The ICS Project

Interacting Cognitive Subsystems

Modelling multimodal interaction:
A theory-based technique
for design analysis and support

An INTERACT'97 tutorial presented by

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This tutorial material has been developed by
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March 1997

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Timetable

This half-day tutorial is divided into three sessions, each of which will last about an hour.

Session 1: The cognitive framework

This session will introduce the Interacting Cognitive Subsystems (ICS) framework, and show how the notion of levels of mental representation and information flow can be used to understand a range of everyday tasks.

The ideas of information structure and transformation will be introduced, and multimodal phenomena used to illustrate the different routes that information can take through the overall architecture, and the different consequences that this can have for perception.

Session 2: Application to HCI

The cognitive framework introduced in session one will be applied to a range of HCI scenarios.

The aim here is to show how an understanding of the cognitive resources required to use an interface can help the designer to anticipate usability problems and, more importantly, can help them identify design resolutions.

Session 3: Tools and Techniques

The handbook will be introduced, and the notational techniques developed for the analysis of representational structure will be described. These will be illustrated through visual structures, task structures and acoustic structures.

Abstract

This Guide is intended to help people who design computer interfaces to use psychological principles to construct the appearance of computer interface objects, their arrangement on the display, their behaviour, and their relationship to the users' tasks.

There are many books that provide 'guidelines' for designing interfaces – some tell you how and when to use different colours and typefaces, how to format columns and tables, and how to make your designs aesthetically appealing. This is not one of those books.

Although they provide a valuable service, and sometimes also try to explain why they are providing the advice that they do, guidelines are intended to be prescriptive – telling you what you should do for each part of an interface. You can follow all of the advice that they provide for every individual part of your interface, and still find that you produce a design that is not 'easy to use'. Books of guidelines cannot tell you how to decide for yourself whether an interface will be usable, nor how to identify the problematic parts of the design so that you can improve them. That is what this Guide tries to do.

It will introduce you to some psychological ideas about perception and cognition – the processes by which people see objects in the world, recognise them, search between them, and use them to reach their goals. The techniques this Guide teaches you will let you decide how difficult it will be for people to group objects together, to tell objects apart, to search for objects, and to switch their attention from one part of the display to another. You don't need to be a psychologist to read this Guide, but when you have read it, you should be able to use these ideas to analyse your interface designs.

Organisation of the Guide

The Guide is organised into several sections. Each section introduces you to some ideas about cognition, with some examples, and shows you how these ideas can be seen to affect the usability of interface designs. The key points in each section are highlighted like this:

this is a key point,
and a **key term** is shown like this.

These key points are summarised at the end of the Guide, so you can use these as an index to refer to particular issues. At several points in the Guide there are exercises for you to try, to check that you understand how the ideas can be used in practice.

The sections build on each other, introducing the simpler ideas first and the more complicated ideas later, and so this isn't a book that you can 'dip into', like a collection of guidelines might be. You have to read it through section by section – but when you have done that, we hope that you'll have learnt enough to put your new skills into practice, without needing to keep the Guide by your side.

Presenter Biography

Jon May

Jon May graduated in psychology from Exeter University in 1983, from where he also obtained his PhD on 'The Cognitive Analysis of Flexible Thinking' in 1987. After working with Prof. Andrew Mathews on attentional biases in clinical anxiety at St. George's Hospital Medical School, London, he moved to Germany in 1989 to work as a full time researcher in Human-Computer Interaction with Alcatel, a multinational telecommunications company. He was employed on a number of EU funded projects, including the RACE project Guidance (as Deputy project manager) and the Esprit project Amodeus (as site manage). In 1992 he returned to the UK, to work with Phil Barnard at the MRC Applied Psychology Unit in Cambridge (as manager of the User Modelling research package within the Esprit project Amodeus-2).

In 1995 he was appointed Lecturer in the Department of Psychology at the University of Sheffield, where he teaches Research Methods & Statistics, Thinking, Reasoning & Problem Solving, and Philosophical Issues in Psychology. His recent research has focused on ways of introducing psychological theory into the design process, to produce more usable computing and telecommunication technologies, and to use the complex tasks typical within the HCI domain to advance psychological theory. A particular theme has been the development of cognitive models that can be expressed formally, facilitating the combined use of psychologically valid models of the user and formal system models.

http://www.shef.ac.uk/psychology/may/
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