Human-Computer Interaction

Course Introduction

Professor Bilge Mutlu

Today's Agenda

- Topic introduction
- HCI research at Wisconsin
- Course introduction

Questions

To ask questions during class:

» Go to slido.com and use code **#2938904** or direct link or scan QR code

» Anonymous

» I will monitor during class

Instructional Team

Instructor: Bilge Mutlu

Professor of Computer Science, Psychology, & Industrial Engineering

Director of People and Robots Laboratory

PhD, 2009, Carnegie Mellon University

bilge@cs.wisc.edu, http://bilgemutlu.com

http://bmutlu.github.io/research-summary/

People & Robots Laboratory

Instructional Team

TA: Ru Wang / 王儒

Third year graduate student

Department of Computer Sciences

How about you?
Give us your name, program, year.

What is this course about?

Human-Computer Interaction

What does HCI mean to you?
Who can give a definition?

Different Perspectives

Design Implications

I want to design a computer system and need to know what to design.

Systems

I would like to discover new ways of making user interfaces.

Evaluation

I have designed a computer system and would like to understand whether it is any good (for people).

Understanding Impact

I would like to understand how a computer system that I designed affects people's lives.

Societal Change

I would like to understand how a computer technology affects society at large.

Definitions

“...a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.”

— ACM

Where does HCI fit within ***Computer Science****?*

1

[1] Image sources: 1, 2, 3, 4, 5, 6

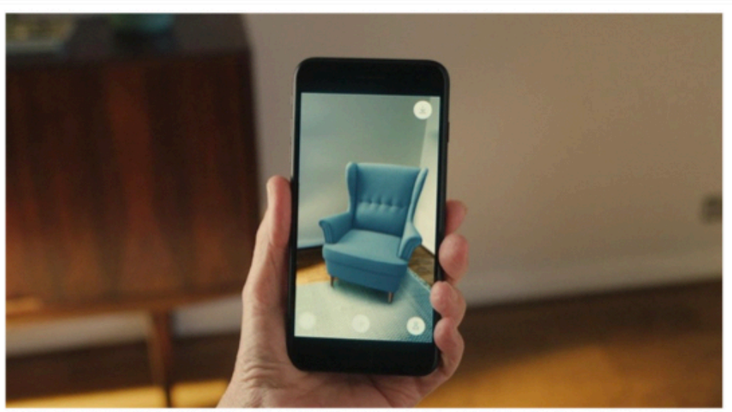
What's missing here?

“The old computing is about what computer can do, the new computing is about what people can do [using the computer].”[2]

— Schneiderman, 2002

[2] Image source

3



[3] Image sources: 1, 2, 3, 4, 5, 6

Where does HCI fit within ***psychology/ education****?*

4

[4] Image sources: 1, 2, 3, 4

What's missing here?

