Introduction

Touchscreen smartphones can be operated in portrait (P) and landscape (L) orientation. Previous research [1, 2, 4, 7, 8] suggests that a landscape layout is quicker to perceive but it remains unclear if it actually performs better than a portrait one and which areas are the best for positioning an element.

We investigate whether a touchscreen smartphone is faster to operate in P or L and where to put a button in each layout for best findability and operability.

How?

In line with various sources on optimum button size [3, 5], we laid out a series of 3, 5, and 8 buttons in both orientations on an HTC Sensation XE. Each button was 53 x 53 pixels in size, had a grey background and black type to minimize the effect of visual salience.

First round (R1): • 44 users to tap a target consisting of a three-letter-word, target name shown on task screen • In portrait and landscape • In a layout consisting of 3, 5 or 8 buttons

Second round (R2): • same as R1, but colour names shown using method similar to Stroop effect [6] to require brief consideration of target before selection • task screen vanishes automatically after one second • in portrait and landscape • In a layout consisting of 3, 5 or 8 buttons

Results

R1: The ANOVA showed no statistically significant difference between P and L or the target positions, only a main effect for button amount, which is expected. F(2,86) = 91.04, p<.001. Bonferroni: alpha: 0.05/3 = .017

R2: The ANOVA showed three effects and one interaction:

- Breakdown:
  - 3 buttons (Median: 1170.00) is faster than 5 buttons (Median: 1302.88), Z = 4.28, p < .001;
  - and 5 buttons is faster than 8 buttons (Median: 1589.50), Z = 4.81, p < .001.
  - Bonferroni alpha: 0.05/3 = .017

- Orientation:
  - Middle (Median: 1260.50) is faster than End (Median: 1392.50), Z = 4.86, p < .001;
  - and End is slightly faster than Start (Median: 1408.25), Z = 2.92, p = .007.
  - Bonferroni alpha: 0.05/2 = .025

- Position:
  - Middle (Median: 1285.38) is faster than End (Median: 1715.25), Z = 4.34, p<.001
  - and End is faster than Start (Median: 1866.50), Z = 2.69, p = 0.007
  - Bonferroni alpha: 0.05/3 = .017

Conclusion

Landscape is faster than Portrait

The effect is stronger the more buttons in the layout

Tips for Designers

When designing time-critical applications, favour landscape orientation over portrait. In addition, the user’s visual focus set by a dialogue has a higher impact on interaction time than the proximity of the finger to an element. Therefore, put a button you would like the user to perceive first in the same place as it was in the layout, and the tertiary options to the left and right of your preferred option in portrait orientation, place these to the bottom and the top respectively.

References

[5] Srinivasan, M. 3-D finite-element models of human and monkey fingertips to investigate the mechanics of tactile sense, 2003