# Research Methods for HCI

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## ABSTRACT
The aim of the tutorial is to help researchers, particularly early career researchers, to develop the appropriate skills to make a useful research contribution to Human-Computer Interaction (HCI). This is in recognition of the fact that HCI draws on a wide variety of disciplines which means that there is a wide variety of methods that a researcher could use and moreover new researchers may have education or experience in only a small fraction of the methods available.

## Keywords
Controlled experiments, Questionnaires, in-depth interviews and focus groups, Eyetracking, Cognitive Modelling, Formal analysis, Statistics, Qualitative analysis, Methodological development, Theoretical analysis and theory creation, Writing,

## 1. INTRODUCTION
HCI is a clearly multidisciplinary subject. It has historically grown out of both computer science and psychology but in addressing the full complexity of how people use computers it has also grown to encompass social sciences, organisational theories, cognitive ergonomics and even philosophy. Each of these areas have their own traditions for how to make a useful contribution to knowledge. This means that researchers coming into HCI, be they MSc students, PhD students or even established academics from another area, are rarely aware of the full range of methods that can be used to provide a useful contribution to HCI knowledge. Moreover, it is through awareness of the range of research methods that good researchers realise that a narrow approach to HCI may not be most appropriate in providing a substantial contribution to the area.

Once they have begun their careers, researchers often become aware of other methods which appear to be useful for their research but perhaps underestimate the amount of diligence required to apply a method with which they are not familiar. Some of our recent work [1] has shown just how often research methods are misapplied. A survey of two BCS HCI conferences (2005 & 2006) and one year (2006) of two leading HCI journals showed that 50% of the papers covered included some form of inferential statistics. Only one of these papers had conducted the appropriate analysis and reported the results correctly. In that paper, we suggest that some "HCI specific education could be of some benefit" to researchers trying to get to grips with methods.

Thimbleby's 2004 paper [2] raises a problem being faced by the HCI community regarding the difficulties that are experienced in obtaining funding for HCI research and getting papers accepted for publication. In theory, with research councils such as the EPSRC having themes such as People and Interactivity, one might imagine that HCI would be top of the list of areas to receive funding. In practise however it does not seem as though it is straightforward to obtain funding for HCI. One of the reasons for this may be the very interdisciplinary nature of HCI. As a community we are often proud of the fact that we can draw on different disciplines when tackling challenging problems in our research but when it comes to evaluating the research of others we are not always so supportive. Reviewers of papers and grant proposals tend to see someone else's research from their own disciplinary perspective and therefore see an alternative way of tackling a particular problem. So rather than congratulating the author of the paper or proposal on their well thought out research, they instead suggest the approach that they would have taken and argue that that would have been better. This appears to be a criticism of the work (and is sometimes meant to be exactly that) and therefore fewer HCI papers are published and grant proposals funded. Although we have aimed this tutorial at those at the beginnings of their research careers we hope that it may be of interest to those further on in their careers who might be interested to know a little more about methods used in HCI that they are not particularly familiar with.

By embracing the interdisciplinary nature of HCI by learning more about the methods that others in the community use, and why they find them useful when trying to answer particular problems, we may as a community be encouraged to be more supportive of each other. Therefore, rather than not valuing, say, qualitative research, researchers might develop a more mature attitude and appreciate that all methods are valuable when applied appropriately. If we are unable to change the attitudes of existing researchers, then perhaps this tutorial might educate the new researchers in our field of the value of alternative methods so that in a few years time we might see the tide turning.

## 2. LEARNING OBJECTIVES
Following the tutorial, participants will be:

- Aware of a range of research methods from the disciplines that contribute to the study of HCI
- To understand the situations in which particular research methods are most useful, and their limtations.
- Able to make good choices about which methods are most suitable to particular research questions.
- Able to formulate a research proposal

## 3. PARTICIPANTS
The tutorial is of interest to PhD students and other early career researchers who are exploring different methods for conducting

their research, and to more experienced researchers who are considering using a methodology that is new to them for their research.

