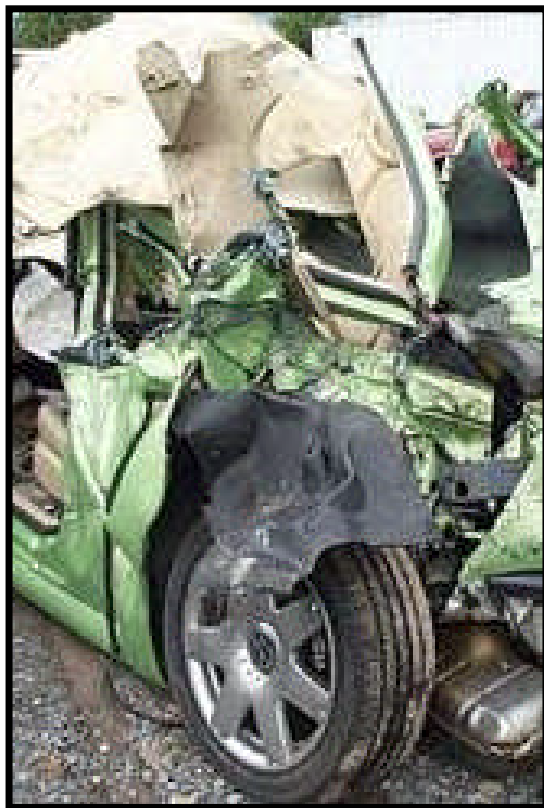




The Science is as good as the View

# Studying the effects of alcohol in the field

Brian Tiplady  
18<sup>th</sup> September 2006

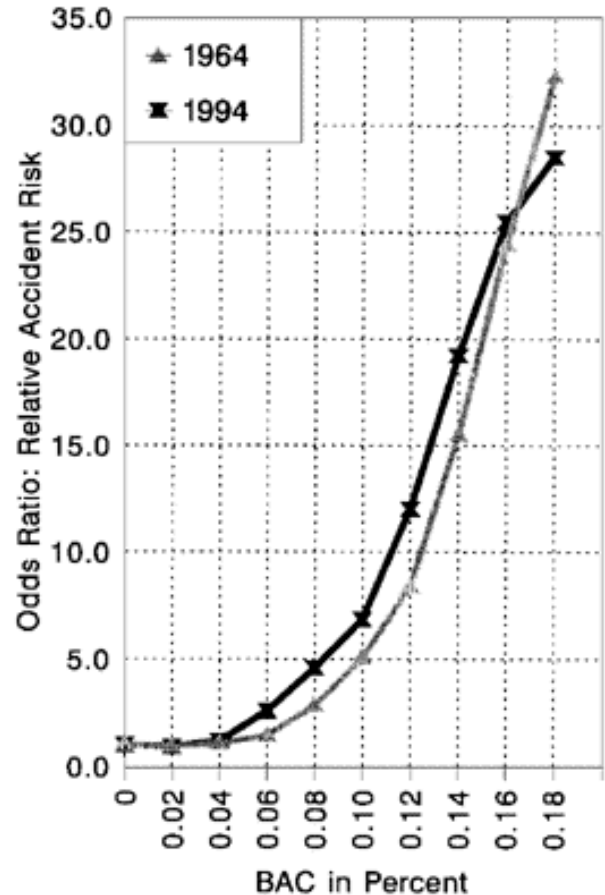


# Goals of Alcohol Research

- 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

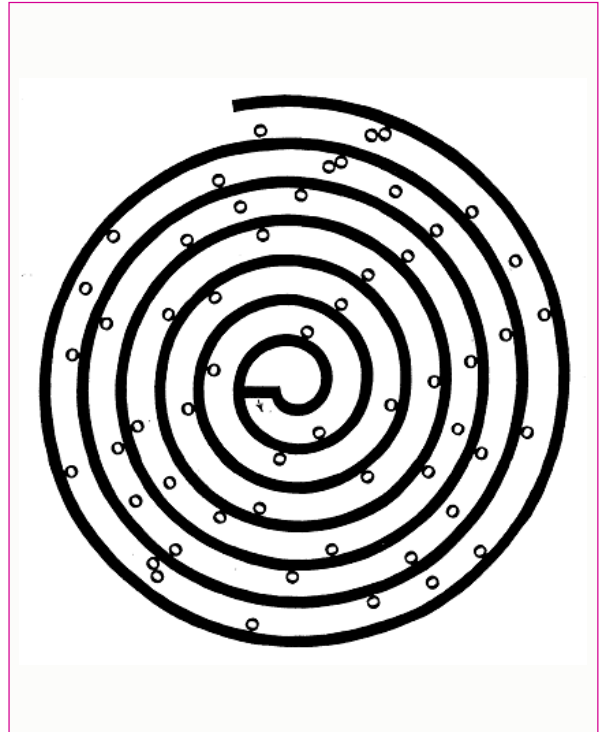