5

[5] Image sources: 1, 2, 3, 4

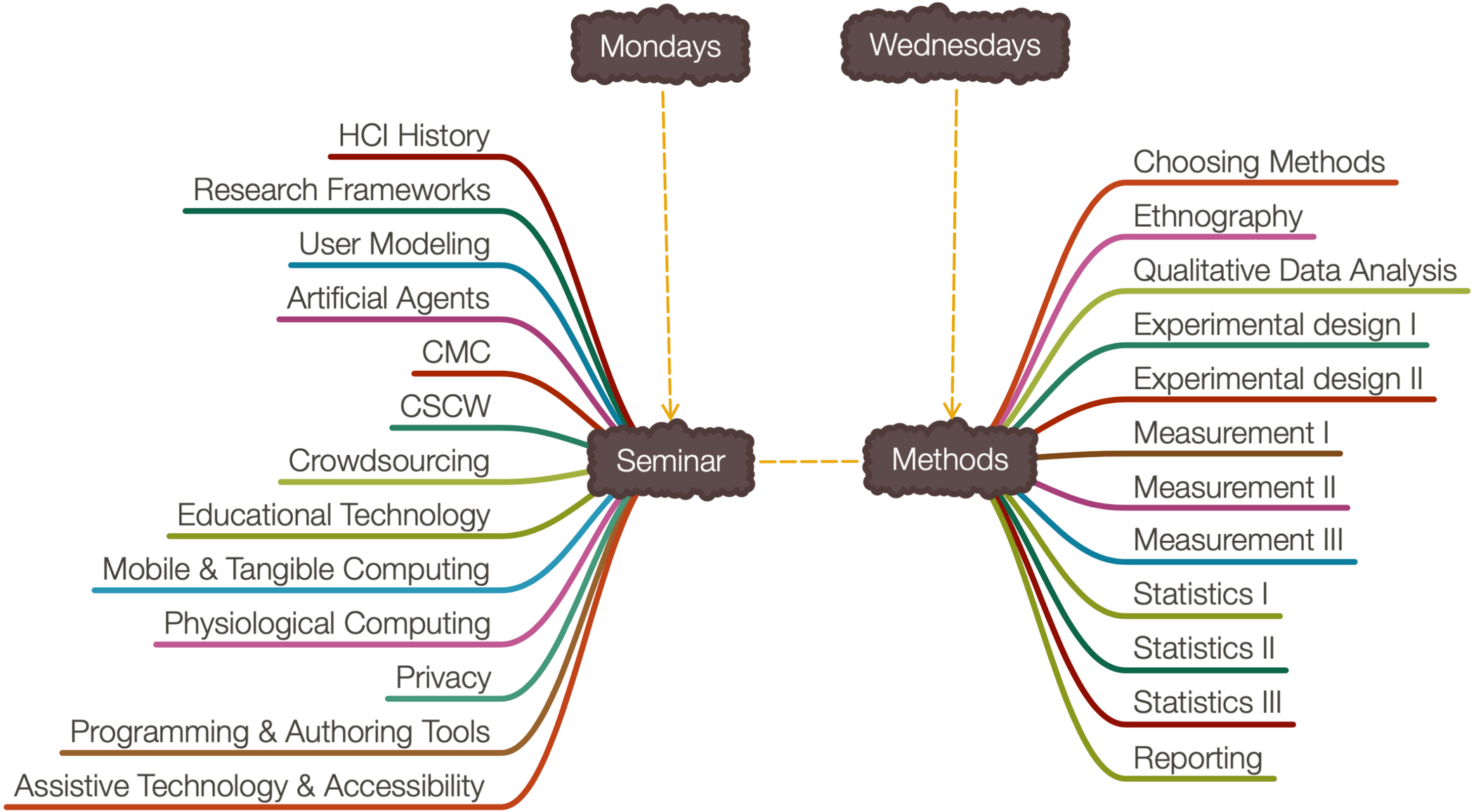
Seminar in HCI

+

Research Methods in HCI

+

Independent Study in HCI


Mondays
Wednesdays
HCI History
Research Frameworks
User Modeling
Artificial Agents
CMC
CSCW
Crowdsourcing
Educational Technology
Mobile & Tangible Computing
Physiological Computing
Privacy
Programming & Authoring Tools
Assistive Technology & Accessibility
Seminar
Methods
Choosing Methods
Ethnography
Qualitative Data Analysis
Experimental design I
Experimental design II
Measurement I
Measurement II
Measurement III
Statistics I
Statistics II
Statistics III
Reporting

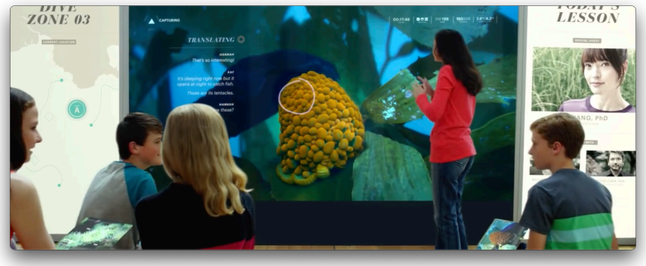
Wearable computing[7]

