

Master Recherche Informatique - Université Paris-Sud

Fundamentals of Human-Computer Interaction

Exam - 22 November 2011 - 2h

Authorized document: a single A4 handwritten sheet.

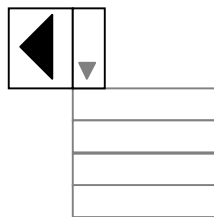
Please read the questions carefully. Answer clearly, precisely and concisely.

A. Course questions (8 points)

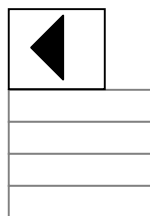
Please answer on the attached sheets

B. Interaction technique (7 points)

The designer of a web browser is faced with a choice between two designs for a back button that also gives access to the history of pages:



- Solution 1 uses two buttons: a left arrow (20 pixels wide) and a down arrow (10 pixels wide). A click on the left arrow goes to the previous page; a click on the down arrow displays a pull-down menu with the list of recent pages (as shown on the left).



- Solution 2 uses a single button (30 pixels wide): a simple click on the arrow goes to the previous page, while a long click on that arrow displays the pull-down menu with the recent pages (as shown on the left). The delay for the long click is 300ms.

The designer decides to run an experiment to compare the performance of the two designs.

1a. Identify the dependent variables, the independent variables, and state the null hypothesis. Don't forget that performance may depend on where the cursor is when the participant starts the interaction.

1b. Describe the experimental procedure: what does each participant do in each condition, which conditions is each participant exposed to and in what order.

1c. What is your prediction? Why?

The designer realizes that he does not have the time to run the experiment, and decides to use the Keystroke model to assess performance instead.

2a. Define the four sequences of operations corresponding to the two actions in each solution using the following operations: *Point(D,W)* for a pointing task, *Click* for clicking and *Wait(delay)* for waiting. (Mental operations are ignored).

2b. Estimate the 4 execution times when selecting the 5th item in the history menu with solution 1 and solution 2 when the user starts with the cursor 200 pixels and 800 pixels away from the button.

Click time is 100ms and the height of the menu items is 10 pixels. The following table gives some (rounded) values for $Point(D,W)$:

MT (ms)	D=50	D=100	D=200	D=400	D=800
W=10	490	620	760	900	1050
W=20	370	490	620	760	900
W=30	310	420	540	675	820
W=40	275	370	490	620	760

3. For the conditions examined in question 2b, is it faster to click the back button five times or to use the history menu to select the 5th item?

C. Conceptual modeling (5 points)

You are asked to create an interface for a simple instant messaging application. This interface must allow the user to:

- Manage contacts: add, remove, edit a contact;
- Manage chats: start a chat by calling a contact or receiving a call, send and receive messages in a chat, end a chat.

1. Describe how the interface looks and identify the objects and operations of the conceptual model.

2. Fill out the objects and operations tables describing the conceptual model of this interface. For each operation, include at least two interactions to trigger the operation. To get you started, the tables include one object and one operation (you can change those in your design).

Objects table:

Objects	Representations	Properties	Operations
Message	Bubble with text and name of sender	Text, Sender, Date	Send
...			

Operations table:

Operations	Commands	Feedback	Responses
Send message	Enter message in text input box and click Send button	Text is displayed as the user types	The message turns into a bubble in the conversation
...			

3. You are asked to add the ability to join two conversations into one in order to create a multiperson chat. Describe two interactions to achieve this function.

Answer part A questions on this page and the following one.

A. Course questions (8 points)

1. Who invented the mouse? (circle the answer)

Ivan Sutherland Doug Englebart Stu Card Steve Jobs

2. Link the features on the left with the historical systems on the right:

Windows and icons •

Geometric constraints•

Videoconferencing •

Bimanual interaction •

Direct manipulation •

• SketchPad

• NLS/Augment

• Xerox Star

3. Who is the author of the concept of “affordance”? _____

Briefly define this concept: _____

Give an example (not necessarily in the field of HCI):

4. Describe two menu techniques other than the traditional linear menu and list one advantage and one drawback for each of them:

Technique 1: _____

Advantage: _____

Drawback: _____

Technique 2: _____

Advantage: _____

Drawback: _____

5. For each of the following pointing facilitation techniques, state how it takes advantage of Fitts law:

Bubble cursor [] reduces target distance [] increases target size

Drag-and-pop [] reduces target distance [] increases target size

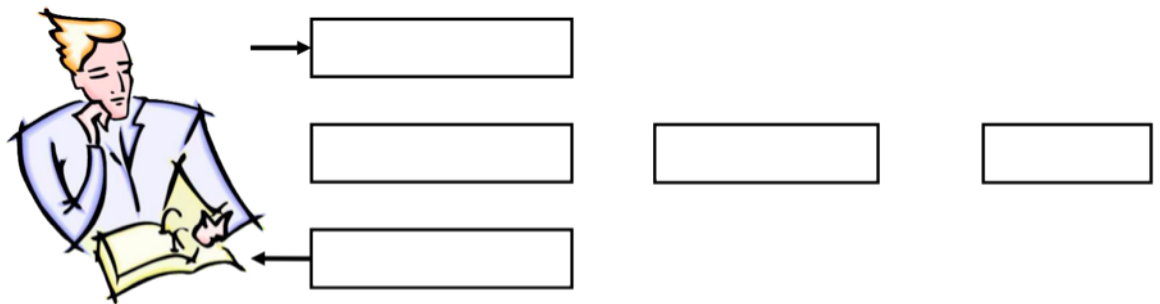
Auto-expansion [] reduces target distance [] increases target size

6. In the design of an experiment to compare different pointing techniques, list which variables are dependent or independent:

<i>error</i>	☐ dependent	☐ independent
<i>expertise</i>	☐ dependent	☐ independent
<i>time</i>	☐ dependent	☐ independent
<i>technique</i>	☐ dependent	☐ independent

7. State the null hypothesis for an experiment comparing the performance of two pointing techniques A and B:

8. Add the missing arrows and labels to this diagram of the *conceptual model*:



9. Link the facets of a widget in a user interface toolkit on the left to the functions on the right:

Presentation •	• Respond to user actions
Behavior •	• Display widget
Application interface •	• Call listeners
	• Layout widgets
	• Change widget state

10. Briefly describe the type of collaborative systems that support these tasks:

Shared editing: _____

Communication: _____

Coordination: _____
