UND School of Electrical Engineering and Computer Science

Csci363 User Interface Design Fall 2020 Midterm Examination

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Answers are to typed and submitted in MS Word (.docx) or Adobe Portable Document Format (.pdf) As this is an open book, open notes exam, all answers must be specific.

1. (8%) List four (4) characteristics of successful user interface designers with respect to their approach to solving UI problems.

*Ans.* Successful UI designers 1) understand the vast array of users and challenges that must be met, 2) they stay up to date on evidence-based guidelines and current research literature, 3) they are fully committed to always improving the experience for users, 4) and they understand the significance of attracting attention through colors and animations, or eliciting an emotional response or surprise from users due to a creative or unexpected design.

2. (8%) As noted in the book, some skeptics feel that accommodating diversity requires dumbing-down or lowest-common-denominator strategies. However, the authors claim that in their experience, rethinking interface designs to accommodate these diversity situations will result in a better product for all users. Give an example of a product that meets the specific needs of a certain group of people, yet gives all users a better experience.

*Ans.* Handicapped-Accessible entrances. Having ramps and doors that open upon push of a button meets the specific needs of people who are in wheelchairs, whether temporary or permanently. However, these entrances also improve the experience for everyone using the buildings involved. If one is carrying a large stack of books or heavy boxes, one can now push the button to open the door without putting down whatever they are carrying. This example of a product that was designed for a specific group of people makes life easier for everyone.

3. (8%) Suggest three usability measures that can be directly used to produce a practical evaluation of a system. Keep the goals of efficiency and satisfaction in mind with these measures.

*Ans.* 1) Standardization: Check if the system uses pre-existing industry standards that have been vetted and tested extensively to avoid errors and ease development. 2) Consistency: Check if the system is compatible across different release versions, is compatible with non-computer-based systems that are related to its purpose, and uses common themes in terms of color, terminology, units, and so on. 3) Portability: Check if the system allows for users to convert data and use the system across multiple software environments and different hardware as well.

4. (8%) Suppose you need to design a system for users in both the United States and Japan. Present a list of cultural differences that you should be aware of so that a successful design can be made.

*Ans.*

The most obvious difference is the language and alphabet. The system must accept both standard English keyboard use and the Japanese keyboard with Hiragana, Katakana, and Kanji.

Adding on to that, the designers must understand any differences in grammar and structure of language.

If the system displays dates or asks for dates to be entered, it must be noted that the United States uses mm/dd/yyyy format and Japan uses dd/mm/yyyy format.

If there are any units of measurement used, the system must display both the imperial system to accommodate users in the United States, as well as the metric system to accommodate users in Japan.

If there is any currency involved, the system must be able to handle both US dollars and Japanese yen.

Telephone numbers and address are also different formats.

In Japan, instead of using Mr./Mrs./Ms. or titles like that, it is customary to refer to others respectfully by their family name, followed by ‘san’ (e.g. ‘Kenji-san’).

If the system deals in any national identification, passports, birth certificates, social-security systems, or anything similar, it must handle the differences and understand that some of those only exist in one of the countries, while others may exist in both but have different formats.

And finally, the designers must understand the differences in etiquette, courtesy, and respect between the two countries.

5. (8%) Consider an Air Traffic Control (ATC) system interfaces, it is necessary to inform users of an abnormal condition or time-dependent information. It is important that the display of this information catch the user's attention. Suggest five ways a designer can successfully attract attention in such an interface.

*Ans.* 1) By sending an audible beeping noise. 2) By blinking the display on, off, and on. 3) By using readable fonts to display the message on the screen. 4) By interrupting whatever the user is doing with the audible message. 5) By using a large font size for the message on the screen.

6. (8%) List four human physiological or psychological factors that can influence human operator performance.

*Ans.* 1) Age, 2) cultural background, 3) personality, 4) education level.

7. (8%) Give a brief explanation of the Eight Golden Rules of Interface Design. For each of the eight rules, state an example you have seen on a device, computer interface or web site that violates those rules.

*Ans.*

1) Strive for consistency: Use similar themes, units, terms, colors, etc. [Campus Connection](https://studentadmin.connectnd.us/psp/NDCSPRD/EMPLOYEE/HRMS/?cmd=login&languageCd=ENG&) violates this rule after it was re-designed, now sometimes it uses the old design and sometimes it uses the new design which can be very confusing.

