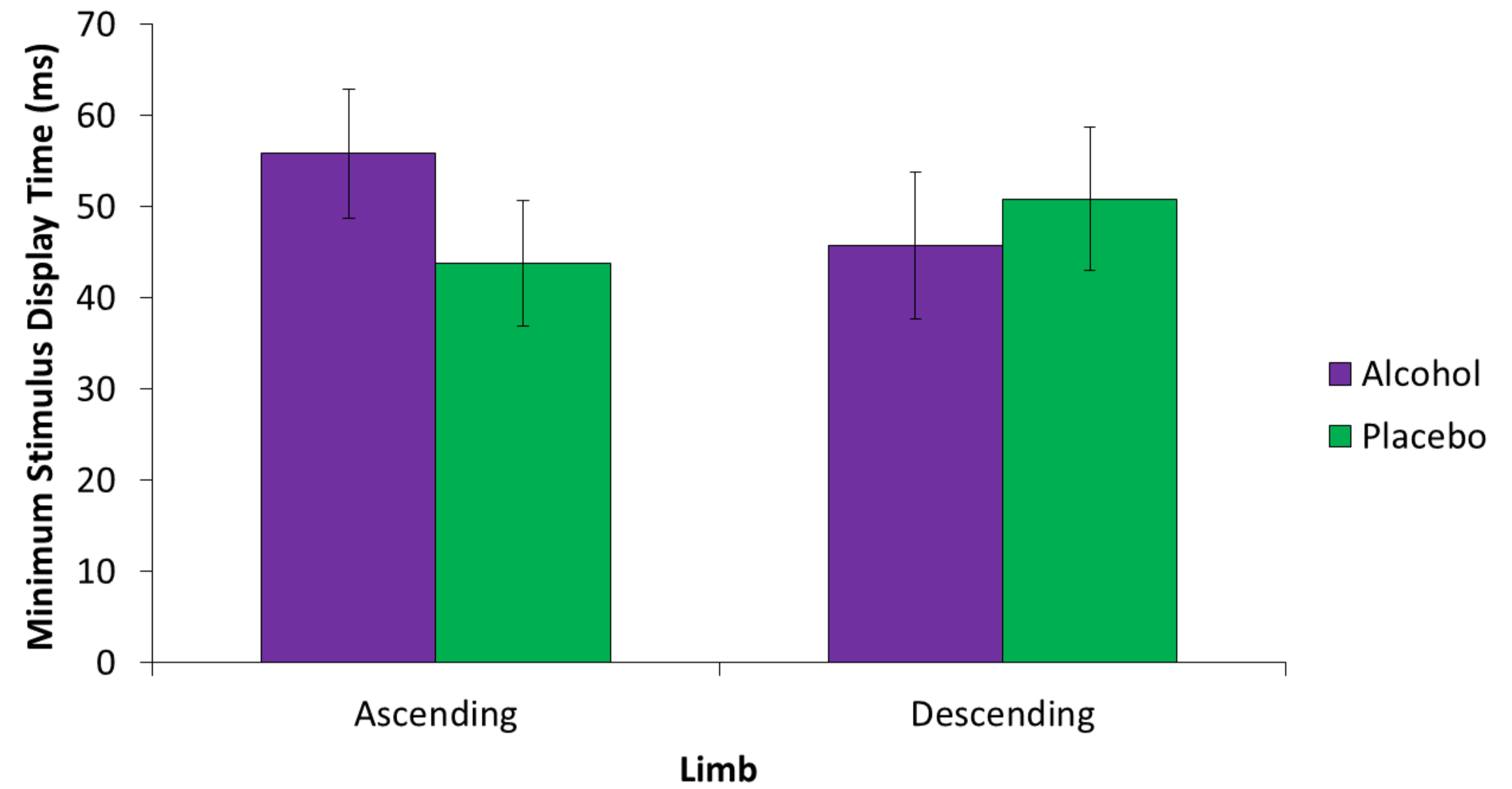


Figure 3. Adjusted mean visual processing speed in dose and placebo groups on each limb

Results

BAC

- The mean peak BAC in the alcohol group was 0.066%
- The mean test-specific BAC on the ascending limb was 0.052%, and on the descending limb 0.053%

ITT

- ITT performance was affected by alcohol. On the ascending limb the alcohol group required longer stimulus display times than the placebo group, $F(1, 37) = 5.81, p = .021, d = 0.79$
- Consistent with a decrease in the effect of alcohol, the difference in stimulus display times between groups was smaller on the descending limb, $F(1, 37) = 0.833, p = 0.367, d = 0.29$
- The difference in alcohol effect between limbs was confirmed by a statistically significant group \times limb interaction, $F(1, 37) = 6.07, p = .019$
- The improvement in the alcohol group was statistically significant, $t(1, 18) = 16.37, p < .01$

