

OLLSCOIL NA hÉIREANN
THE NATIONAL UNIVERSITY OF IRELAND
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UNIVERSITY COLLEGE, CORK

Summer Examinations 2012

CS2511 Usability Engineering

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Time: 1.5 Hours

Answer *all* Questions
All questions carry equal marks
The use of calculators is permitted

1

- (a) A medical-equipment company has developed a new user interface for one of its products. It was found that users sometimes made mistakes when using the original interface (A); the new interface (B) has been designed to reduce the likelihood of user-error.

A study has been conducted in order to see if the re-design has been successful. Twenty subjects took part, all of whom were medical doctors familiar with equipment of this type. Each subject performed a standard task a set number of times on both interfaces, but half of the subjects used interface A first, then interface B, while the other half used interface B first, then interface A. The number of errors made by each subject under each condition was recorded.

Identify the *independent variable*, the *dependent variable*, the *control condition*, and the *experimental condition* in the study described above.

State whether the subjects have been allocated to conditions using an *independent measures* or *repeated measures* design.

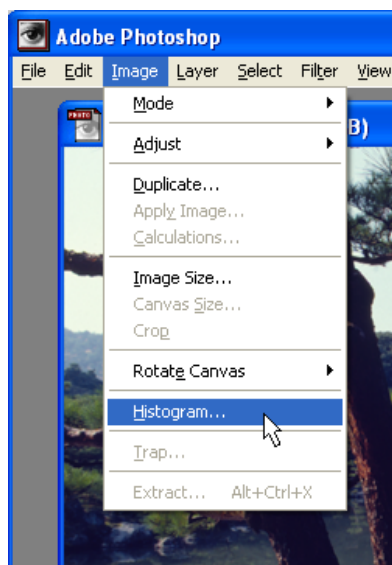
Suggest a *prediction* the study might have been designed to test.

Discuss the implications of the test design and the type of data gathered in terms of choosing a suitable statistical test to analyse the data.

(9 marks)

- (b) State Fitts' Law and explain its significance.

Shown below are two different types of menu. Discuss the usability of each menu in the light of Fitts' Law.



(1)



(2)

(9 marks)

- (c) In terms of interactivity, web-sites have traditionally differed considerably from standalone computer applications. The range of interaction-styles used on the web is narrower, as is the number and range of standard widgets available. However, this is set to change with the introduction of HTML5.

Describe and compare the interaction-styles currently in use on web-pages and on standalone applications. Discuss the likely benefits of enabling web-browsers to support interaction-styles currently only available in standalone applications.

Summarise the new features in HTML5 that support enhanced interactivity, and discuss how you would go about implementing them given that most current browsers only support a sub-set of the new features. Illustrate your answer with an example.

(12 marks)

2

- (a) Most early ATMs were designed to return the customer's card at the end of a transaction, after all other operations (dispensing cash, etc.) had been completed. However, it was found that while customers rarely forgot to collect their money, they frequently forgot their card and left it in the ATM. In most modern ATMs, the sequence has been changed so that the card is returned BEFORE performing the requested service(s). This has almost eliminated the problem of forgotten cards without adversely affecting performance on other aspects of the task.

Using your knowledge of human memory, etc., explain why users in such situations are likely to forget their card but not their money, and why changing the sequence of operations makes this less likely.

Briefly explain how a cognitive modelling language (e.g., CCT) can be used to estimate the cognitive effort/memory load involved in performing tasks such as this, making it possible to analyse and compare interface designs before they are implemented.

(9 marks)

- (b) Briefly explain the meaning of the following terms:

- (i) The Recency effect
- (ii) The Auditory Suffix Effect
- (iii) Pre-categorical Audio Store

(9 marks)

- (c) It has often been predicted that we will one day be able to interact with computers entirely through speech. However, despite enormous advances in speech recognition and related technologies, speech-based interaction remains confined to a few specialised applications.

Describe the major problems involved in creating speech-based interfaces to interactive systems, and discuss their significance for the future development of such systems.

(12 marks)

3

- (a) Explain the difference between *structural* and *functional* mental models. Give an example of each.

Explain how a metaphor may be used to help the user adopt an appropriate mental model of a system.

(9 marks)

- (b) Human memory is generally regarded as comprising three distinct systems: *sensory memory*, *short-term memory* and *long-term memory*.

Briefly describe each of these memory systems, and explain the role each plays in the learning process.

(12 marks)

- (c) Briefly explain the meaning of the following terms:

- (i) Sensory acuity
- (ii) Kinaesthetic Feedback
- (iii) Rapidly-adapting mechanoreceptors

(9 marks)