# Speed and Accuracy

- 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

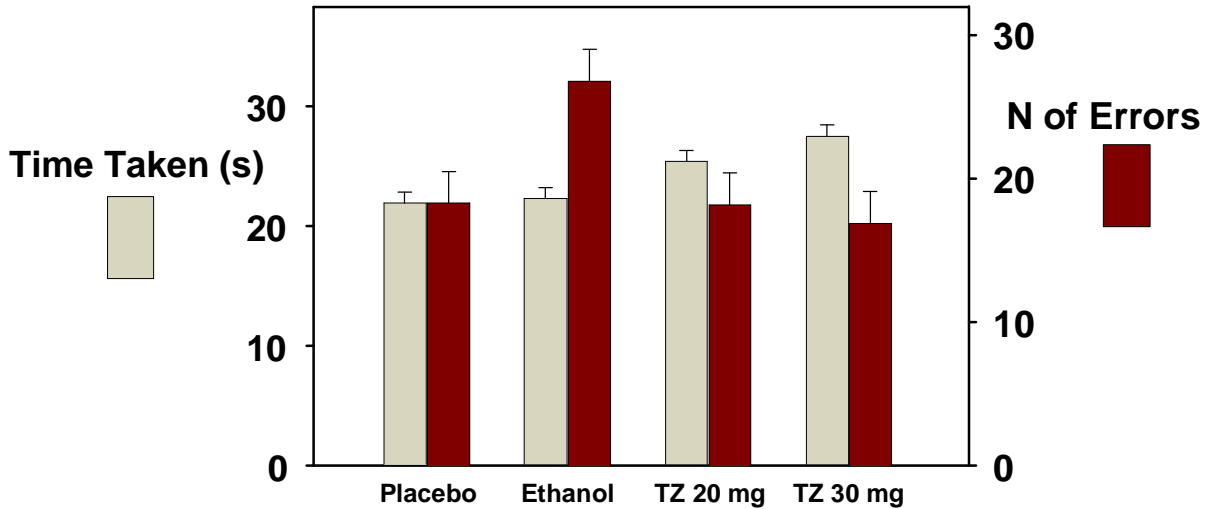


# Spiral Maze

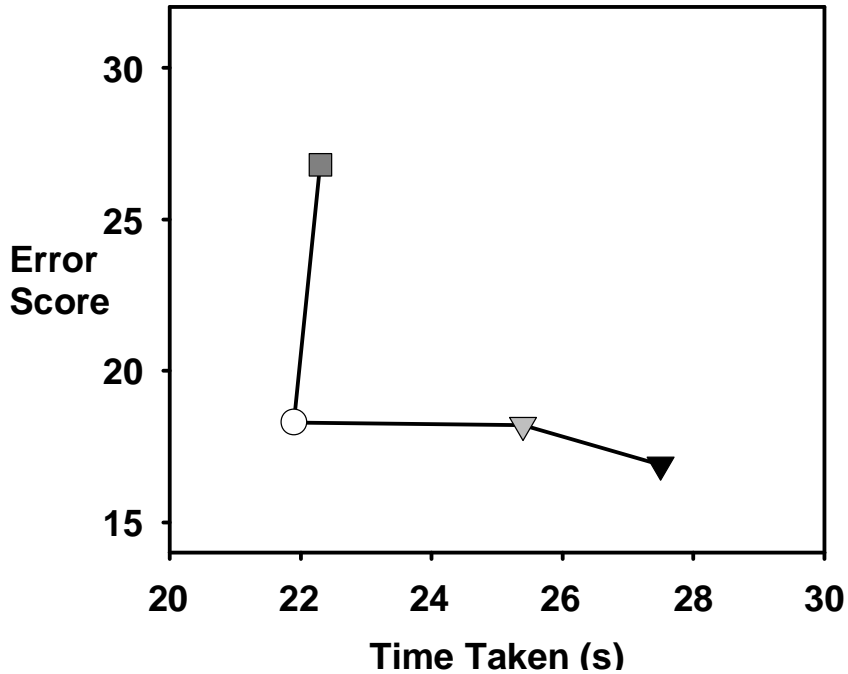
- Volunteer starts with pen at centre of spiral
- Traces path around spiral as quickly as possible, while avoiding the edges and the obstacles
- Time taken and number of errors recorded



