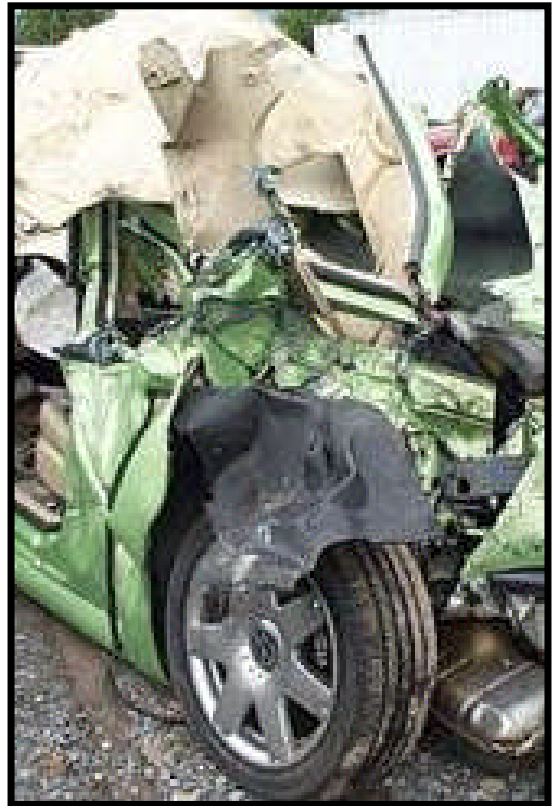




The Science is as good as the View

Studying the effects of alcohol in the field

Brian Tiplady
18th September 2006

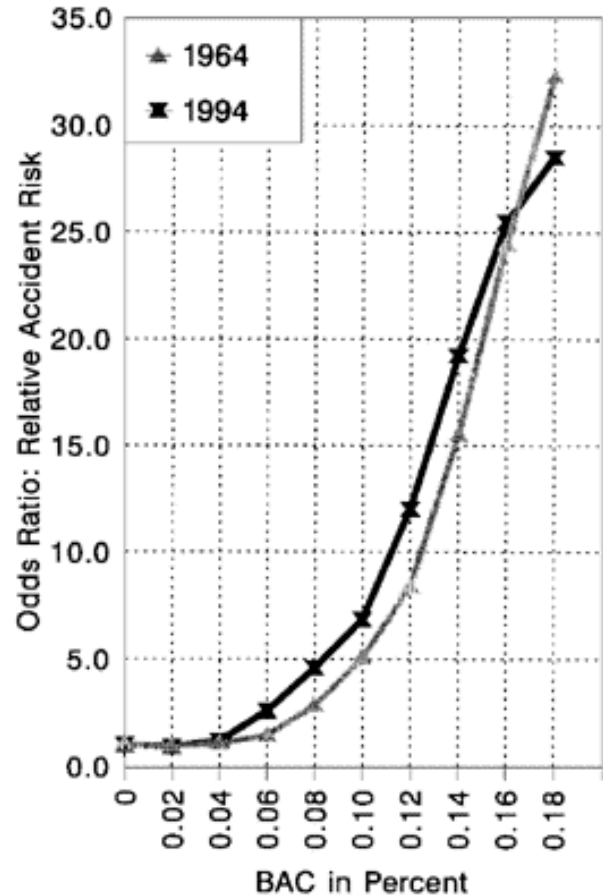


Goals of Alcohol Research

- Addressing Specific Problems
 - Driving under the influence
 - Domestic violence
- Understanding Actions of Alcohol
 - Impulsivity
 - Alcohol “myopia”
- Comparative Pharmacodynamics
 - Relating profiles of drug effects to their actions on neurotransmitters

Driving

- Large, consistent effects on accident risk
- Accelerating function of Breath Alcohol Concentration (BAC)
- Moderate amounts of alcohol lead to substantial increase in risk



Other Drugs and Driving

- Much harder to demonstrate increased risk
- New methods such as responsibility analysis have increased reliability
- Now accepted that both prescription and illicit drugs impair driving
 - Benzodiazepines (when taken during the day)
 - Cannabis