CSCW

CMC

Tangible computing/AR

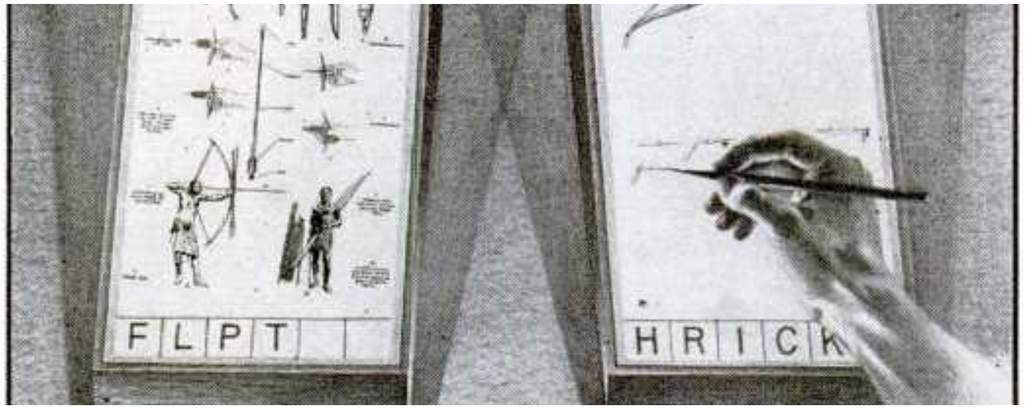
Educational Technology

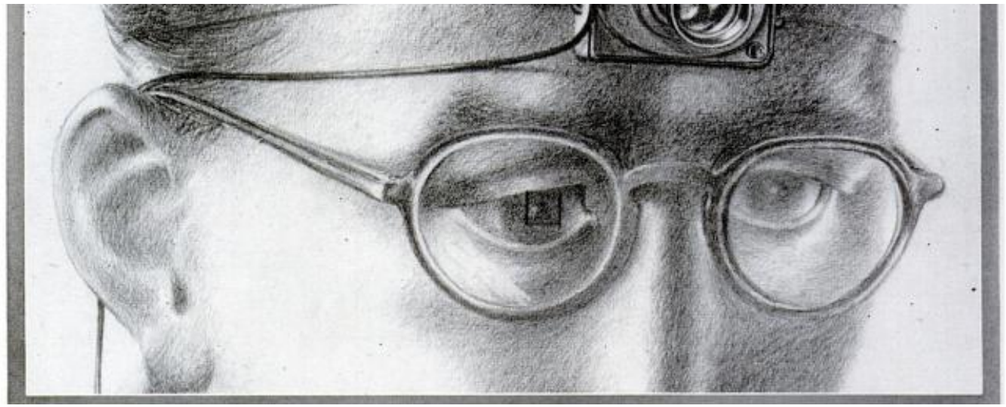


Human-Robot Interaction

[7] Microsoft Office

1945 (Vannevar Bush)[8]





2011 (Microsoft)

[8] Wired, Microsoft

Questions?

HCI Research @ Wisconsin

CDIS [CS, iSchool]

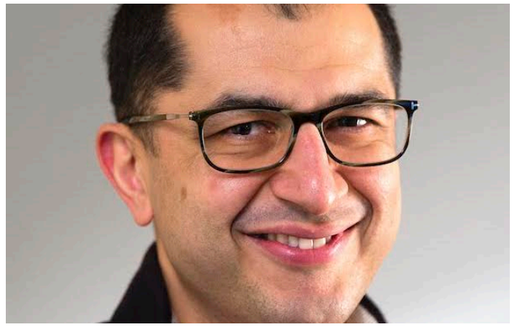
Distributed [ISyE, EdPsych, Psych, ME]

HCI Research in CS

Yea-Seul Kim

Information visualization, data-driven decision making

Bilge Mutlu



HRI, end-user programming, educational technology

Michael Gleicher

Information visualization, graphics, HRI

Yuhang Zhao

AR/VR interfaces, accessibility

HCI Research at the iSchool

Corey Jackson

Citizen science, science engagement, online communities

Adam Rule

Medical informatics, health decision making, information visualization

Jacob Thebault-Spieker

Social computing, bias and fairness

Other HCI-related Research on Campus

John Lee (ISyE)

AR/VR, automotive interfaces

Paula Niedenthal (Psych)

Affective human-machine interaction

Shamya Karumbaiah (Ed Psych)

Human-centered AI, learning

Michael Zinn (ME)

Haptic interfaces

Questions?

Course Outline

What's the difference between 570, 571, and 770?

“...a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.”

— ACM

“...a discipline concerned with (**570**, **571**) [the design, evaluation and implementation of interactive computing systems for human use] and with (**770**) [the study of major phenomena surrounding them].”