# Spiral Maze



# Spiral Maze



# Number Pairs

Five digits appear on a computer screen.

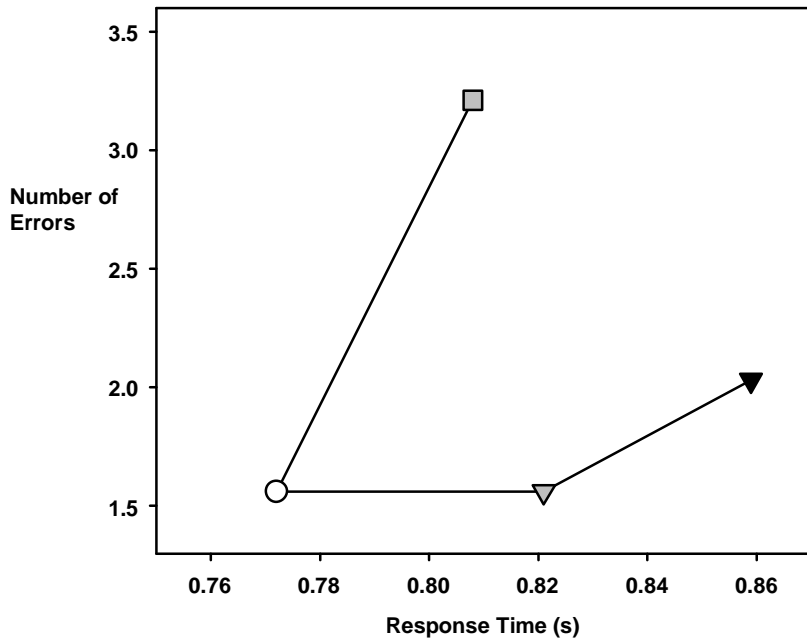
Targets are second and fourth. If targets are the same, respond YES, otherwise respond NO:

**4 3 2 3 9**

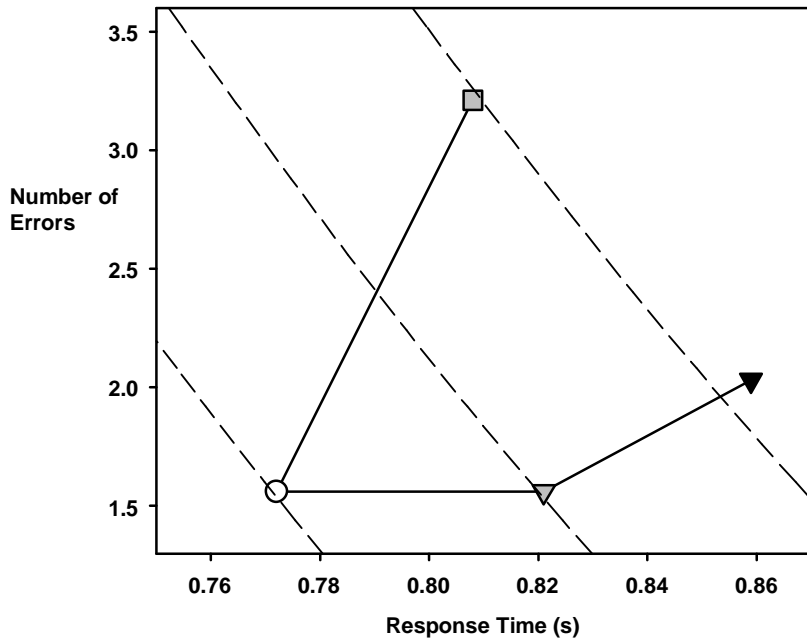
**6 2 4 6 6**

Tests set up on portable pen computer

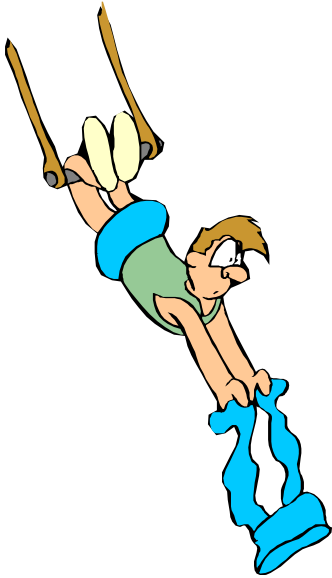
# Number Pairs



# 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

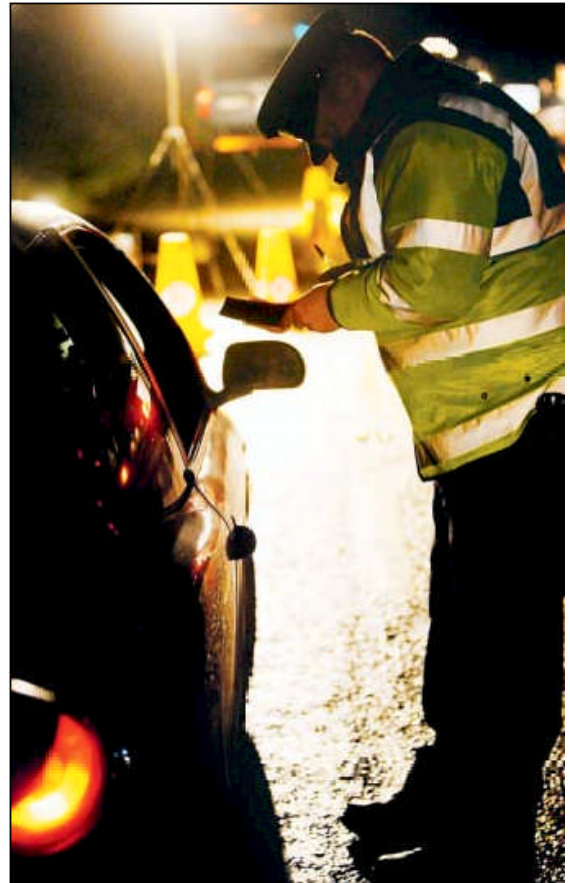
- Avoid the “white coat” effect
- Realistic intake of drug
- Correlation with other aspects of life
- Frequent assessments of fluctuating or rapidly changing conditions
- Specific contexts such as pubs, clubs, festivals

# 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

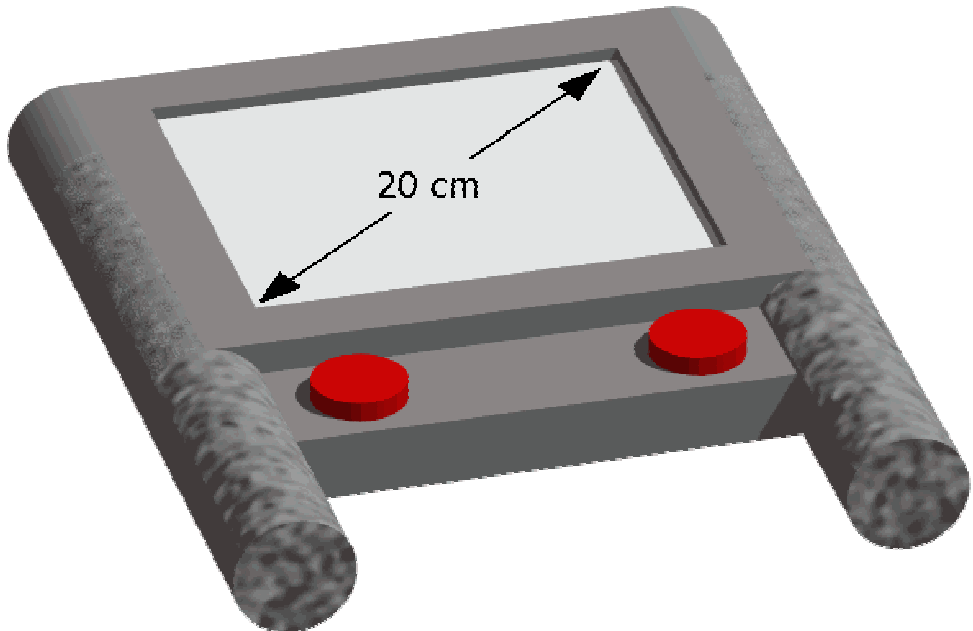
- Short time period for testing
- Tests should be straightforward, consistent, and easy to use by all drivers
  - Response Format
  - Screen Size
  - Test complexity