Lab Studies of “Driving-Related” Skills

- Very clear effects of, e.g., benzodiazepines, tricyclics, on psychomotor performance
- Effects of alcohol are relatively modest on these tests considering the accident risk

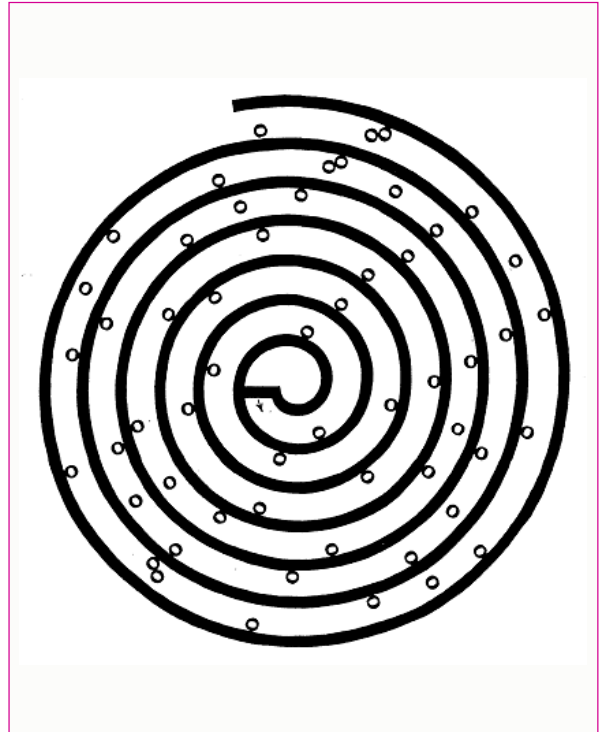
If alcohol-induced impairment at 0.75g/kg is taken as the benchmark, there are a number of substances [including nitrazepam, chlorpheniramine and amitriptyline] which cause greater performance decrements than alcohol at this dose

Speed and Accuracy

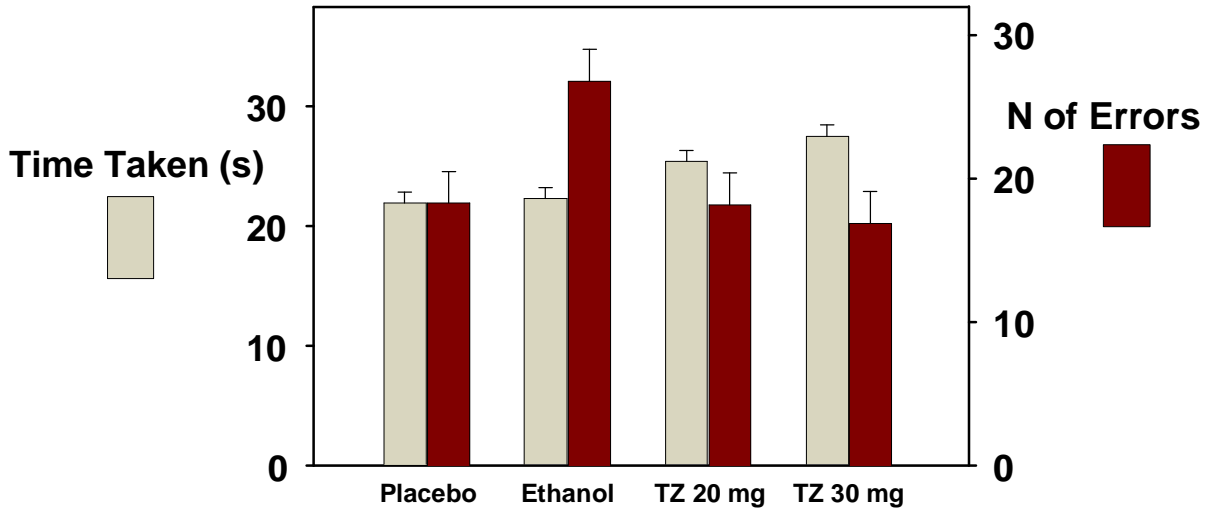
- Accuracy of performance (e.g. errors in a choice task) is as important as speed
- Speed and accuracy can be traded off against each other
- Important to measure both aspects of performance in impairment studies

