

A selective reminding word-number test administered on a mobile phone

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Recall and Recognition

"A critical problem of long standing in psychological study of memory is concerned with the relation between recall and recognition. In what sense are they the same, and in what sense are they different?" (Tulving and Watkins, 1973)

Since 1973, literally thousands of papers have been published on this topic. It is now believed that there are two distinct processes, recollection and familiarity detection. Recall depends only on the first, while recognition may involve both processes (see e.g. Aggleton and Brown, 2006). It is important that both processes are evaluated.

Automated Memory Testing

Setting up recognition memory tests on a computer testing system is straightforward, but the most widely used measures of recall, such as word-list learning, require a verbal response which is then recorded by the investigator.

We have evaluated an alternative paradigm, first suggested by Frankhuizen et al. (1978). Words are presented paired with digits. The response to each word is then to press the corresponding number button. Since all of the set of digits are used for each stimulus set, response familiarity is not a valid cue, and only recollection can be used.

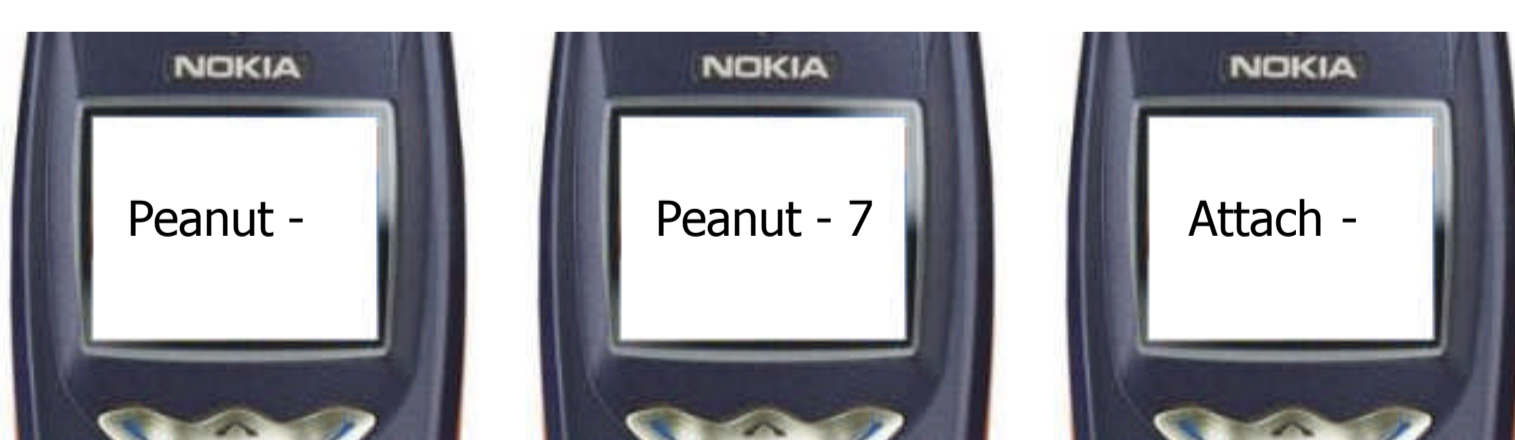


Word-Number Test

1. The test is set up on a mobile phone. Eight word-number pairs appear one at a time on the screen, using the digits 1-8..



2. Words then appear singly, and the volunteer presses the corresponding number key. This number then appears. No feedback for correct or incorrect responses is given at this stage.



3. The word-number pairs NOT correctly recalled are then presented again (Buschke and Fuld, 1974)

4. Step 2 is then repeated, with the complete set of 8 words. A total of 6 presentations, with the same Word-Number pairings, was made at each time-point, This selective reminding method allows separate estimation of recall from long-term memory.

References.

