Research Methods in Human–Centered Computing

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Introductions

• Find a partner— you will introduce that person and he/she will introduce you
  – Name
  – Year
  – Major/Department
  – Fun fact
Information

• Class times: Tuesday Period 7 (1:55-2:45pm), Thursday Period 7-8 (1:55-3:50pm)
• Location:
• Prerequisites: STA 3032, COP 3530. If you don't meet the prereqs, please email the instructor to discuss.
• Textbook: Human-Computer Interaction, by I. Scott MacKenzie
• Laptop: Please install MATLAB, R
• Instructor: Dr. Eakta Jain
  – ejain@cise.ufl.edu
  – Office: E540
  – Office hours: Tuesday 2:45-3:45 in E540
• Course TA:( Your first point of contact. )
  – Email:
  – Office hours:
• For class policies (attendance, honesty etc), please see the syllabus
Grading

• Project (40 points)
  – Proposal (10 points)
  – Mid-term presentation (10 points)
  – Final movie (20 points)
  – Best project by class vote (Extra Credit 5 points)

• Mid-term exam (20 points)

• Study Participation (10 points)
  – 2 points per study

• Scribe for Lectures (20 points)
  – 10 points per lecture

• Class Participation (10 points)
  – Answer a question asked by a fellow student in class (2 points)
Long history of experimental research

• Pavlov’s Conditioning Experiment ([http://clipsforclass.com/learning](http://clipsforclass.com/learning))
What is Research?

• “Research” means different things to different people
• Often just a word adding weight to an assertion (“Our research shows that…”)
• ISP television ad:¹
  “Independent research proves our Internet service is the fastest and most reliable – period.”
• Hmm... Is this research available for public scrutiny?
• What about the independence of the research?
• Research has at least three definitions (next slide)

¹ Aired in Ontario, winter of 2008/2009 (ad for Rogers Communications Inc.).
Research – Definition #1

• Research is…

  Careful or diligent search

• Examples
  – Searching one’s garden for weeds
  – Searching a computer to find all files modified on a certain date
Research – Definition #2

• Research is…

Collecting information about a particular subject

• Examples
  – Survey voters to collect information on political opinions in advance of an election
  – Observe people using computers and collect information, such as the number of times they
    • Consulted the manual
    • Clicked the wrong button
    • Retried an operation
    • Uttered an expletive
Research – Definition #3

- Research is…

Investigation or experimentation aimed at the discovery and interpretation of facts, the revision of accepted theories or laws in light of new facts.

- Example
  - Design and conduct a user study to test whether a new interaction technique improves on an existing interaction technique
Experimentation

• A central activity in HCC research
• An experiment is sometimes called a *user study* or a *human-subjects experiment*
• Formal, standardized methodology preferred
  – Brings consistency to a body of work
  – Facilitates reviews and comparisons between different user studies
Facts, Theories, Laws

• Facts
  – Building blocks of evidence
  – Evidence is tested to confirm hypotheses (more later)

• Theory
  – An hypothesis assumed for the sake of argument
  – A scientifically accepted body of principles that explain phenomena

• Law
  – More constraining, more formal, more binding
  – A relationship that is invariable under given conditions
  – HCI involves humans, so laws are of questionable value
Let’s look at some other characteristics of research that are not encompassed in the definitions…
Research Must Be Published

• Publication is the final step
• Also an essential step
• *Publish or perish!*
  – Edict for researchers in all fields, and particularly in academia
• Until it is published, research cannot achieve its critical goal:
  – Extend, refine, or revise the existing body of knowledge in the field
Peer Review

• Research submitted for publication is reviewed by peers – other researchers doing similar research
• Only research meeting a high standard of scrutiny is accepted for publication
  – Are the results novel and useful?
  – Does the evidence support the conclusions?
  – Does the methodology meet the expected standards for the field?
• Accepted research is published and archived
• The final step is complete
Patents

• Some research develops into bona fide inventions
• A researcher/company may wish to maintain ownership of (profit from) the invention
• Patenting is an option
• The patent application describes
  – Previous related work
  – How the invention addresses a need
  – The best mode of implementation
• If the application is granted, the patent is issued
• Note: A patent is a publication; thus patenting meets the must-publish criterion for research
Citations, References, Impact

- Citations, like hyperlinks, connect research to other research
- Through citations, a body of research takes shape
- The number of citations to a research paper is an indication of the paper’s impact
- Can you spot the high-impact paper below? (arrows are citations)
Research Must Be Reproducible

• Research that cannot be replicated is useless
• A high standard or reproducibility is essential
• The research write-up must be sufficiently detailed to allow a skilled researcher to replicate the research if he/she desired
• The easiest way to ensure reproducibility is to follow a standardized methodology
• Many great advances in science pertain to methodology (e.g., Louis Pasteur’s detailed disclosure of the methodology used in his research in microbiology)
• The most cited research paper is a “method paper”\(^1\) (see Google Scholar for the latest citation count)