Spiral Maze

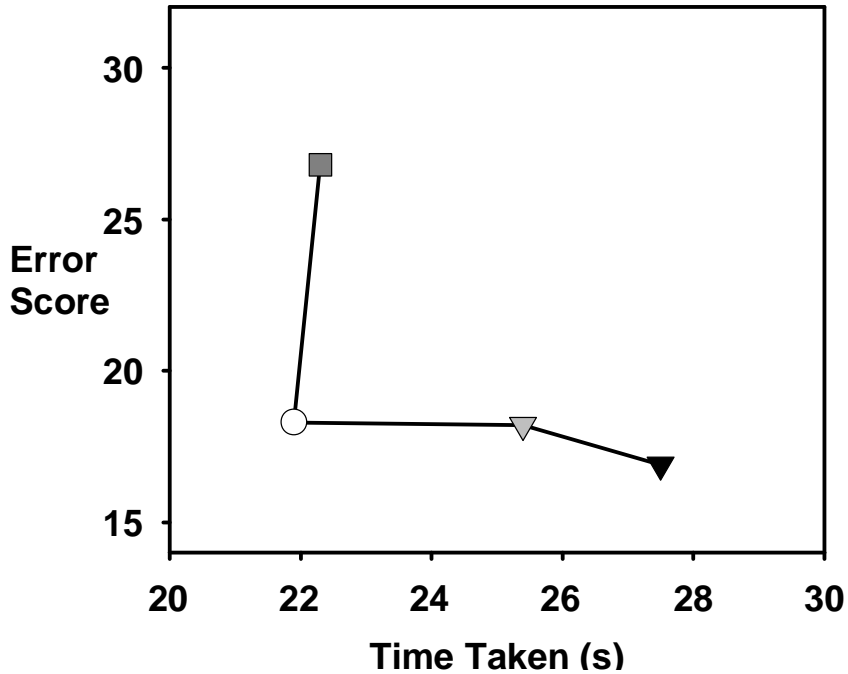
- Volunteer starts with pen at centre of spiral
- Traces path around spiral as quickly as possible, while avoiding the edges and the obstacles
- Time taken and number of errors recorded



Spiral Maze



Spiral Maze



Number Pairs

Five digits appear on a computer screen.

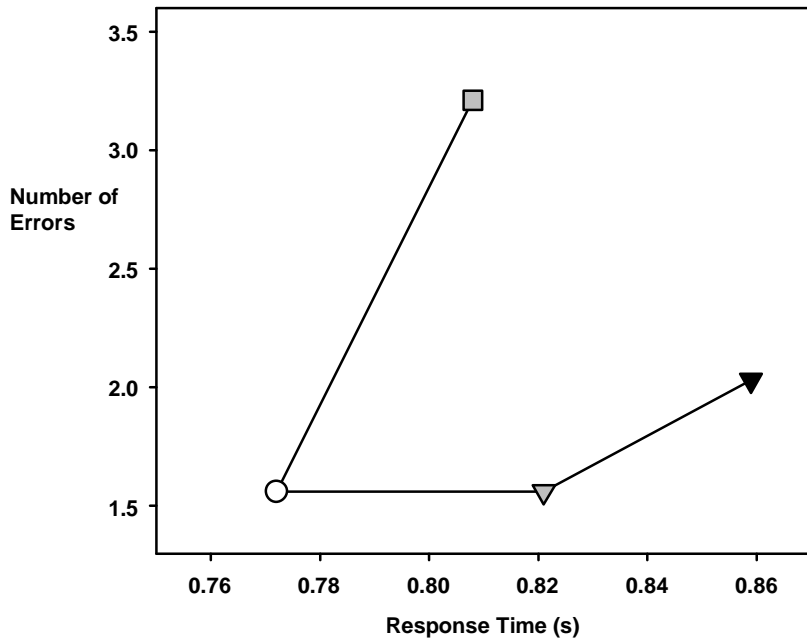
Targets are second and fourth. If targets are the same, respond YES, otherwise respond NO:

4 3 2 3 9

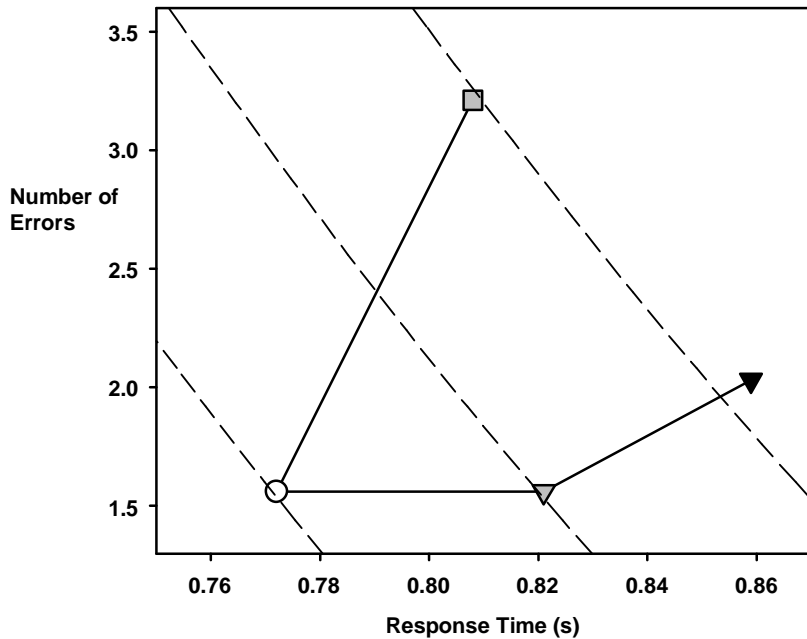
6 2 4 6 6

Tests set up on portable pen computer

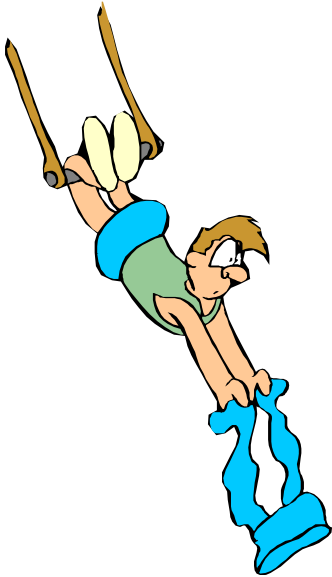
Number Pairs



Number Pairs



So...



At equally impairing doses of temazepam and ethanol, we go faster and make more errors on ethanol

- Ethanol makes us behave in a “riskier” fashion
- Temazepam makes us behave more cautiously

Alcohol and Errors

- Important to include error measures in assessment strategies
 - Roadside Impairment Testing
- May relate to other aspects of alcohol effects
 - Impulsivity
 - Judgements of risk
- May account for the particular dangers associated with alcohol and driving

Assessment in the Field

- Portable testing systems
 - Mobile Phones
 - PDA/Handhelds
- Home-based Systems
 - World-Wide Web



Testing in real life

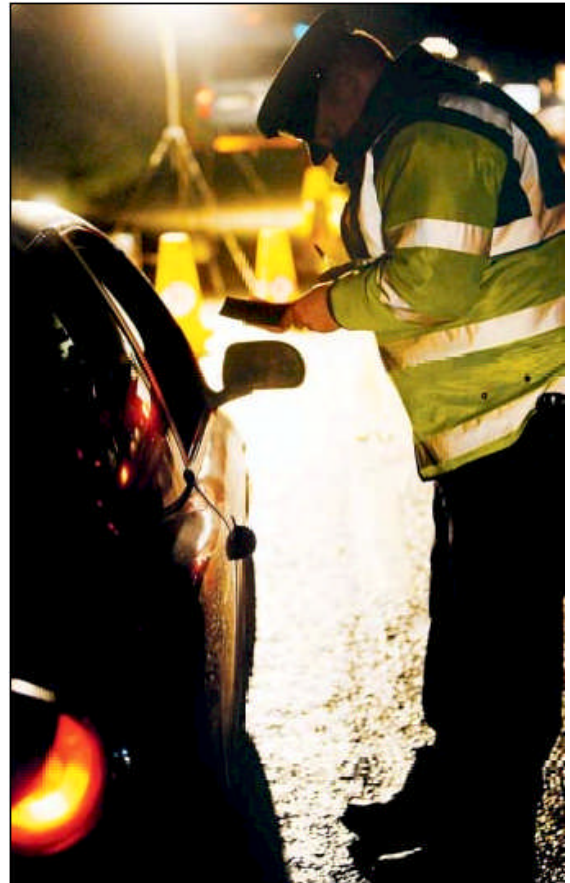
- Avoid the “white coat” effect
- Realistic intake of drug
- Correlation with other aspects of life
- Frequent assessments of fluctuating or rapidly changing conditions
- Specific contexts such as pubs, clubs, festivals