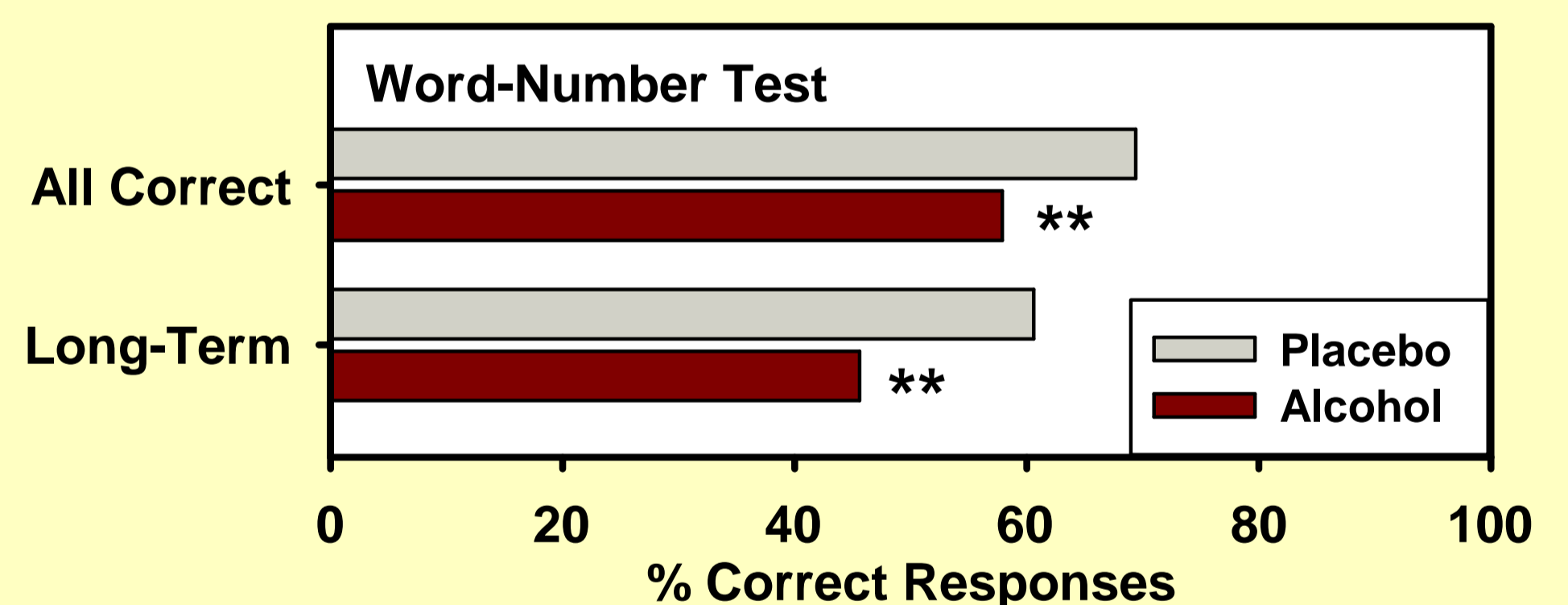
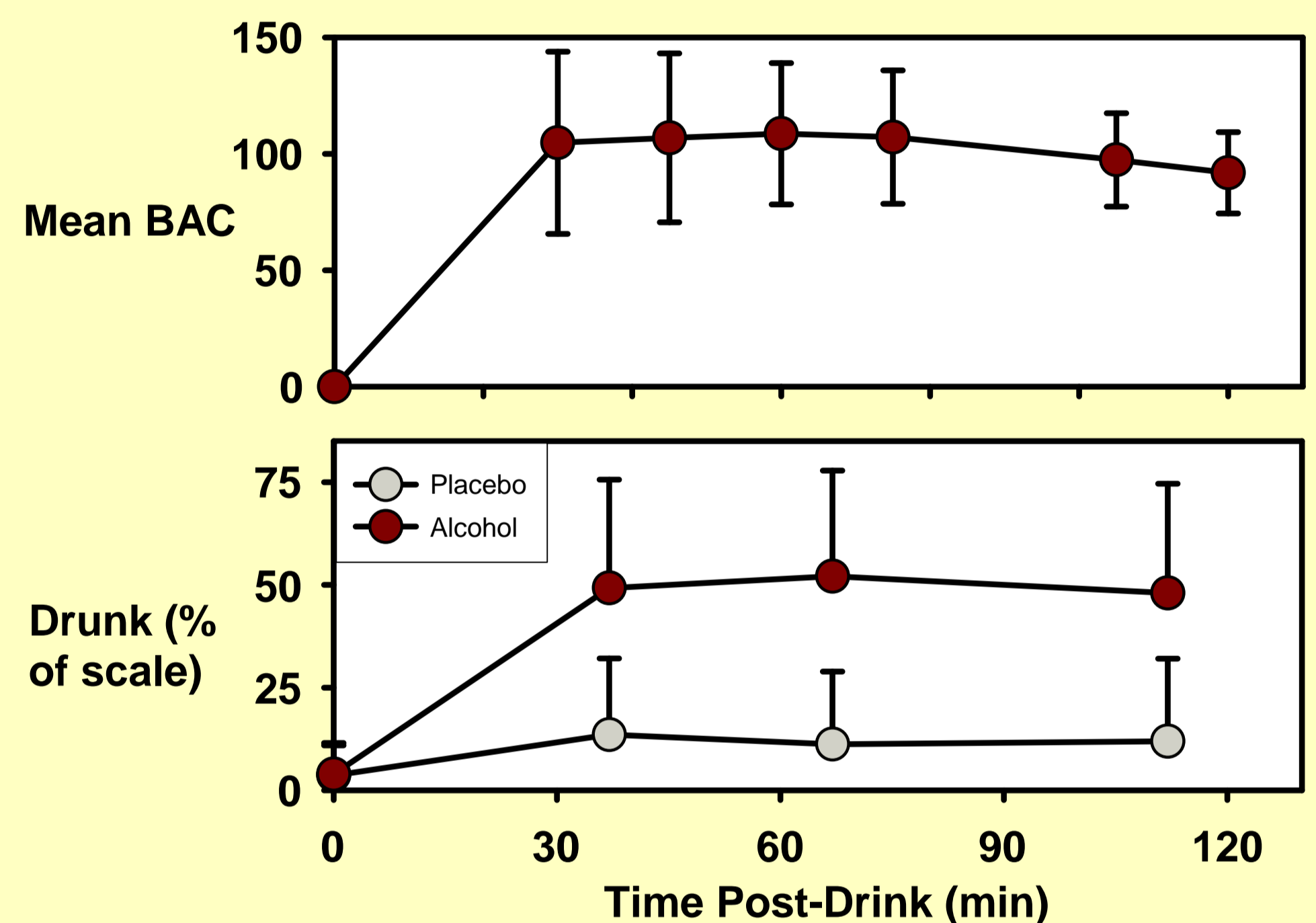
- Aggleton & Brown (2006) Trends Cogn Sci 10: 455-463
 Buschke and Fuld (1974) Neurology 24: 1019-1025
 Frankhuizen et al. (1978) Br J Anaesth 50: 229-234
 Tiplady et al. (2003) J Psychopharmacol 17: 41-49
 Tulving and Watkins (1973) Am J Psychol 66: 739-748