— ACM

770

- Research methods
- For grads from across campus
- Project-based
- No technical background

570

- Design methods
- For undergrads
- Project-based
- No technical background

571

- Design/building methods
- For CS undergrads
- Assignment-based
- Needs at least CS-400 & JS

Let's focus on 770

Learning Goals

1. Define research questions, construct hypotheses, map out and identify gaps in the research literature, and situate research questions and hypotheses in existing knowledge
2. Gain familiarity with seminal research across various topics in human-computer interaction
3. Determine the research approach that best fits a research question, identify variables of interest for empirical investigation, and design qualitative, qualitative, and hybrid studies

1. Determine appropriate objective, behavioral, physiological, subjective, and composite measures for empirical investigation
2. Design survey questions, construct scales, and assess reliability and validity
3. Analyze qualitative and quantitative data using grounded theory and statistical methods
4. Carry out a project to investigate an original research question in human-computer interaction
5. Write an academic paper to report on research design and findings

Setting Expectations

1. Be prepared to read a lot ~ 2 papers + 1 book chapter each week
2. This class will take about 10-15 hours/week (university guidelines require a *minimum* of 9 hours for 3-credit courses, and that's for undergraduates)
3. A substantil semester-long project where you will work with others
4. Be prepared to engage in discussion in class

Questions?

Overview of Syllabus

Three modules

1. Seminar
2. Methods
3. Project

Module 1: Seminar

General Outline[9]

We will read seminal papers, discuss them online and in class.

» You will read 1–2 papers per week and will find 1 resource (an academic paper, popular science article, a video) yourself

» First 45 minutes of Tuesday class

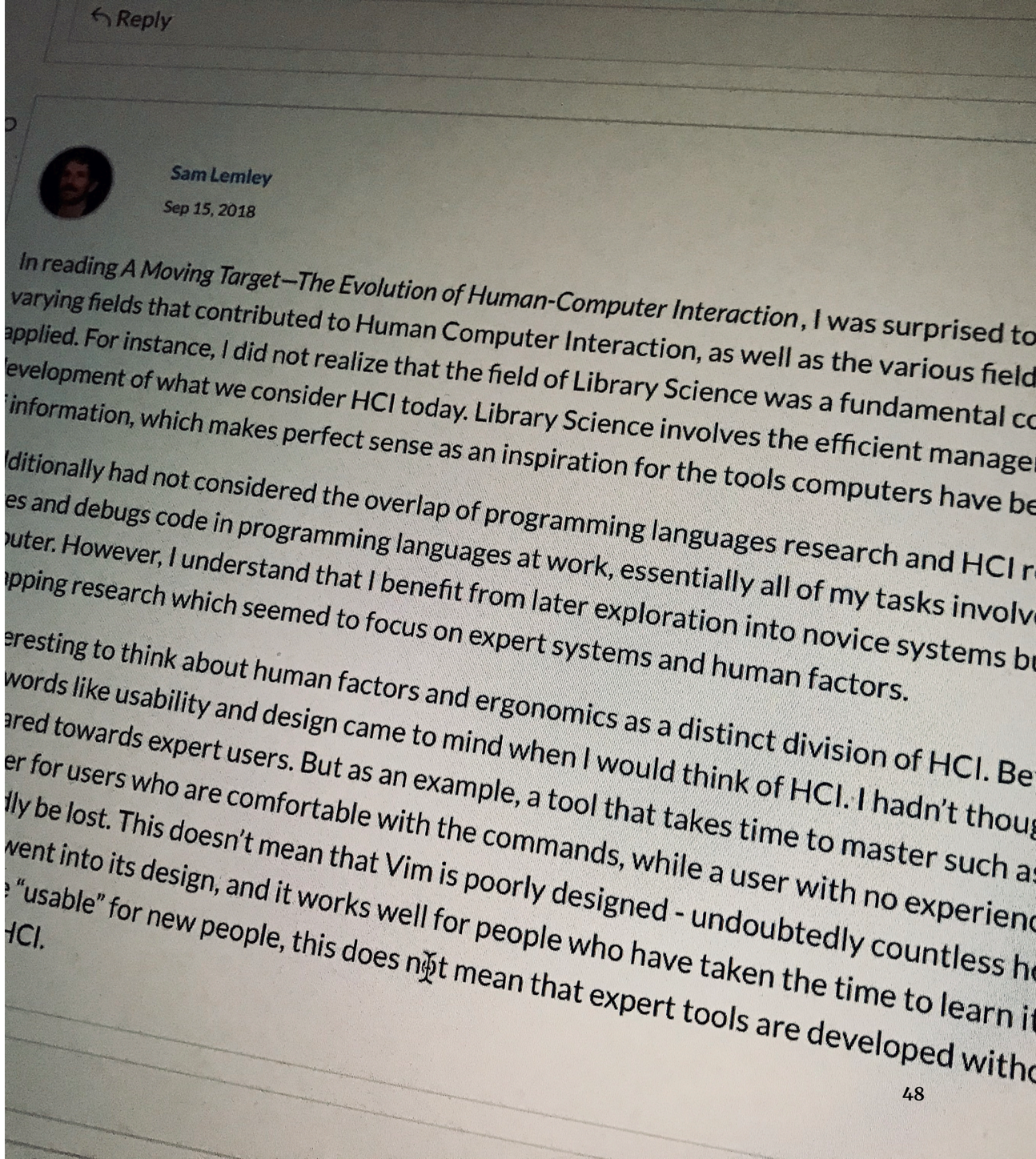
» I will give a 30-minute overview of the topic and lead a 30-minute in-class discussion