Recruitment of Large Samples

- Portable devices are low-cost
- Use of patient's own system
 - Mobile phone
 - World-Wide Web
- Web can be used for recruitment as well as for test administration

Roadside Impairment Testing

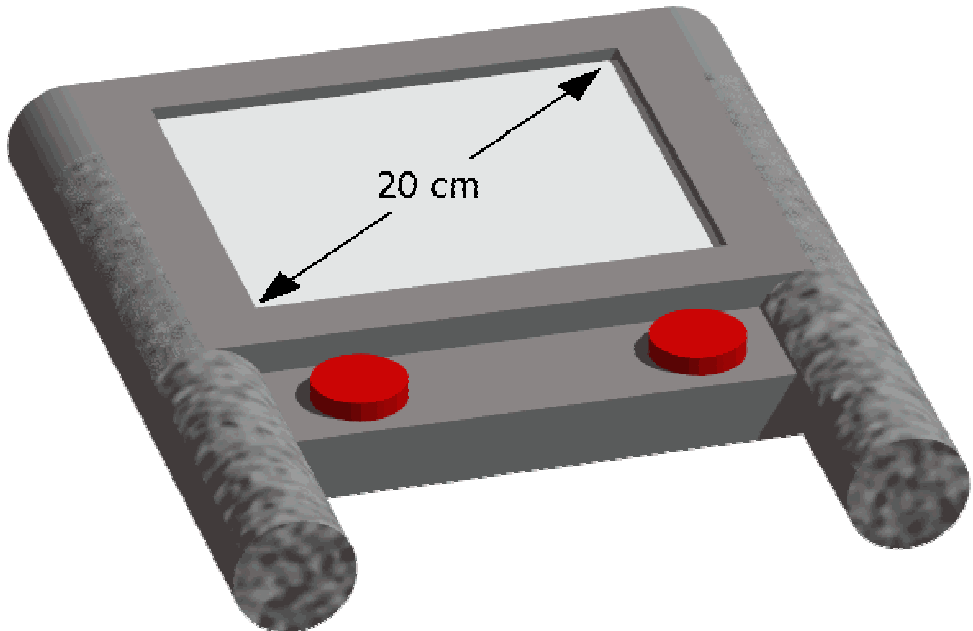
- Short time period for testing
- Tests should be straightforward, consistent, and easy to use by all drivers
 - Response Format
 - Screen Size
 - Test complexity



