Potential Final Exam Questions
CIS 443/543 - A.Hornof - 5/30/00

You should be able to answer all of the following questions, most of them in twenty words or less. The final exam will draw heavily from the concepts discussed here. (N&L=Newman & Lamming)

Norman’s Seven Stages of Human Action
Lecture 2 (and Norman)

Draw Norman’s seven stages of human action diagram, and give an example of each stage in the context of a specific human-computer interaction task.

Define “gulf of execution” and “gulf of evaluation”. Give an example of each in the context of a specific human-computer interaction task.

Lecture 3 (and Norman, Ch. 2-4)

What is the Productivity Paradox and how does it relate to interface design?

What field of study does Norman draw from, a field of study that has been studying users, tasks, and system usability in the workplace for over fifty years?

Who do people typically blame when they have trouble using a system?

After a person encounters a particular computer interface for the first time, what happens as the person continues to use the system regularly for weeks and months?

Define and give a specific interface example for each of the following terms:

Affordance
Visibility
Conceptual model
Mapping
Feedback

How do you know if a mapping is a “natural mapping”?

Define an ATM task sufficiently well so that an experienced ATM user could approach a familiar ATM and accomplish the task.

Human Error
Lecture 4 (and Norman, Ch. 5)

People will make mistakes. Give three examples of how systems can be made easier to learn and easier to use by anticipating that people will make mistakes.

Give a specific example in a specific computer system where the user is required to confirm a potentially destructive action.

What information should an error message convey to the user?

What does signal detection theory tell us about unnecessary alert and dialog boxes that interrupt your work?

People with disabilities, such as people with impaired hearing or vision, are extra-ordinary users. How and why do ordinary users benefit from design innovation intended for extra-ordinary users?

Principles of Good Design
Lecture 5 (and Norman)

What are Norman’s seven principles for good design?

Generally, the user and the designer communicate only through the ________________.
**Swing**

You should know the basics of building Swing applications and building a GUI with Swing. For example, you should be well-versed in Events, Listeners, Model-View-Controller, and Layouts.

You may be tested on any Swing components or concepts that were essential for Project 2.

For example: How do you create a Listener? What do Listeners do?

**Users, Tasks, User Studies, and System Specification**  
**Lecture 8 and 9 (and N&L)**

What are the four necessary components of a one-sentence design problem statement?

What is a situation of concern? How does it relate to the design problem?

What is the purpose of a user and task study that is conducted before the design of a system? To what extent should these studies discuss the details of the computer system that will be built to support the users and tasks? Should you ask the user for input on the system design?

Identify, and explain briefly how to conduct, two specific kinds of user studies.

What is a task?

What is a task hierarchy?

Goal-oriented behavior tends to be hierarchical. How can we use this fact to design better interfaces?

Describe the difference between (1) a task and (2) the functionality of an interface.

In an object-oriented design, what does the object model describe? What are the main components of an object diagram, and what do they represent?

In an object-oriented design, what does the dynamic model describe? What are the main components of an state diagram, and what do they represent?

State three different specific objective measurements that can be used to measure the usability of a computer system.

**Interviews and Observational Studies**  
**Lecture 10 (and N&L)**

What are the benefits and disadvantages of interviews as a means for learning about users and tasks?

What are three specific things to do when conducting an interview?

What are the benefits and disadvantages of an observational study as a means for learning about users and tasks?

What are three specific things to do when conducting an observational study?

What is the main difference between user and task studies conducted before building a system, and usability testing conducted after building a system?

**The Human Virtual Machine (or the Human Information Processor), Fundamental Human Performance Capabilities**  
**Lecture 12 (and N&L 3)**

What are the three main stages involved in information flowing through the human information processor? There are one or more processors associated with each stage. (Answer: perception; cognition or decision; action or motor activity)

Identify two different perceptual processors discussed in class, and three different motor processors discussed in class.

What are three basic differences between working memory and long term memory?
Physical limitations in the human body create bottlenecks in which human processor(s), or in which stage(s) of processing?

