CS160 Fall 2008 Midterm

Part I: Short-Answer Questions (40 points)

Give short answers to the following questions:

1. **What kinds of skills would you want in the members of a UI design team? [2 points]**

   Technical skills (graphic design, technical writing, programming, etc.), problem solving skills, decision making skills, interpersonal skills (good communication, good at focusing a group, conflict mediation, etc.).

2. **What is a medium-fidelity prototype, and what techniques are used? [2 points]**

   Medium-fidelity prototypes are those that are higher fidelity than sketches or paper prototypes but lower fidelity than fully-implemented applications. They typically have much more interactivity built-in than a low-fidelity prototype would, but generally do not have all of the back-end (database, speech recognition, etc.) functionality that the high-fidelity prototype will have. Flash, HTML, and JavaScript/AIDS are excellent platforms for medium-fidelity prototypes. Wizard-of-oz style testing can make up for the fact that the back-end of the application has not been developed.

3. **What characteristics of team members contribute to team creativity? [2 points]**

   The most creative team members are often the ones most willing to be in conflict with the rest of the group while keeping the conflict constructive. The key to this is focusing on issues around the task and the ideas being generated, rather than focusing on individuals. Team members that can keep the conversation moving and avoid perfectionism are also very valuable.

4. **What are “resources” in a game, and what are they used for? [2 points]**

   Resources are game elements that enhance a player’s success, but are scarce. They are effectively the currency of the game, and the player’s collection of resources reflects her effort or skill in the game. Examples include gold, equipment, keys, etc. Good resource design will keep the player hooked – they always want to get that next bit of gold, the better sword, or the perfect shield.

5. **Define “puzzles” in game play and their limitation: [2 points]**

   Puzzles are small challenges in a game that are fun to complete and that have a (usually single) right answer. Puzzles are challenging and often have surprising or amusing solutions. Solving a puzzle often involves an explicit search of the space of legal solutions. Puzzles are fun and interesting, but can generally only be solved once. Therefore, a single instance of a puzzle does not support extended play or a full game.
6. List some attributes of BART ticket users that would derive from task analysis [3 points]

BART riders are typically either regular customers (commuters) or tourists. All manner of individuals ride BART, including disabled, elderly, and otherwise impaired individuals. Even more typical riders are often hurried or distracted. Most BART riders have some experience with purchasing items from automated kiosks, and certainly have experience with debit/credit cards. BART riders often have one or more of these characteristics: frugal, environmentally conscious, hurried, dislike driving, etc. BART riders have varying heights, weights, ethnicities, language skills, and ages.

7. What roles do the interview and interviewer enact during contextual inquiry? [2 points]

Master and Apprentice. The Master explains tasks and context to the Apprentice just as she would in a normal apprenticeship relationship. Ultimately, the Master should act as if the Apprentice were going to perform the tasks on their own someday, and teach with that in mind.

8. Give an example of a tangible interface [2 points]

The Marble Answering Machine is a famous TUI. In this system, a collection of marbles in a bowl represents the messages left on an answering machine. When a new message is left, a new marble is added to the bowl. The user can take individual marbles and place them in a special dish. When they do so, the corresponding message is played back.

9. What affordances does a scroll bar have? [2 points]

Scroll bars have three clicking affordances and a drag affordance. The first two clicking affordances are the arrow buttons at the top and bottom of the scroll bar. The third is the ability to click at an arbitrary point on the scroll bar, causing the view to jump to that location. The drag affordance is the ability to click and drag the bar portion of the scroll bar, causing the view to scroll in a corresponding fashion.

10. Give an example of a control with a simple conceptual model. [2 points]

A control for adjusting a car seat that is shaped like the seat itself has a simple conceptual model. The user pushes back on the seat portion of the control to move back the seat. The user tilts back the upright portion of the control to tilt the seat.

11. Give two advantages of low-fidelity prototyping over high-fidelity prototypes [2 points]

1: Low-fidelity prototypes encourage the user to provide honest feedback. In a high-fidelity prototype, the user might be unwilling to provide feedback that would hurt the designer’s feelings.

2: Low fidelity prototypes can be changed much more rapidly than high-fidelity prototypes. This means there are more opportunities for iteration. In fact, with a paper prototype iteration can often occur during the course of a single study.
12. What should you report as critical incidents during a Wizard of Oz study? [3 points]

Critical incidents are unusual or interesting events during the study. Many of them are usability problems, but some can also be positive experiences. Signs that a critical incident has occurred include the user getting stuck or frustrated, the user suddenly understanding something, or the user uttering something interesting like “that’s neat” or “I hate this…”

13. Explain with a figure the “Zone of Proximal Development”. How is it relevant to game design? [4 points]

![Diagram of the Zone of Proximal Development](image)

The ZPD is the subset of tasks that a learner can do with help, but cannot do on their own. This is where socially situated learning occurs. As the individual learns over time, tasks that were once in the ZPD will become possible alone and new things (that would not have been possible even with help before) will move into the ZPD. Similarly, games need to be challenging, but not so difficult that they become excessively frustrating. Players usually do not enjoy success without putting up with a struggle first – this is why cheat codes that give invincibility are rarely satisfying in the long-run.
14. Sketch a graph of task performance time vs. number of repetitions that demonstrates the “power law of practice”. [2 points]

![Graph of task performance time vs. number of repetitions]

15. What kinds of memory are there in the MHP (Model Human Processor)? [2 points]

Sensory memory (visual image storage/auditory image storage) holds the image or sound just long enough to get it into working memory. Working memory is where things are stored while being processed – this memory decays quickly. Long Term memory is where concepts are stored (semi-) permanently. This memory uses semantic encoding and is built from items that are seen repeatedly in working memory or that stand out as important.