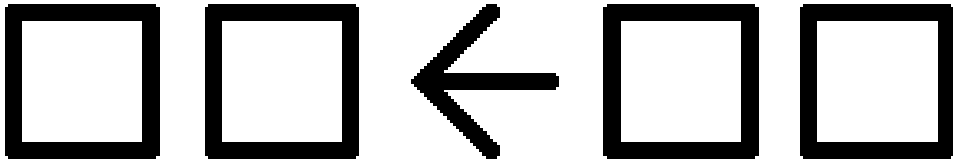
Tester Layout



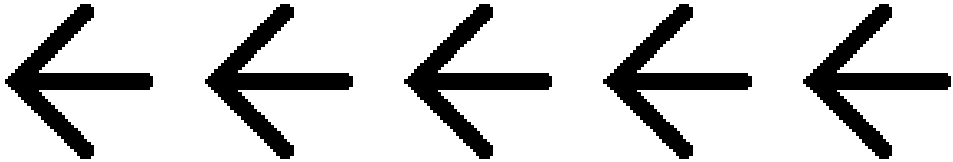
Tester Layout



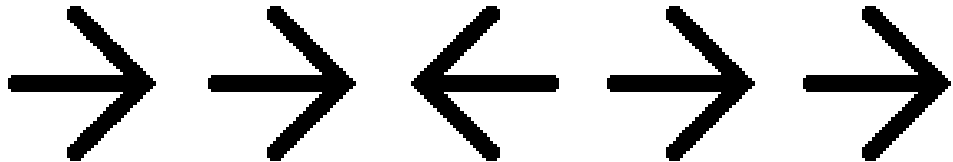
Arrow Flanker Test



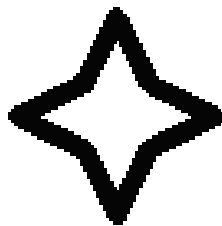
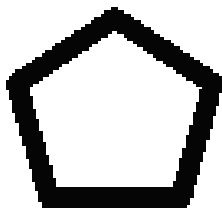
Arrow Flanker Test



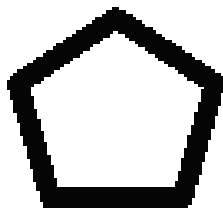
Arrow Flanker Test



Paired Associates



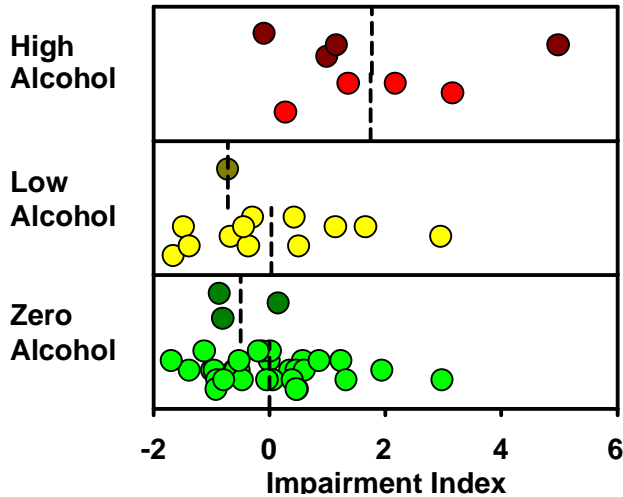
Paired Associates



The Festival Study

- Study in two music festivals summer 2003
- 55 volunteers recruited (30 male, aged 17-45)
- Drug and alcohol consumption from questionnaire
- Cozart saliva test and breathalyser
- Performance on impairment tester

Overall Impairment Index



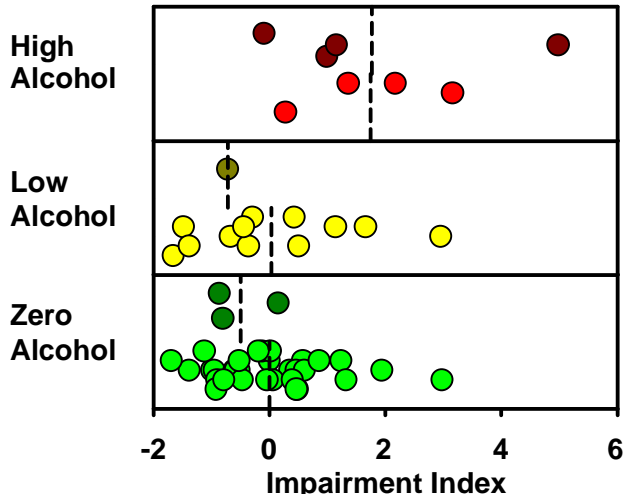
ANOVA

Ethanol $F = 7.36$ $p < 0.01$

Drug $F = 0.55$ n.s.

Inter'n $F = 0.17$ n.s.