Study Outline

Thirty volunteers, 16 male 14 female, aged 19-64 years (mean 37.4) took part in two half-day sessions in a laboratory setting in which they received alcohol and placebo drinks in randomized order. They completed a battery of tests before the drink and at intervals over the two hours following the drink. The battery included tests of memory, attention and reaction time, and visual analogue scales (VAS). We present data from the word-number test and the sober—drunk VAS.

Effects of Alcohol

Mean peak Blood Alcohol Concentration (BAC) in the alcohol session was 121 mg/100 ml, with peak values between 30 and 75 minutes. Subjective drunkenness showed a similar time course. Alcohol caused impairment on the Word-Number test, both for the total number correct and for the responses attributed to long-term memory recall. The trend was to a greater effect for the latter measure, as has been seen previously with selective reminding recall tasks (Tiplady et al., 2003). The percentage reduction with alcohol was greatest in the initial administration, and gradually declined over time. A similar pattern was seen for statistical significance indicating that multiple administrations of the material do not increase the sensitivity of the test



Word-Number Test. Correct scores and reductions with alcohol

N Pres	Total Correct			Long-Term		
	Placebo	Alcohol	% Red	Placebo	Alcohol	% Red
1	69.4	57.9	16.7**	60.6	45.6	24.7**
3	77.2	67.2	13.0*	71.7	60.7	15.4*
6	83.8	74.7	10.9*	80.3	69.7	13.1*

Correct scores are percentages of total. *: p<0.05; **: p<0.01

Summary and Conclusions

1. The Word-Number Test is practicable for use in a mobile phone cognitive test system.
2. The Word-Number test is sensitive to the effects of alcohol as assessed in a laboratory setting
3. The pattern of impairment seen is similar to that previously noted for a selective reminding word-list task

We thank the Clinical Research Facility, Royal Infirmary, Edinburgh, for their help and support in carrying out this study. There was no external funding for the study.

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