Started on	Friday, 25 September 2020, 7:08 AM
State	Finished
Completed on	Friday, 25 September 2020, 7:24 AM
Time taken	15 mins 48 secs
Marks	1.00/1.00
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Complete

Mark 1.00 out of 1.00

Aims

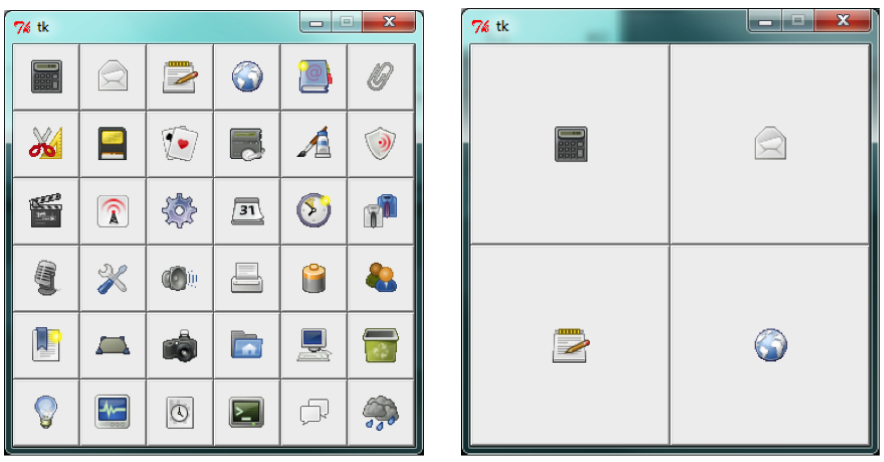
In this lab you will use your knowledge of Fitts' law, visual search, and the Hick- Hyman law of choice reaction time to theoretically predict item selection times in two different interface structures.

At the end of this lab you should understand the basics of the following:

• How to combine Fitts' law with performance models for visual search and decision times to compare potential interface designs.

Design scenario

A company is designing the central user interface for a touchscreen mobile device. They have two main design concepts: one involving 36 iconic items in a grid (left, below); and the other involving 4 large iconic grid items. Both designs will allow users to use leftward or rightward 'swipe' gestures to move to further icon sets - swiping the finger leftward 'drags' a new set of icons in from the right; and vice versa for the left. Moving past the end of the list rotates back to the start. After each selection in the 4 item version, the interface returns to the 'home' page showing the first 4 icons: the intention being to help users learn the actions required to acquire each target.



Some of the designers prefer the 36-item grid, arguing that it will allow rapid access to items once the user has learnt their location; and 36 items should be enough for all users except those who download lots of additional applications.

However, the proponents of the 4-item design argue that the 36 item display will be cluttered, making visual search slow and taxing.

Who do you think is right? Will one design be better than the other for novices and/or experts? Will the difference be large or small? Write down your intuitive feel for the relative efficiency of these designs, and revisit what you wrote after completing the exercises below.

Predicting performance

Use your knowledge of Fitts' law, visual search, and the Hick-Hyman law of choice reaction time to predict the average time to select a random one of the 36 targets using these interfaces. You should calculate two mean average values for each interface: a novice average and an expert average.

You will need to make several assumptions, including the following:

- All items are equally probable, and users always start at page one when making a selection. (This assumption is very unlikely to be true in actual use, as users normally have a Zipfian distribution of target frequency. However, the assumption of equal probability greatly simplifies modelling).
- Assume that each swiping gesture takes 500ms to complete. Although unrealistic, you can assume that a swipe finishes where it starts (to simplify Fitts Law modelling).
- Use Fitts' law a and b parameters of 200ms and 150 ms/bit.
- Target widths/heights are 53 pixels in the 36 item condition and 160 pixels in the 4 item condition, with the cursor positioned at the centre of the screen. For simplicity, you can assume that the target width for Fitts Law modelling is the same as the width or height of the square item.
- The average number of items that a novice user needs to visually search to find a present item among *n* items is given by (*n*+1)/2. For example, if there are three items, the average number to search before finding a present item is 2, and if there are four items, the average number to find a present item is 2.5.
- Use visual search intercept and slope parameters of 300ms and 80 ms/item.
- Use Hick-Hyman decision parameters of 240ms and 80 ms/bit.

  Write out a list of the steps involved in selecting the average target with each of the interfaces, for both the novice and the expert. Remember to include all discrete steps, such as when a visual search or decision is needed.

  For each of the steps, use the appropriate predictive formula to calculate the time required. Sum the times for each interface to create your prediction. Use an Excel spreadsheet to complete your calculations.

  Once you have your predictions, consider how they would change with different configurations of the grid (changing the number of pages/number of items per page). Which elements of your model remain constant, and which change? Is there a "sweet-spot" for novice and expert performance?

To help you get started, here's an example of what the finished spreadsheet should look like. Yellow cells indicate parameters to the model that you can modify. All other cells are computed from these parameters. The red outlined grey blocks show the bits you have to calculate.

For 36 items at once						
Total Items	36			Visual	HH	Fitts
Num. Pages	1		a	300	240	200
Items per Page	36		b	80	80	150
Display Size	320					
Swipe time	500					
Target Size	53					
Number of pages after first						
Mean distance to target (by pythagoras)						
Mean ID						

Novice				Expert		
Visually scan half of the items (on average)				Decide on first page		
Point to item				Point to item		

For 4 items across 9 pages	
Total Items	36
Num. Pages	9
Items per Page	4
Display Size	320
Swipe time	500
Target Size	160
Number of pages after first to middle page	
Mean distance to target (by pythagoras)	
Mean ID	
Time to scan all items on a page (failing to find item)	
Time to find item half way through a page	

Novice (on average, the user will find the item at the middle of 5th page)				Expert (on average, the user will decide about the action sequence to acquire an item at the middle of the 5th page)		
Total visual scan time to middle item				Decide on first page		(This assumes that the user makes ONE decision to recall an action series like "4 swipes, then bottom left")
Total swipe time to middle page				Total swipe time to middle page		
Point to item				Point to item		

	Novice	Expert
36		
4		

Submit an Excel Spreadsheet containing your predictions.

lab7.xlsx

Comment:

◄ keyboard_src.zip

Jump to...

Lab 8: Heuristic Evaluation ►