[9] Image source

Online Discussion

Students reflect on the topic (from the readings and/or the resource they found) in online forum

- Minimum of 250 words
- Due Sunday midnights
- Post on Canvas
- Graded on timeliness, depth, and substantiveness



Classroom Discussion

We will work together to try to come up with a list of takeaways.

» 15-minute group discussion — write down key points to a note doc

» 15-minute summary & discussion from each group

» We will distill takeaways and share the notes after class

We'll review the process on Monday.

Why are we doing this?

- **Dialectics** — through discussion, we establish common themes/concerns/ground
- **Reflection** — you rarely get the chance to engage in open-ended discussion on research topics
- **Trivium** — you will get the grammar (language), logic (mechanics), and rhetoric (arguments) of a topic

Module 2: Methods

General Outline[10]

We will learn about HCI research methods through lectures and hands-on-activities.

» Every week, a new research method is presented

» Reading a chapter from the textbook (necessary for hands-on activity)

» Lecture for ~30 minutes

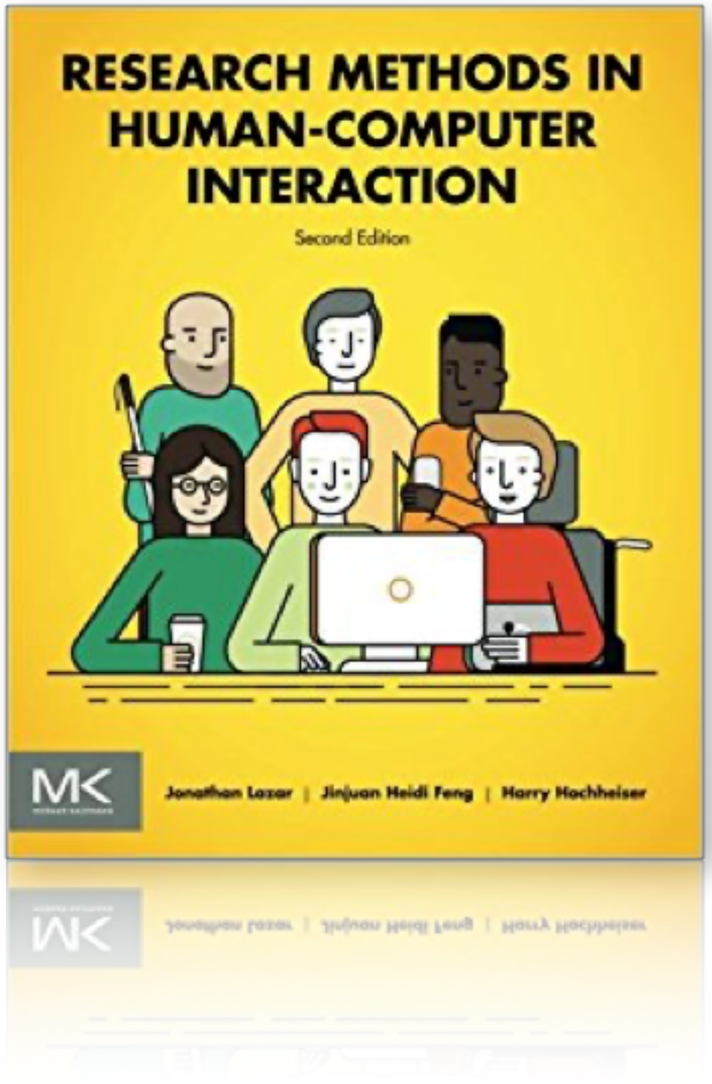
» A~30-minute hands-on activity (graded for completeness)

[10] Image source

Textbook

Research Methods in Human-Computer Interaction, *Second Edition*, Lazar et al., 2017

Free through the University Library



Why are we doing this?