2) Cater to universal usability: Understand the varying users in terms of age ranges, differing cultures, exposure to technology, disabilities, and add features that ease access and usability for each group of users. [Yale School of Art website](https://www.art.yale.edu/) violates this rule, as anyone with any issues with dyslexia or colorblindness would likely have a very difficult time understanding anything on the page.

3) Offer informative feedback: Supply the user with notifications when something is updated, or when some state of the system is changed by a user’s action. [Blackboard](https://blackboard.und.edu/webapps/portal/execute/tabs/tabAction?tab_tab_group_id=_93_1) violates this with its poorly designed notifications, which sometimes continue to display the number of notifications for a user even after the user dismissed those notifications.

4) Design dialogues to yield closure: Upon executing a sequence of events, provide users with relief and assurance that their intentions were carried out by giving a clear confirmation page showing the completion of the events. [Campus Connection](https://studentadmin.connectnd.us/psp/NDCSPRD/EMPLOYEE/HRMS/?cmd=login&languageCd=ENG&) also violates this rule with adding enrolling in courses, not giving a clear and understandable confirmation of the end result.

5) Prevent errors: Design the system so that the users cannot take actions that will produce errors or cause serious issues to any states of the system. If the user takes an action that would produce an error, provide simple feedback to steer the user back on course. If the user types something in an incorrect format into one piece of an online form, the system should indicate to the user to fix that specific piece, and not require anything entered previously to be changed. I don’t remember the specific websites I’ve used that have violated this rule, but I have filled out application forms in the past that would erase all entered data if any piece was incorrect upon click of the submit button.

6) Permit easy reversal of actions: Whenever possible, it should be straightforward to reverse user actions. When it is not possible, it should be clear to the user that the action they will take is irreversible, (e.g. clicking the ‘place order’ button when online shopping). I’ve also filled out several forms online that violated this rule by having no means of going back, even if there was no reason for them to not have that option.

7) Support internal locus of control: Users who know what they are doing and have used a system before want to know that the system will do what they expect it to do and feel in control of their actions within the system. There should be no unexpected changes in the behavior of the system, or difficulty finding information within the system. [Campus Connection](https://studentadmin.connectnd.us/psp/NDCSPRD/EMPLOYEE/HRMS/?cmd=login&languageCd=ENG&) also violates this rule with the unnecessary difficulty in finding specific courses and the fluctuating style of the website.

8) Reduce short-term memory load: The system should limit the amount of information a user is required to remember. Avoid situations where a user would have to remember information from one window or display and use that information on a second window or display. The closest example of violation I can think of for this is when mobile websites don’t allow phone numbers to be copied and pasted or clicked to call, so one must remember the phone number to exit the website and enter it in order to make the phone call.

8. (8%) Clarify the difference among guidelines, principles, and theories.

*Ans.* Guidelines are specific directives to follow that are widely accepted and used by many UI designers, Principles are more fundamental, enduring, and encompassing than guidelines. Theories attempt to interpret and explain why and how a type of design should work.

9. (8%) What are “accessibility guidelines”? State four example guidelines.

*Ans.* Specific directives to follow in order to ensure that a system can be used comfortably and efficiently by all groups that may be using it. 1) For every non-text element, have a text equivalent. 2) Any information conveyed with color should also be conveyed in a fashion that does not require use of colors. 3) Each frame should be titled in an understandable way to enable ease of navigation. 4) Any video or gif presentation of information that is time-based should have an alternative means of displaying that information.

10. (8%) What is the difference between micro-HCI theories and macro-HCI theories?

*Ans.* Micro-HCI theories deal with the usability of existing technology to make user interfaces easier and more engaging to users. Macro-HCI theories deal with developing new user interfaces that interact with users’ emotions, ideally in positive ways.

11. (20%) Consider a system that you have been asked to design, which is a totally automated fast-food restaurant, where customers order via touch screen interactions, pay by swiping their debit or credit cards, and then pick up their food - analogous to the self-check-out at some supermarkets, but even more extreme. Draw a UML Use Case Diagram and the requirements-level (problem-level) Class Diagram that describes the system services and the application classes and relationships, respectively. (This question is to be answered using a drawing tool, example StarUML and the diagrams included in the submission file as an inserted image).

*Ans.*

Diagram

Description automatically generated

Diagram

Description automatically generated

Assumptions: User’s payment information is not saved. Employees creating the food simply see each Order on a screen in the kitchen, each Food item in each Order, and the priority of each Order (i.e. which Order was placed first).