Midterm II – Solution Guide

Part 1: Short Questions (16 pts)
1. **FALSE**: A direct manipulation interface is not necessarily a tangible interface. For example, a light pen or a stylus on a touch screen both use direct manipulation but the screen is not a tangible interface.

2. **FALSE**: Icons may help internationalization, but the ones mentioned are culture-specific and may not be universally understandable.

3. **TRUE**: Adaptive menus shrink to show only frequently used options. Hence, they violate positional consistency.

4. **FALSE**: Having a fixed toolbar on the left or a fixed menu at the top will not scale well to a wall display since it will disrupt drawing by requiring frequent going back and forth to the toolbar to make selections.

5. **TRUE**: These features have been used successfully in IDEs to speed up typing and reduce the reliance on memory recall.

6. **TRUE**: See DTUI, p. 326 (“Carroll uses congruent to refer to meaningful pairs of opposites”).

7. **FALSE**: Users rely on hand-eye coordination to control the pointer.

8. **FALSE**: Users’ gaze fixations can be misinterpreted as actions or confirmations even when not intended.

Part 2: Fitts’s Law (24 pts)
1. MT is the movement time to the center of the target. D is the distance from the initial cursor position to the target center (in a direct line), W is the width of the target as it pertains to the given task (intuitively, the tolerance in aiming the center).
   
   Both D and W must be measured in the same plane, it makes little sense to measure distance of mouse movement on the desk (e.g., in centimeters) and the width of the target on the screen (e.g., in pixels).

2. a. Fitts’s Law predicts movement time for healthy adults. With some adjustments it could be applied to children and the elderly. However they do have unique characteristics.
   
   b. Children and the elderly may be particularly disadvantaged as this will require them to make a relatively stable horizontal movement to get to the submenu and make a selection in it. Deviating slightly could make the menu disappear.
   
   As demonstrated on DTUI p. 369 for children, this may be quite challenging for these populations. This task requires fine motor skills which may have not yet developed in children, or have already deteriorated in the case of the elderly.

3. In this task, users are instructed to move as quickly as possible. Therefore, they will aim to move vertically downward. The distance to reach the center of the line is 200 pixels. The tolerance width for vertical movement is 5 pixels. Therefore, \( \frac{D}{W} = \frac{200}{5} = 40 \).

4. Having the gap between the edge of the screen and the scrollbar when the window is maximized will hurt performance. Instead of “blindly” moving the cursor all the way to the right until it hits the right edge (\( W = \infty \)), users will have to ensure they don’t overshoot the scrollbar. Therefore Fitts’s Law come into play and given that the target is fairly small, this design will slow down users.

   Notice that when the window is maximized, the window bezel disappears, so there’s no excuse for maintaining this gap.

Additional reading:
A Quiz Designed to Give You Fitts ([http://www.asktog.com/columns/022DesignedToGiveFitts.html](http://www.asktog.com/columns/022DesignedToGiveFitts.html))
Part 3: Design Critique (30 pts)

1. We are going to name a few advantages and disadvantages of the Ribbon interface compared to menus + toolbars. Note that some of these require more intimate familiarity with the Ribbon than was required for this exam.
   **Advantages:**
   - Makes choices always visible: enables recall. However, only the active tab is shown.
   - Task-oriented organization: should diminish the need to switch tabs frequently.
   - Icons and their labels are always shown. In toolbars, text is shown only as a tooltip.
   - Larger icons: more understandable, easier to click (bigger targets).
   - Grouping: within each tab, related choices are grouped.
   - Supports preview.
   - Brings to the front the most frequently used choices.
   - Shows a context sensitive tab (e.g., when editing a table, adds a table tab).

   **Disadvantages:**
   - Breaks backward compatibility with the old interface, requires retraining and time to adjust.
   - Wastes screen real-estate (by default, however it can be hidden).
   - Full dialogs are hard to reach (have to click very small arrow, not very clear).
   - Shortcut keys are not shown (holding ALT shows some, hovering over buttons shows CTRL combinations).
   - The File menu was superseded by the office button (the round button at the top left). It may not be obvious that it is clickable.
   - Advanced functionality may be harder to access.

Additional reading:

2. Customization benefits users by allowing them to arrange the interface in a way that best fits their workflow and habits. Users usually have the choice of reverting to “factory settings” in case of a problem. However, customization hurts standardization, so switching to a different installation may be difficult and it also makes it harder to consult technical support or documentation which usually assume factory settings.

Part 4: Design (30 pts)

1. Some aspects of the United website (advantages and disadvantages):
   - Airport selection uses a popup window.
   - Date input is restricted to ensure validity.
   - The interface uses a small part of the screen.
   - Advanced search options are available but separated from the interface.
   - Search can be done by Schedule & price or Price (may be confusing since there’s also a Dates flexible option).
   - Uses alignment and grouping effectively.
   - Uses only a small fraction of the screen real-estate despite the importance of flight booking to the airline.

Some aspects of the Kayak website (advantages and disadvantages):
- Uses auto-completion for airport name.
- Uses a two-month calendar (useful since frequently trips span over month boundaries).
- Grays out invalid days. In the return calendar, does not gray out days before departure, but selecting them will clear departure.
- Uses loose time definitions (Evening, Early Morning, etc.)
- Shows Best Fare preview, however may not be clear enough that these may be outdated.
- Shows alternative date format underneath departure and return dates, including day of the week.
- Allows keyboard date input.
- Has no way to input age category of travelers (child, adult, senior).
2. In this question we were mainly looking to see:
   Proper grouping of operations.
   Proper ordering of tasks (e.g., by anticipated frequency of use).
   Catering for expert users: use of broad and flat hierarchy to reduce navigation, keyboard shortcuts, reduce number of clicks.
   Reasonable layout.