

16/5/2019

14.00 - 16.00pm

CMPU 2008 Human Computer  
Interaction

National Stadium, Irish Athletic  
Boxing Centre

Programme Code: DT228  
Module Code: CMPU 2008  
CRN: 22398

# TECHNOLOGICAL UNIVERSITY DUBLIN

## KEVIN STREET CAMPUS

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### BSc. (Honours) Degree in Computer Science

#### Year 2

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SEMESTER 2 EXAMINATIONS 2018/19

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### Human Computer Interaction

Dr. Art Sloan  
Dr. Deirdre Lillis  
Mr. Patrick Clarke

TWO HOURS

ANSWER **QUESTION (1)** AND **ANY TWO** OTHER QUESTIONS

QUESTION (1), CARRIES **40** MARKS.  
QUESTIONS (2), (3), AND (4) CARRY **30** MARKS EACH.

- Q1. (a) Why should a distinction be made between *novice* and *expert* users when designing computer interfaces?  
(6 marks)
- (b) Describe the five Gestalt laws of perceptual organisation and explain why they are important in screen design.  
(10 marks)
- (c) Explain how the following design principles can be used to enhance the design of an interface.
- Affordance
  - Mapping
- (4 marks)
- (d) Miller has proposed that  $7 \pm 2$  chunks of information can be held in human short-term memory at any one time. How does such a characteristic of short-term memory influence interface design?  
(5 marks)
- (e) Describe a simple test which may be used to show how humans use *automatic processing* when processing familiar information. Briefly explain the relevance of automatic processing when designing a system interface.  
(8 marks)
- (f) Choose *two* alternative input technologies that may be suitable for use by a blind user who is unable to use a standard keyboard and explain how your choice of input technologies may be influenced by the nature of the user's impairment.  
(7 marks)

- Q2. (a) An interface designer is deciding whether to use *recognition* or *recall* to enhance the learnability of a system. Which design approach would you recommend and why? (7 marks)
- (b) Learning through *analogy* is one of the main learning approaches taken by users when learning to use new computer systems.
- (i) Explain how users learn through *analogy*. (5 marks)
- (ii) Indicate how learning through analogy can be facilitated within computer systems design. (2 marks)
- (iii) Describe how learning through analogy is supported by the Graphical User Interface (GUI). (3 marks)
- (c) The Key Stroke Level Model (KLM) is to be used to develop numerical predictions of user performance of a new system. Using the operator steps and times provided in Table 1, estimate the time that will be taken by an experienced computer user to enter the following information into a text box on the screen:

**“Position tracking log is open”**

Explain any assumptions made in your calculations. (13 marks)

Operator	Description	Time (sec)
K	Pressing a single key or button	0.35
	Average skilled typist (55 wpm)	0.22
	Average non-skilled typist	0.28
	Pressing shift or control key	0.08
	Typist unfamiliar with keyboard	1.20
P	Pointing with a mouse or other device on a display to select an object	1.10
P1	Clicking the mouse or similar device	0.20
D	Draw a line with a mouse	Variable
H	Bring “home” hands on the keyboard or other device	0.40
M	Mentally prepare/respond	1.35
R(t)	System response time is counted only if it causes the user to wait	T

**Table 1**

- Q3. (a) Define the terms *user interface* and *usability*. (4 marks)
- (b) The job or task of the user must be understood prior to system design. Describe *four* methods a designer might use to do this. (8 marks)
- (c) The Principles of Universal Design define seven principles that can be used to guide the design process of computer systems. Briefly explain the concept of Universal Design and describe how *any five* of the design principles can be used to guide the design of an Automated Teller Machine (ATM). Include *at least one* specific design suggestion for each of the five principles that you use. (18 marks)
- Q4. (a) A new electronic ticketing system has been commissioned that will be used at railway stations for quick and easy purchase of train tickets.
- (i) Recommend a suitable *lifecycle model* that should be used to develop the system. (6 marks)
- (ii) Recommend an appropriate *interaction style* for the system. (5 marks)
- (iii) Recommend appropriate *input and output device(s)* for the system, explaining the reasons for your choice. (11 marks)
- Give a clear indication of the rationale for your recommendations in (i), (ii), and (iii), and for the alternative option(s) that you have rejected.
- (b) Describe how any *two* of Nielsen's usability principles may be applied to improve the usability of the electronic ticketing system described in Part (a). Use specific examples to support your answer. (8 marks)