16. Give two persuasive principles (psychology principles, not rhetorical) [2 points]


17. How do interface events propagate through the tree of visible windows? [2 points]

Events from the event queue are dispatched to the relevant window. That window then handles the event itself (for window events like resize/close/etc.) or passes it along to the relevant component. If that component is a container itself (e.g. JPanel in Swing) then it can further decide whether to handle the event itself or pass it along to a child component.

18. Give one advantage and one disadvantage of between-subjects experiments vs. within-subjects. [2 points]

Advantages: Participants cannot compare conditions; Can collect more data for a given condition; No ordering/learning effects;

Disadvantage: Requires more participants; Cannot compare an individual across conditions, therefore harder to isolate the effects of individual differences.
Part II Heuristic Evaluation (10 points)
Find five usability problems in the UI shown on the next page. Label each violation with a number from 1 to 10 on the figure. Then make a list in the space below which is indexed by those numbers. Each entry should include the Heuristic from the list below that has been violated. You must also explain the violation in words. Finally you should suggest a solution for each of these problems. Use Nielsen’s second set of heuristics below to label each violation. Remember to list each violation separately. Remember: If the same violation occurs in multiple places, it is still one violation. But the same interface element may cause several violations.

HEURISTIC POINT BREAKDOWN:
1 points for “labeling each violation with a number on the figure”
20 points for the ten violations

Reference: Nielsen’s Revised Set of Ten Usability Heuristics

H2-1: Visibility of system status
H2-2: Match between system and the real world
H2-3: User control and freedom
H2-4: Consistency and standards
H2-5: Error prevention
H2-6: Recognition rather than recall
H2-7: Flexibility and efficiency of use
H2-8: Aesthetic and minimalist design
H2-9: Help users recognize, diagnose, and recover from errors
H2-10: Help and documentation
1: Help and Documentation: Help should be readily accessible. The user should not need to go through all the effort of moving the cursor around and pushing the button to get to the help screen, especially since the targeting mechanism may be what the user needs help with. A more reasonable design would be to let the user access the help screen by simply pressing a key (e.g. F1).

2: User Aesthetic and Minimalist Design/Consistency and Standards: Different options are not clearly indicated and the user is left to guess what the meanings of the “rocket ship” and “Earth” options are and what the difference is between the two. A better design might indicate that some problems are multiplication based while some are about addition, etc. The icons could reflect these differences, rather than being arbitrary graphics.

3: Visibility of System Status: I would guess that this green hue is intended to show the currently valid target. However, this is far from clear. A better design would make the current target much more distinct from the rest of the options. Of course, a really good design wouldn’t have this limitation in the first place (see Issue 6).

4: Error Prevention: This targeting cursor is much too large and could easily cause confusion about what item is being selected. Given the dire consequences of a poor selection (“you will be annihilated”) this is problematic. A smaller target would fix the problem.
5: Flexibility and Efficiency of Use: It is surprisingly difficult for the user to move between pieces of the interface. Making a selection involves manipulating three distinct controls while are not near each other in the interface nor easily distinguished. Why not let the player just select with the mouse and lock in the selection by clicking?

6: User Control and Freedom: Only one target is valid at a time. It is unclear if the different targets mean different things, but if we surmise that this is the case then this interface is wildly limiting. It is particularly troubling if “help” is not always available, but only available when currently valid. A better design would let the user pick their targets at will.
III: UI Scenario and Sketch (20 points)
You task is to design a game to help users reduce their electrical energy consumption.

Assume your game runs in asdf monitored house and is aware of the change in energy use caused by each user action (turning devices on or off) while the game is running. Your game should support the following tasks:

(a) Notifying the user that they have received credits for low energy use, and allowing them to redeem them in an online store (to buy energy efficient light bulbs etc.)

(b) Providing the user with a display of other players current energy use and allowing the user to visualize other players energy use over time – the display should help the user plan their own energy use strategy.

Create scenarios for each task, and show the sequences of screens for each task with sketches. [10 points each]

Task a)

Scenario: Kimberly has worked hard on monitoring her energy usage this week. She has kept lights turned off when not needed, has minimized use of high-energy appliances, and has allowed the sun to heat her house naturally. She is checking on her progress in the “Go Green!” app, when she is delighted to see a pop-up notification that tells her that she has received credits for low energy usage this week. She decides to spend those credits on purchasing a set of CFLs.
Scenario: Amber is having trouble formulating an energy plan. She knows that her friend Kimberly has been successful in reducing her energy usage, so she decides to check out Kimberly’s energy usage in the “Go Green!” app. There, she sees Kimberly’s current energy usage along with her usage over the past month. The usage chart shows significant events, such as turning off lights and weeks in which the dishwasher was rarely used. Amber selects the “turn off lights” strategy and adds it to her personal energy plan.