Fitts’ law predicts ______ as a function of ______.  

Write the equation for Fitts’ law. Provide all necessary numerical coefficients. Clearly label all variables.

Answer: 
Pointing time = 100 + 100 * log2 (d/w + 1) msec 
where d is the pointing distance, and w is the width of the target. 
[A value of 0.5 is often used instead of 1, but you don’t need to include that fact.]

Roughly speaking, what is the minimum amount of time needed to look at four or five different locations on a computer screen?

KLM and GOMS, Predictive Engineering Models 
Lecture 13 (and N&L 8)

Predictive engineering models allow the analyst to predict user performance based on what three components? (Answer: description of the device, task analysis, and fundamental laws of human performance).

The best way to find problems in computer interfaces is to build prototypes and test them with real users accomplishing real tasks. Another way is to build predictive models and simulate the human accomplishing the task using methods such as the KLM and GOMS. List three advantages that user testing has over predictive models. List three advantages that predictive models have over user testing.

What does KLM stand for?

What does GOMS stand for? What is GOMS?

What does the KLM predict?

What does the KLM not predict?

For each KLM operator, give the letter used, the description of the operator, and the timing associated with the operator. (The correct answer is given here.)

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Keystroke</td>
<td>0.28 sec</td>
</tr>
<tr>
<td>P</td>
<td>Point with mouse to a target on the display</td>
<td>1.1 sec</td>
</tr>
<tr>
<td>B</td>
<td>Press or release mouse button</td>
<td>0.1 sec</td>
</tr>
<tr>
<td>H</td>
<td>Home hands to keyboard or mouse</td>
<td>0.4 sec</td>
</tr>
<tr>
<td>M</td>
<td>Mental act of routine thinking or perception</td>
<td>1.35</td>
</tr>
<tr>
<td>R(t)</td>
<td>Response time by system</td>
<td>t sec</td>
</tr>
</tbody>
</table>

What kinds of users does the KLM methodology typically model?

Cognitive Walkthrough 
Lecture 14 (N&L 8)

What is a Cognitive Walkthrough?

Is Cognitive Walkthrough biased more in favor of ease-of-use or ease-of-learning?

What four questions must be answered in preparing to conduct a cognitive walkthrough?

What four questions must be asked during the walkthrough? When should each be asked? Give one way to fix an interface problem that relates to each question.
What do you do if, during the walkthrough, you identify a place in the interaction where the user must push button X, but you cannot come up with a credible story to explain why the user would push button X.

For each of the four questions that must be asked during the walkthrough, state one way to fix an interface problem that relates to that question.

At what point in a Cognitive Walkthrough should design alternatives be discussed?

Does the Cognitive Walkthrough methodology typically model highly practiced users?

**Usability Testing**

**Lecture 17 (N&L 9)**

What is the purpose of a usability test?

Is it as good as a GOMS analysis or Cognitive Walkthrough?

What are the ten steps for conducting a usability evaluation?

During a usability test, how do you get users to tell you what they are doing? (Give two ways.)

What should you do if the user stops the task and starts to suggest design alternatives while in the middle of a usability test?

At what point in a usability study is it appropriate to discuss possible design modifications with the user?

**N&L Case Study A: Project Ernestine**

(Lecture 18)

In Project Ernestine (N&L’s Case Study A), researchers conducted an analytic usability analysis as well as a live user test of two telephone operator workstations. There was a current workstation, and a proposed new workstation.

What specific kind of analysis did the researchers conduct? State the acronym of the analysis method, what each letter stands for, and describe the methodology in thirty words or less. Which workstation did the analytic method predict would be faster?

Give three reasons why this analytic method used was particularly appropriate for predicting user performance for this task.

Which workstation was faster? How much faster? Was this a significant amount of time? Why or why not?

Give three reasons why the slower workstation was slower.

What does this case study teach us about building more usable interfaces in general? (Provide three points.)

Why was GOMS more appropriate than Cognitive Walkthrough for this analysis?

**General Question**

Is this a good interface?