# 4. OVERVIEW BY SESSION

## 4.1 Before the tutorial

Participants will submit a two page paper outlining their current research project, the methods that they are currently considering using for their research and what they hope to gain from attending the tutorial. The submitted papers will not be reviewed in order to select participants, but to help the presenters to plan the day more effectively, particularly in assigning participants to groups.

## 4.2 Choosing a method

The first session will concentrate on outlining some of the different methodologies that are used in HCI research highlighting the strengths and limitations of each approach. Particular emphasis will be given to the process of triangulating results by exploring research questions with more than a single methodology. This session will be lecture style and encompass a variety of presentation styles including videos and an interactive statistics demonstration.

## 4.3 Solving problems

Participants will be grouped according to their research interests and/or discipline. Each group will be facilitated by one of the presenters and will discuss the reasons why group members have chosen their initial methodological approach and discuss the pros and cons of their decisions. The group will work together to make suggestions for additional or alternative methods that might be appropriate for the research of participants.

## 4.4 Write Now!

A short presentation will be given explaining the importance of writing when researching. This will be followed by an opportunity for participants to write their own fantasy abstract of their dream paper which will explain the methods they imagine they will use, together with the outcomes they will expect to find. Within group peer review of these abstracts will provide participants with feedback on their work before the final session.

## 4.5 Plenary

Following short presentations by participants of the abstracts developed in the previous session to the whole group, a final presentation will be given by the presenters of the workshop. This will summarise the difficulties raised by participants in their own work and the challenges of applying old/traditional methods to new research problems.



# 5. REVIEW

The tutorial is well suited to presentation at HCI 2008. The level is introductory to intermediary and is accessible to participants at various stages of their research careers. It aims to enhance the rigour of research in the area and to foster community building.

# 6. ABOUT THE PRESENTERS

**Dr Paul Cairns** originally studied mathematics but after a brief spell as a software engineer, became a lecturer in Computer Science at Middlesex. He spent 6 years at UCL where he taught on the MSc in Human-Computer Interaction with Ergonomics and the MSc in Research Methods in Psychology. He is now a senior lecturer in the Department of Computer Science at the University of York where he teaches postgraduate HCI and is the programme leader for the newly developed MSc in Human-centred Interactive Technologies. He has over 60 publications that employ a wide range of research approaches including statistical analysis, qualitative research, formal modelling and mathematical analysis.

**Dr Anna Cox** studied Cognitive Science before becoming a lecturer in HCI at Hertfordshire. She joined the UCL Interaction Centre in 2004 where she teaches on the MSc in HCI-E and the BSc in Psychology. She has over 35 publications. She organized a workshop at CogSci2006 on eyetracking, and has co-authored five chapters in Cairns & Cox's new book, Research Methods in HCI, Cambridge University Press.

**Professor Harold Thimbleby** is director of the Future Interaction Technology Lab at Swansea University, and was previously the director of the UCL Interaction Centre (UCLIC) which he founded. He was a Royal Society-Wolfson Research Merit Award Holder (2001-2006). He has an international reputation in HCI, having presented 33 conference keynotes and published around 390 refereed papers and several books. He has many given research tutorials and chaired doctoral programmes at BCS HCI etc over the years. He recently published his fifth book, Press On, MIT Press.

**Natalie Webb** studied biology and psychology before working as a management consultant in Australia for Booz Allen Hamilton. She then undertook an MSc in Human Computer Interaction at the UCL Interaction Centre, University College London. She then moved to Amberlight Partners undertaking a range of research and design work for companies such as Orange, the Carphone Warehouse, Microsoft and AOL. She is now an independent consultant currently working for eBay. Natalie has been extensively involved in eyetracking workshops at British HCI 2005 , UPA 2006 and CHI2006. REFERENCES

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