» **Learning** — you will learn a sample of all of the major methods and tools used in HCI research

» **Practice** — you will practice some of the critical ones in structured, guided ways

Module 3: Project

General Outline

We will carry out a semester-long research project where you will connect and practice the **seminar** and **methods** modules.

» ~3-student teams

» We will use the last 15 minutes of class on Mondays and Wednesdays to discuss project goals, steps, deliverables

» Feedback during office hours, through deliverables

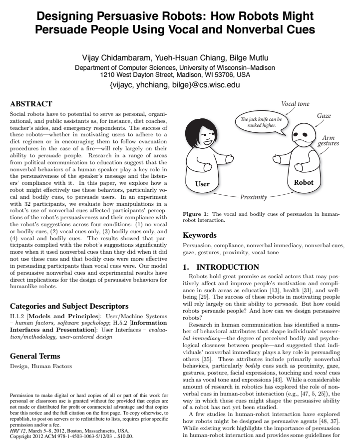
» Expectations will differ based on the number of group members

Project Deliverable

- We will incrementally write a ~8-page paper in the ACM SigCHI format, potentially submittable to an HCI conference.
- The project should include both qualitative and quantitative methods.

2012

Chidambaram et al.



Designing Persuasive Robots: How Robots Might Persuade People Using Vocal and Nonverbal Cues

Vijay Chidambaram, Yueh-Hsuan Chiang, Bilge Mutlu

310 citations

2012

De Simone et al.

Is cheating a human function? The roles of presence, state hostility, and enjoyment in an unfair video game

J.J. De Simone, Tessa Verbruggen, Li-Hsiang Kuo, Bilge Mutlu

16 citations

2015

Johnson et al.

Handheld or Handsfree? Remote Collaboration via Lightweight Head-Mounted Displays and Handheld Devices

Steven Johnson, Madeleine Gibson, Bilge Mutlu

75 citations

2017

Rakita et al.

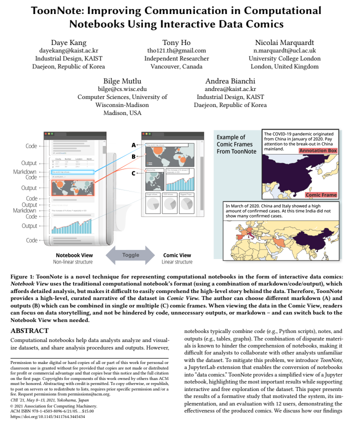
A Motion Retargeting Method for Effective Mimicry-based Teleoperation of Robot Arms

Daniel Rakita, Bilge Mutlu, Michael Gleicher

94 citations

2021

Kang et al.



ToonNote: Improving Communication in Computational Notebooks Using Interactive Data Comics