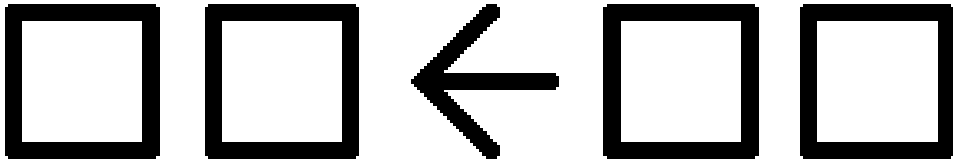
# Tester Layout



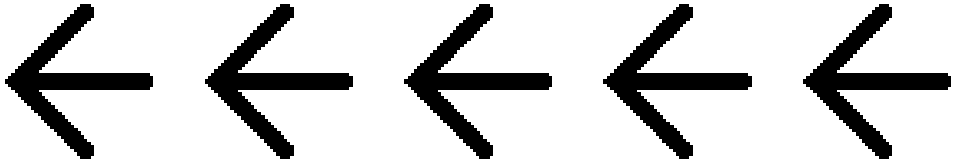
# Tester Layout



# Arrow Flanker Test

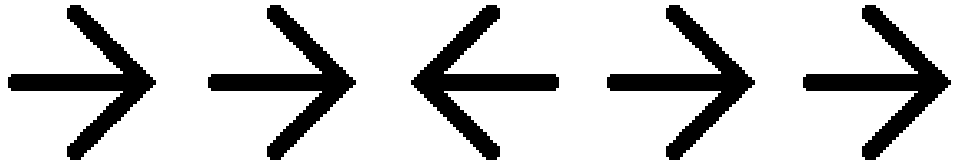


# Arrow Flanker Test

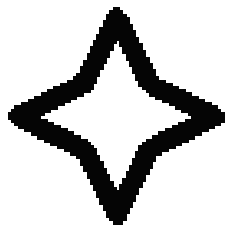
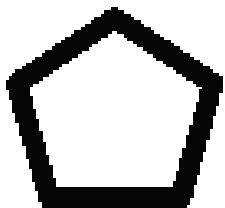