Overall Impairment Index



Pairwise Comparisons

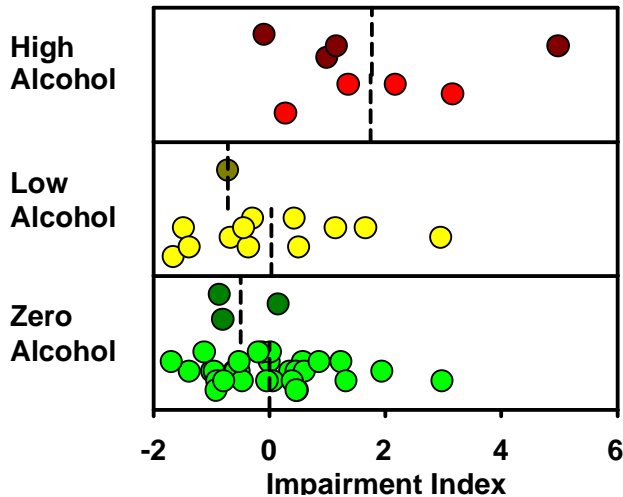
High vs Zero

$t = 3.58$ $p < 0.001$

Low vs Zero

$t = 0.13$ n.s.

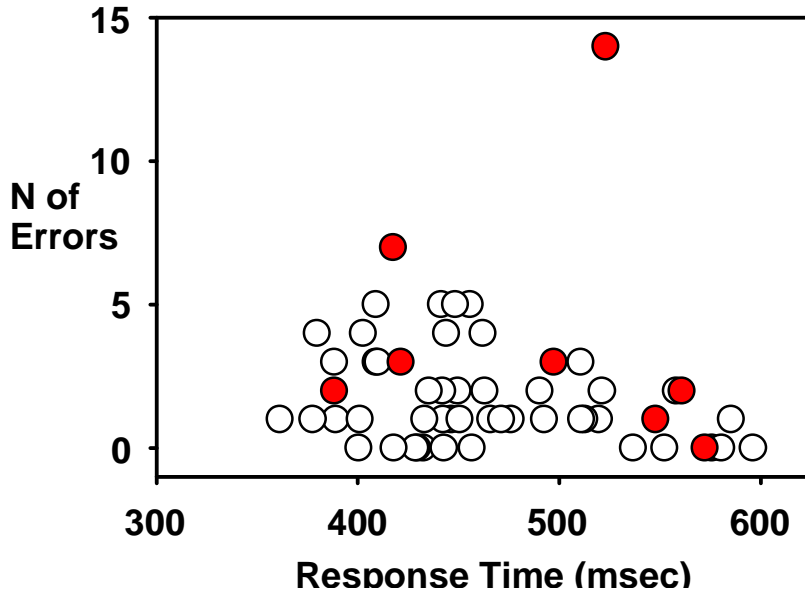
Overall Impairment Index



All but one of the High Ethanol scores is above the **median** for the Zero group

Only 2/8 High Ethanol scores are above the **maximum** for the Zero group

Arrows Speed Accuracy



Conclusions

- Impairment tester effective in detecting effects of ethanol in the field
- Important to have measures of both speed and accuracy
- Need to improve ability to discriminate between impaired and poor end of normal performance

The Pub Study

- Study in pubs in central Edinburgh
- 70 volunteers recruited (44 male, aged 18-55)
- Alcohol consumption from questionnaire
- Blood alcohol measured with Breathalyser
- Performance and Visual Analogue Scales on mobile phone