28 citations

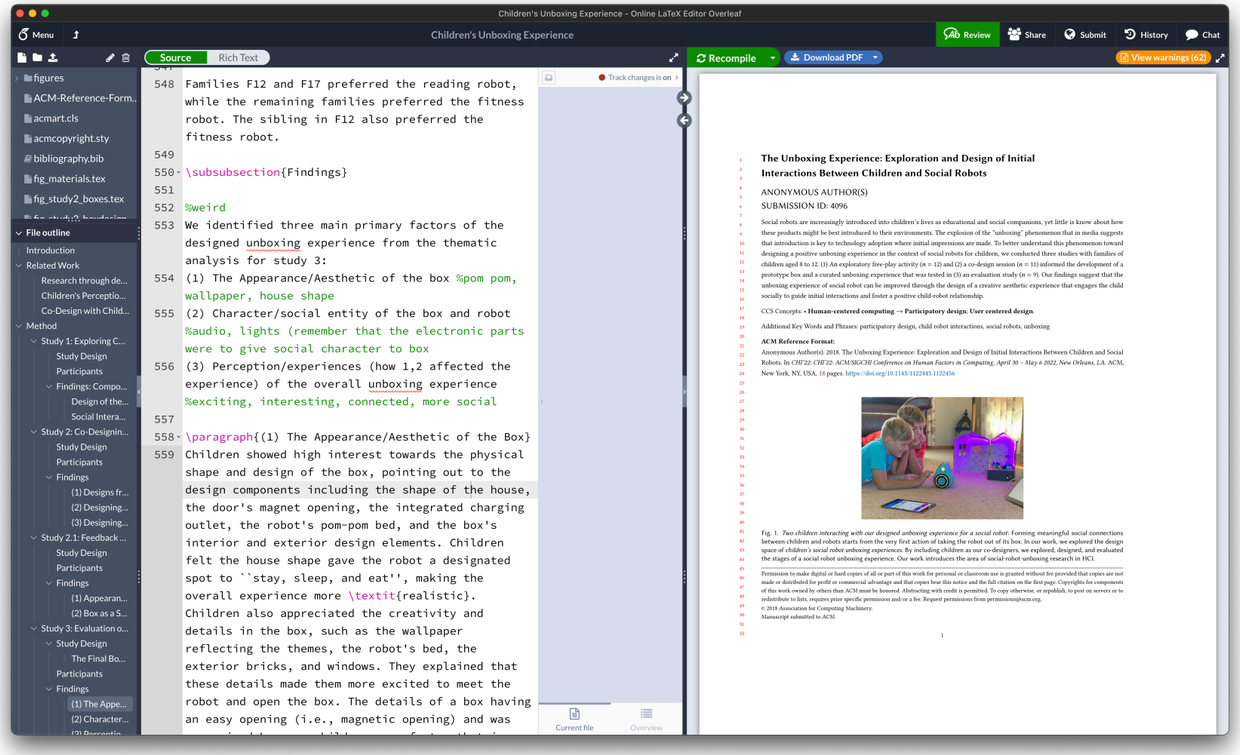
Project Topics

Take inspiration from last year's CHI paper-award winners at CHI using the algorithm:

1. Skim a set of papers
2. Focus on 2-3 based on interest/research style
3. Read related work to understand gap
4. Read what the paper did to understand where it fits
5. Determine what else remains unexplored from limitations
6. Zoom out, choose topic, find partner (optional)

Project Deliverables[11]

- Project Topic
- Literature survey, RQs
- Method
- Data
- Analysis, results
- Final paper



[11] Image source

Why are we doing this?

» Practicing research in an uncontrolled, unstructured, long period

» Bridging the seminar and the methods, contextualizing the methods within the seminar topics

Questions?

Course Policies

Grading

Assessments	Points
Seminar: Participation in online discussions	15
Methods: Hands-on activities	20
Project	40
Final presentation & Paper	20
General: Attendance, classroom participation	5
Total	*100*

Letter grade	Grade range	Description
A	93.5–100	Excellent work *(Exceeds expectations)*
AB	89.5–93.4	Good work *(Robustly meets all stated requirements)*
B	83.5–89.4	Adequate work *(Meets the spirit of all stated requirements)*
BC	79.5–83.4	Slightly below adequate *(Missing small required elements or turned in late without approved extension)*
C	73.5–79.4	Below adequate *(Missing required elements or turned in late without approved extension)*
D	73.4–63.5	Well below adequate *(Missing many required elements or turned in late without approved extension)*
F	63.5	Inadequate *(Work not turned in, no extension requested)*

Rule of Thumb: If you complete every assignment, you should be getting an **A** or an **AB**. So, just come to class, do the work, and don't worry about your grade.

Communication

Type	Examples	Channel
Question about course content	"R is giving me a singularity error;" "Should we be turning in our data file?"	Post on Piazza
Personal questions	"I am traveling to a conference on <date>;" "I have to travel to my home country because of an emergency!"	Send message to me/TA via email
Feedback request	"Can we get feedback on our study design;" "Can you check if I'm doing this analysis right?"	Office hours + appointment

During Class

Laptops/tablets: Laptop and tablet use is encouraged for the ongoing class and discouraged for anything else:

» Engaging in Piazza; looking through readings, slides; researching

» We will have sli.do at every lecture for questions

Phones: Should be put away.

In general, please strive to **be present**.

Late, Absence Policy

Late assignments: Will lose 20% of the total grade for the assignment for each day it is late. Only true emergencies (e.g., hospital visits) justify extensions.

Each project group will have **one grace day** for your assignment across the semester (Five project assignments in total; cannot be used for the final paper submission).

Missing class: $E[m] = 2, m = \{0, 1, \ldots, 29\}$, so we will discount two absences from hands-on-activities/classroom discussion.