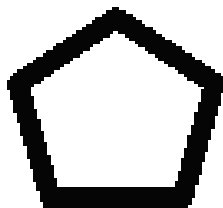
# Arrow Flanker Test



# Paired Associates



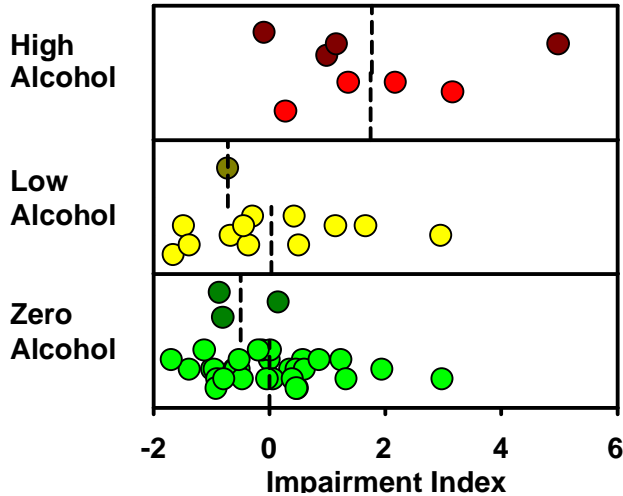
# Paired Associates



# 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



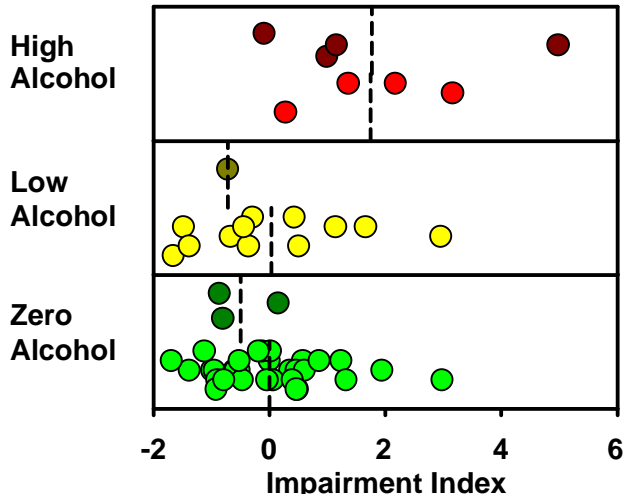
ANOVA

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

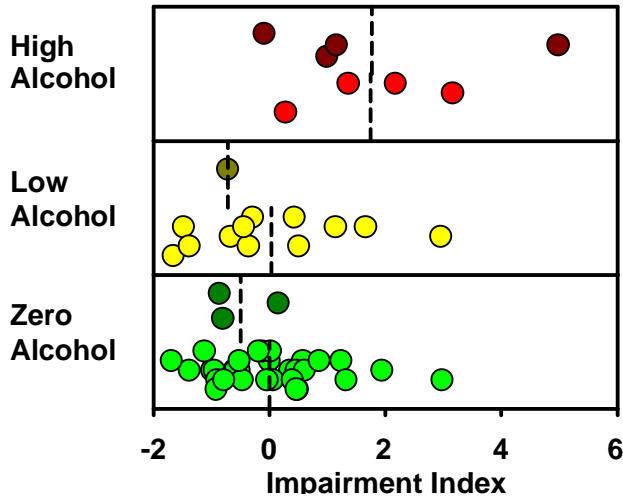
High vs Zero

$t = 3.58$   $p < 0.001$

Low vs Zero

$t = 0.13$  n.s.