Visual Analogue Scales



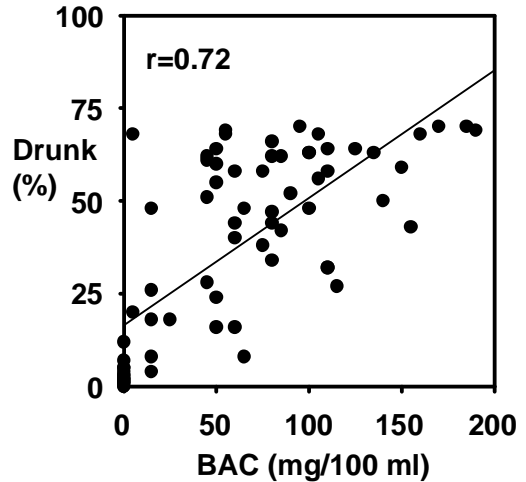
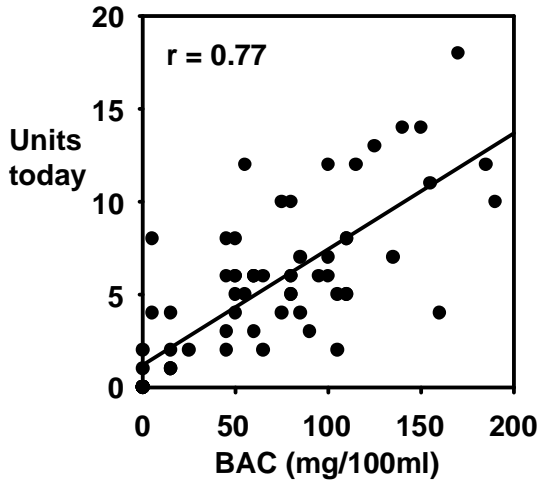
Visual Analogue Scales



Arrow Flankers



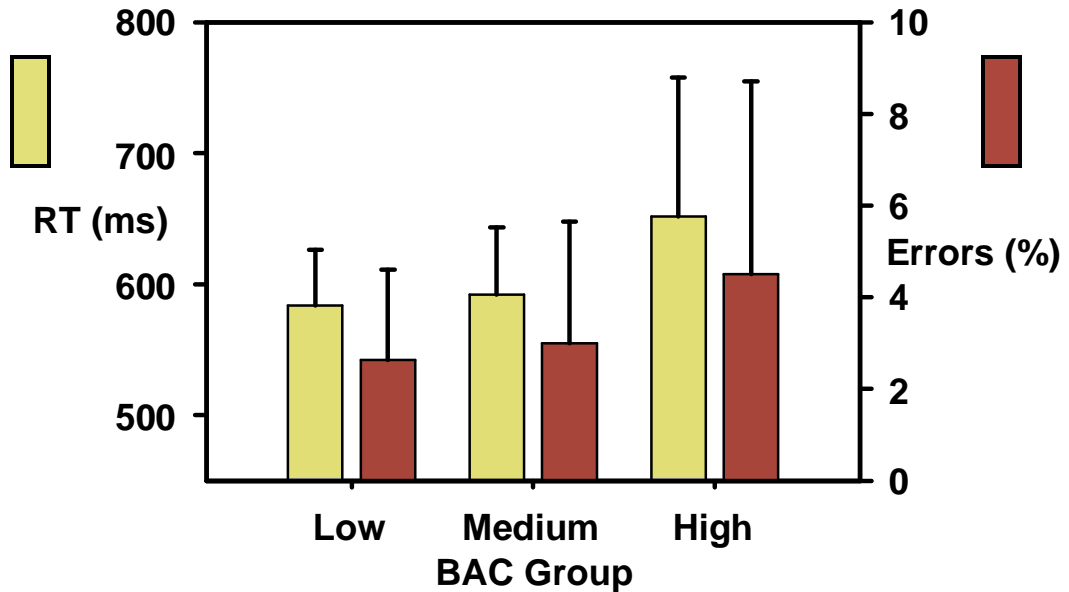
Correlations with BAC



Correlations with BAC

| Test/Measure | r | sig |
|-----------------------|----------|------------|
| Arrow Flankers RT | 0.48 | p<0.001 |
| Arrow Flankers Err | 0.41 | p<0.001 |
| Paired Associates RT | -0.09 | n.s. |
| Paired Associates Err | 0.28 | p<0.05 |
| ZigZag Maze Time | 0.11 | n.s. |
| ZigZag Maze Err | 0.28 | p<0.05 |

Arrow Flankers



Conclusions

- Portable testing methods allow performance to be assessed in a field setting
- Effects of alcohol in field studies are qualitatively similar to those seen in the lab
- Comparisons of alcohol effects between field and lab settings in the same individuals would be valuable

Thanks to

University of Edinburgh

Tom Armstrong

Michael Goulbourne

Peter Wright

University of Surrey

Andria Degia

Home Office Scientific Development Branch

Philip Dixon