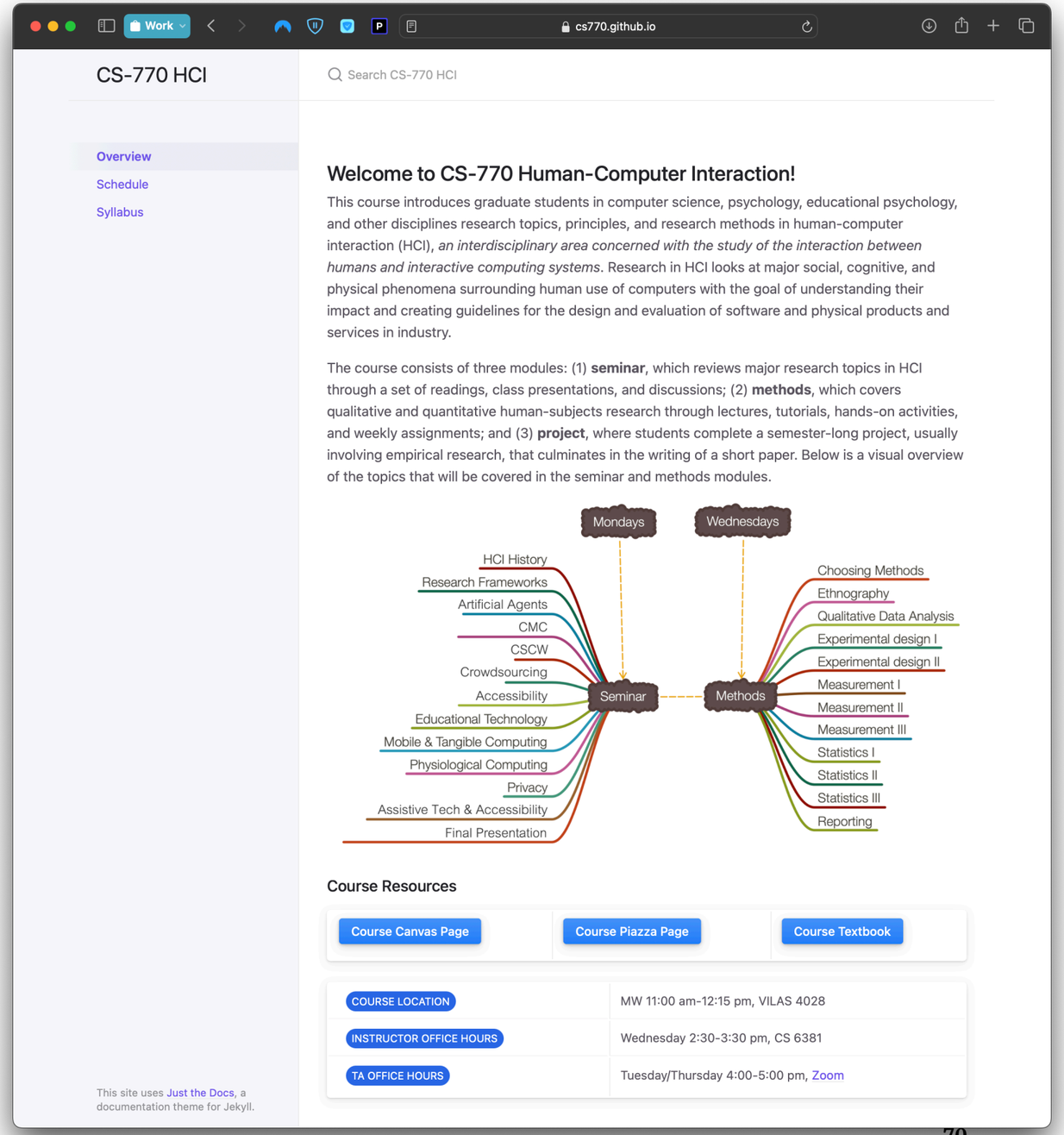
Logistics

» Course Website | Course Canvas

Office Hours

» **Instructor:** Wednesday 2:30-3:30 pm, CS 6381

» **TA:** Tuesday/Thursday 4:00-5:00 pm, Zoom



Questions?

What's next?

- **Seminar**
  - *Readings* due on Monday; *forum comment* — due on Monday
- **Method**
  - *Chapter reading* — due on Wednesday
- **Project**
  - We'll discuss on Monday; *topic selection* — due Feb 9