

The use of a mobile phone to administer visual analogue scales

Brian Tiplady, Department of Psychology, University of Edinburgh

Background

Handheld computer systems are increasingly being used to administer performance tasks and mood assessments, being relatively inexpensive and highly portable (Totterdell & Folkard, 1992; Tiplady, 1994). Mobile phones represent the next step in this development, as they are even more compact, and are regularly used by a much greater proportion of the population. Thus people are already comfortable with their use, and there is the possibility of carrying out assessments on the user's own mobile phone.

Mobile phones have certain limitations. The screens tend to be rather small, and touch screens are not generally available. This presents two potential problems for setting up visual analogue scales:

- Paper scales are generally 100 mm long, and measured to the nearest mm. A scale on a mobile phone screen would have to be very much shorter, and have fewer subdivisions. This could affect the way the scale is used. Shorter scale lengths on handhelds (about 40 mm) have been validated (Jamison et al., 2001), but mobile phone scales need to be shorter still.
- It is desirable to have the scale start without a cursor, to avoid bias (Palmlblad and Tiplady, 2004). This can readily be done with a touch screen, with the cursor appearing in the position first tapped, but this approach cannot be used with standard mobile phones.

With careful attention to screen layout and response formats it should be possible to minimise these problems. This study aimed to evaluate one approach to scale design on a mobile phone using an application programmed in Java™:

Visual Analogue Scale

The scale was 21 mm long on the phone we used. The scale was initially blank, with no cursor visible:



The first response was made by pressing on the left or right key. The cursor appeared ¼ or ¾ of the way across the scale depending on which button was first pressed.



The cursor was adjusted using right and left keys, then scroll-up to finish. The scale was 26-point, moving in intervals of 4% of scale length.



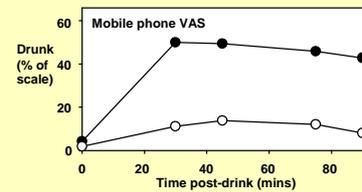
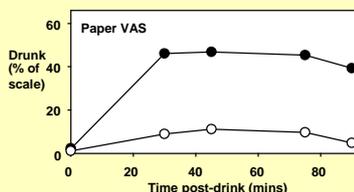
The Study

Mobile phones were used to assess the subjective effects of ethanol in 40 healthy volunteers (19 male) aged 19-50 years (mean 23) years weighing 54-89 kg (mean 70). 20 volunteers consumed a drink containing vodka and orange juice, the other 20 a placebo drink containing water and orange juice. Assessment were made between 30 and 90 minutes after the start of the drink.

Subjective changes were assessed using 3 visual analogue scales: Alert—Drowsy; Sober—Drunk; and Bored—Interested. They were assessed on mobile phone (21 mm) and on paper (100 mm) in randomized order. Data are shown only for Sober—Drunk.

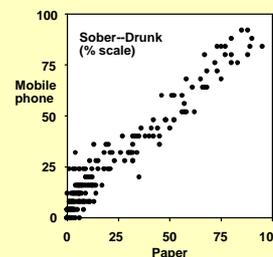
Results

The maximum blood alcohol concentration averaged 99.5 mg/100 ml. This dose (closed circles) made our volunteers feel more drunk than placebo (open circles). The effect was similar whether measured by paper (100 mm line) or mobile phone (21 mm line):

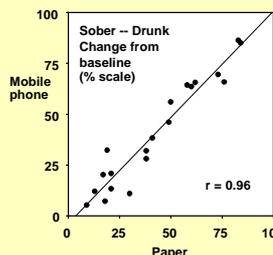


The mean post-drink scores were expressed as change from baseline, and ethanol and placebo scores compared using Student's t-test. For paper, the t-value was 5.23 (p<0.0001) while for mobile phone it was 5.57 (p<0.0001). So if anything, in spite of the shorter length and lower resolution of the phone scale, the phone was more sensitive than paper.

A scattergram of all data points, comparing paper and mobile phone, shows good agreement between the two measurements, but suggests that there is a slight discontinuity at the 24% position on the scale, i.e. the position that the cursor first appeared if the left button was pressed.



When the change from baseline scores were compared for the volunteers taking ethanol, very good agreement was seen between paper and mobile phone assessments. Taken together with the sensitivity data, this indicated that the mobile phone visual analogue scale is an appropriate method for assessing subjective effects of drugs.



Conclusions

1. The 21 mm mobile phone visual analogue scale is as sensitive as the 100 mm paper scale in detecting subjective effects of ethanol
2. The initial "jump" to the ¼ or ¾ position on the scale has a slight effect on ratings, but this does not have any observable effect on the changes found with ethanol. Such effects should always be documented, and their significance assessed.

References.

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Contact Details.

email: brian@penscreen.com
web: www.penscreen.com