Subjective Intoxication

- Participants in the alcohol group gave higher ratings of subjective intoxication on the ascending limb, $t(1,38) = 4.07, p < .01, d = 1.29$
- The effect of alcohol on subjective intoxication was smaller on the descending limb, $t(1,38) = 1.80, p = .08, d = 0.57$
- The decrease in alcohols effect between limbs was confirmed by a statistically significant group \times limb interaction, $F(1,39) = 4.184, p = .048$
- the decrease in ratings between limbs in the alcohol group was statistically significant, $t(1,19) = 6.223, p < .01$, and substantial, $d = 1.44$

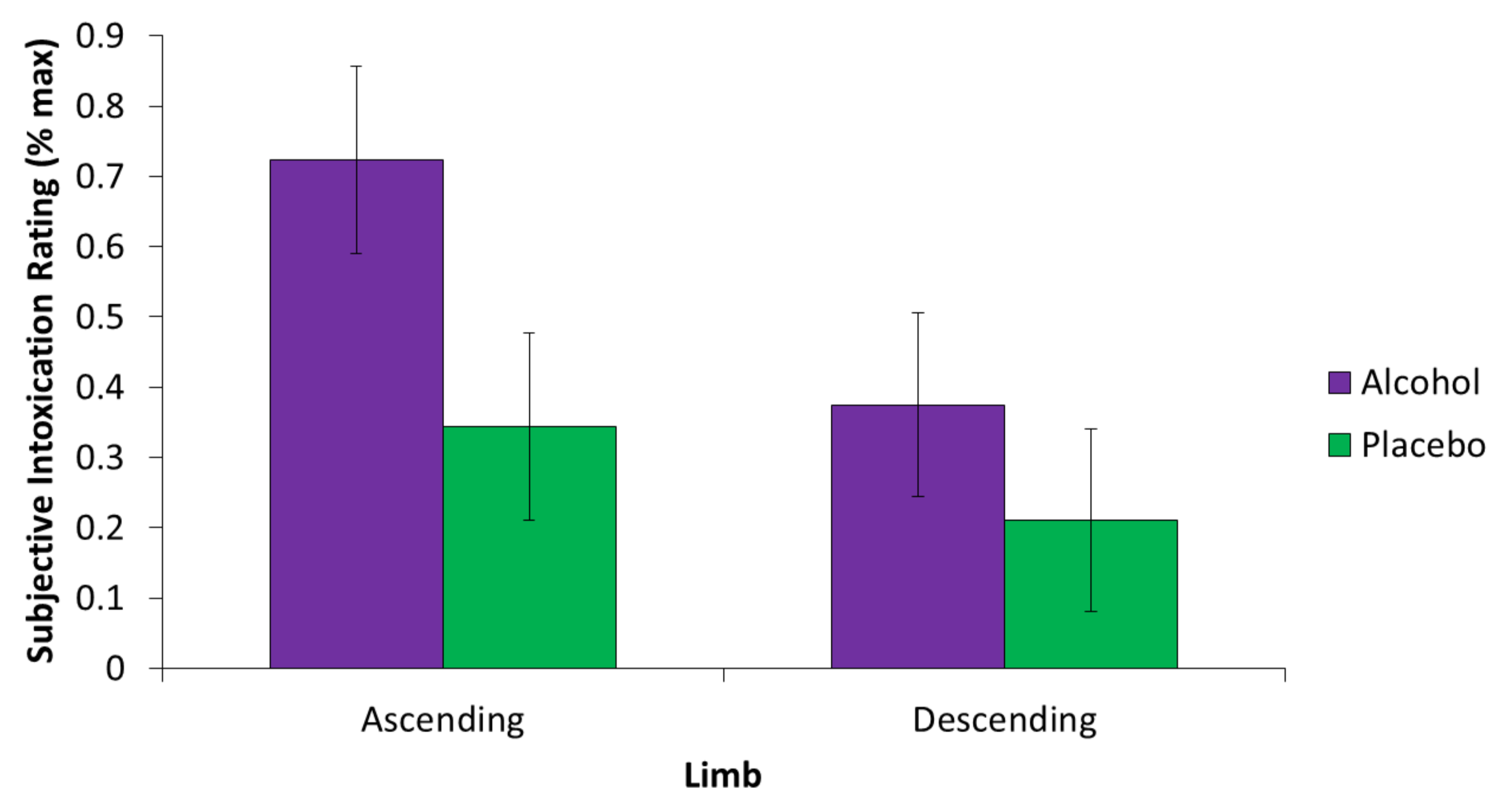


Figure 4. mean ratings of intoxication under both dose and placebo groups on each limb

Conclusions

- Acute tolerance to the effect of alcohol was found in measures of information processing and subjective intoxication
- The ITT is the first measure of information processing to show acute tolerance in performance other than reaction time
- This finding lends support to the hypothesis that the development of acute tolerance is affected by the rate of consumption
- The relative degree of intoxication felt at a BAC of .05% differed greatly between limbs
- The subjective effects of alcohol are important to consider, because they are the most readily available cues for an individual to determine their drinking behaviour
- Public safety campaigns have not explicitly targeted awareness of acute tolerance as a factor to consider in responsible drinking