

Master Informatique - Université Paris-Sud
Fundamentals of Human-Computer Interaction
2015-2016 - Assignment #3

Modeling interaction: Color selection

The Keystroke model is used to compare the times to execute interactive tasks by decomposing them into actions called “operators”. In this exercise, we consider the following two operators:

<i>Name</i>	<i>Description</i>	<i>Time</i>
$P_{D,W}$	Point or drag-and-drop	Fitts' Law (see table)
K	Type a key or push a button	100ms

The time in milliseconds to reach a target of size W at distance D is given by the table below. D/W is the ratio of target distance to target size; MT is the movement time in milliseconds, computed as $MT = 100 + 150 \log_2(1 + D/W)$.

<i>D/W</i>	4	5	6	8	10	15	20	30	40	50
<i>MT</i>	450	490	520	580	620	700	760	840	900	950

For the rest of the exercise, when you describe an interaction, make sure to explain what each operator corresponds to and to specify the distance and width used for each P operator.

We consider an interface for editing drawings made of geometric shapes (circles, rectangles, etc.). A shape is selected by clicking within it. Multiple shapes can be selected by clicking the first one and shift-clicking the rest.

1. The following interactions are available to change the color of an object:
 - a) Select one or more shapes, then select a color in the Colors menu from the menu bar;
 - b) Right-click on a shape to display a contextual menu and select a color in the Colors sub-menu;
 - c) Select a color in the color palette on the left of the screen, then apply the color to one or more shapes by clicking on each shape.

The layout of the display is as follows:

- The height of each menu item is 1cm, the width is 3cm;
- The height of a menu is 10cm on average and the target item is in the middle of the menu;
- The size of each color palette item is 1cm;
- The menu bar is 30cm away from the shapes;
- The color palette is 30cm away from the shapes;
- The shapes are 2cm wide on average, and are 10cm apart on average.

- 1a.** The cursor is 10cm away from the closest shape and 30cm away from the menu bar and the color palette. Draw the content of the display and show the trajectory of the cursor for each of the above three techniques.
- 1b.** Calculate the time to change the color of one shape with each of the above techniques. Which technique is fastest?
- 1c.** Calculate the time to assign the same color to 5 shapes with each of the above techniques. Which technique is fastest? Compare with the results of 1b.
- 1d.** Calculate the time to assign a different color to 5 shapes with each of the above techniques. Which technique is fastest? Compare with the results of 1c.
- 2.** We want to create a color instrument that is efficient in all the above scenarios. First we use a toolglass, i.e. a semi-transparent floating palette manipulated with the non-dominant hand. The toolglass contains the color swatches. To apply a color to a shape, the user moves the toolglass over the shape with the non-dominant hand so that the desired color swatch is over the shape, then moves the cursor with the dominant hand over the color swatch to “click-through” it.
- 2a.** Draw the interaction and specify any new hypothesis about the layout that you may need.
- 2b.** Calculate the time to assign the same color to 5 shapes with this technique.
- 2c.** Calculate the time to assign a different color to 5 shapes with this technique.
- 3.** We create a second instrument to set the color. This instrument is located in the tool palette, and shows the last color that was used.
- To apply this color, simply select the tool and then click one or more shapes (as in method c).
 - To change the color used by the tool, right click while the tool is selected. This displays a palette of color swatches. Click a swatch to select that color. The palette disappears. Clicking outside the palette closes it without changing the color.
- 3a.** Draw the interaction and specify any new hypothesis about the layout that you may need.
- 3b.** Calculate the time to assign the same color to 5 shapes with this technique.
- 3c.** Calculate the time to assign a different color to 5 shapes with this technique.
- 4. Compare the results from questions 1, 2 and 3. What do you conclude?**