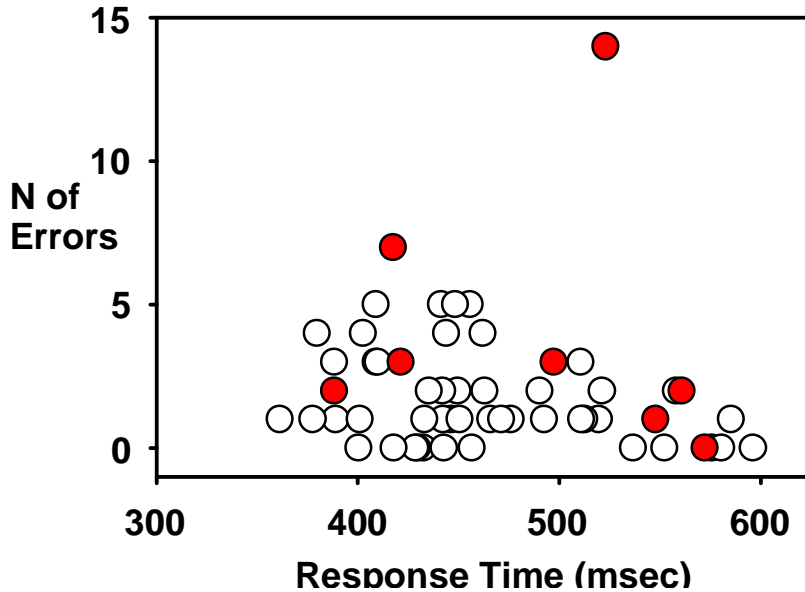
# Overall Impairment Index



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



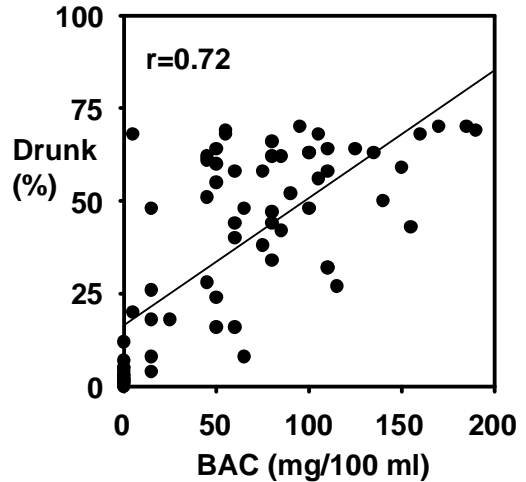
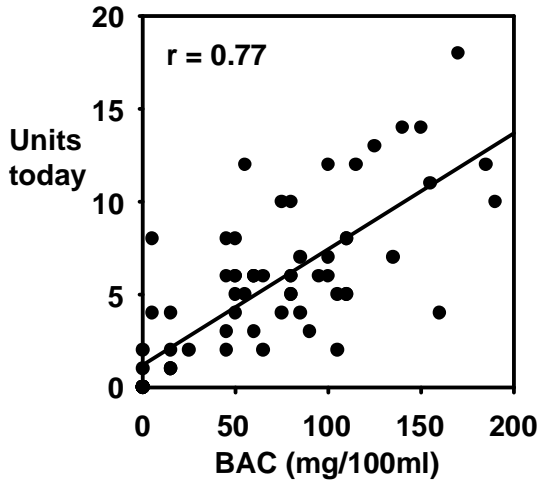
# Visual Analogue Scales



# Arrow Flankers



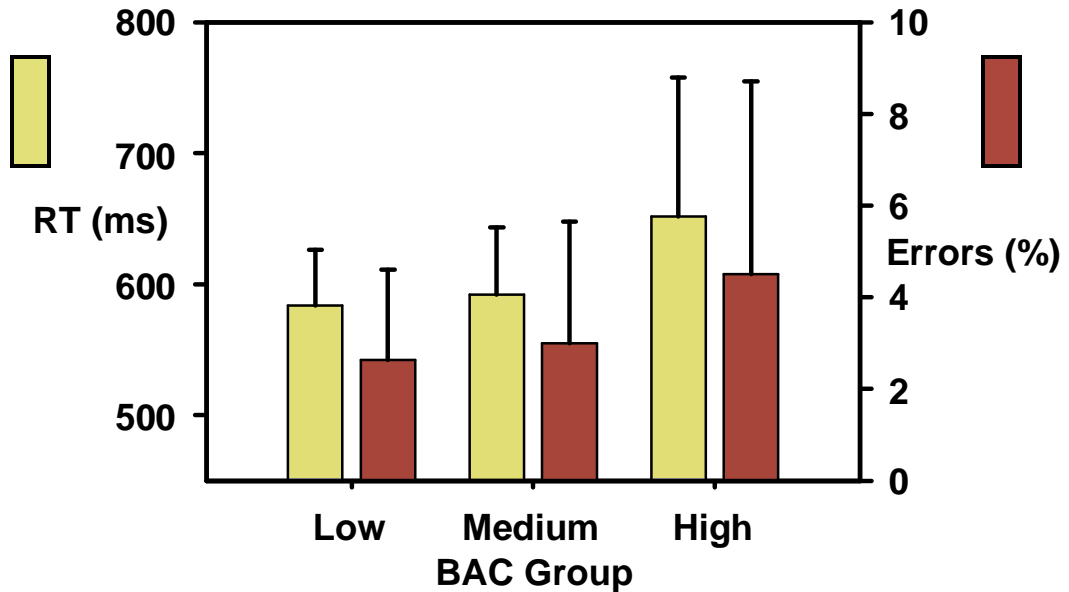
# Correlations with BAC



# Correlations with BAC

| <b>Test/Measure</b>   | <b>r</b> | <b>sig</b> |
|-----------------------|----------|------------|
| 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