

# **IN4MATX 232: Research in HCI**

**Class 1:**  
**History & Course Overview**

**Daniel Epstein**

# Today's class

- Defining Human-Computer Interaction (HCI)
- History of HCI
- Course overview

**Discussion time! Split into 6 groups.**

**What is Human-Computer Interaction?**

# Making the world a better place?



The ACM CHI Conference on Human Factors in Computing Systems is the premier international conference of Human-Computer Interaction (HCI). CHI – pronounced ‘kai’ – annually brings together researchers and practitioners from all over the world and from diverse cultures, backgrounds, and positionalities, who have as an overarching goal to make the world a better place with interactive digital technologies.

<https://chi2023.acm.org/>

# Design and use of computer technology?

## Human–computer interaction

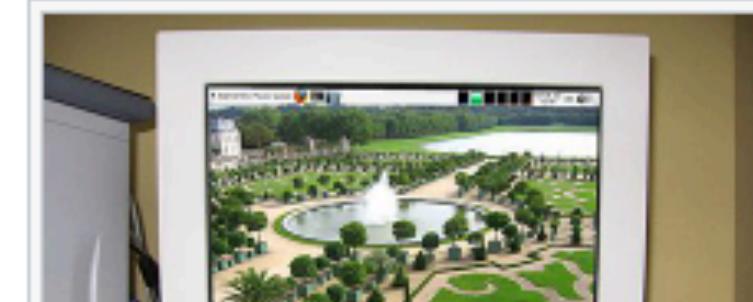
From Wikipedia, the free encyclopedia

(Redirected from [Human-computer interaction](#))



This article **may contain an excessive amount of intricate detail that may interest only a particular audience**. Please help by [spinning off](#) or [relocating](#) any relevant information, and removing excessive detail that may be against [Wikipedia's inclusion policy](#). (August 2021) ([Learn how and when to remove this template message](#))

**Human–computer interaction (HCI)** is research in the design and the use of [computer technology](#), which focuses on the [interfaces](#) between people ([users](#)) and [computers](#). HCI researchers observe the ways humans interact with computers and design technologies that allow humans to interact with computers in novel ways.



### What is Human-Computer Interaction (HCI)?

Human–computer interaction (HCI) is a multidisciplinary field of study focusing on the design of computer technology and, in particular, the interaction between humans (the users) and computers. While initially concerned with computers, HCI has since expanded to cover almost all forms of information technology design.

[https://en.wikipedia.org/wiki/Human-computer\\_interaction](https://en.wikipedia.org/wiki/Human-computer_interaction)

<https://www.interaction-design.org/literature/topics/human-computer-interaction>

# Multi- and inter-disciplinary

- Cognitive Science
- Computer Science
- Disability Studies
- Electrical Engineering
- Education
- Industrial & Visual Design
- Health Informatics
- Human Factors Engineering
- Media Studies
- Social Psychology
- Software Engineering
- Science, Technology, & Society

# Multi- and inter-disciplinary

*“It no longer makes sense to regard HCI as a specialty of computer science; HCI has grown to be broader, larger and much more diverse than computer science itself. HCI expanded from its initial focus on individual and generic user behavior to include social and organizational computing, accessibility for the elderly, the cognitively and physically impaired, and for all people, and for the widest possible spectrum of human experiences and activities.” -John M. Carroll*

<https://www.interaction-design.org/literature/topics/human-computer-interaction>

# HCI versus HCC

## Human-Computer Interaction vs. Human-Centered Computing

- They effectively the same thing
- HCC is probably more inclusive
  - Computing can be human-centered without requiring interaction
  - NSF recently switched the name of their call to HCC
- By in large, the research community uses HCI, so I'll default to that
  - A few programs use HCC (GT, UMBC, Clemson) or Human-Centered Design (UW)

### Synopsis

Human-Centered Computing (HCC) supports research in human-computer interaction (HCI), taken broadly, integrating knowledge across disciplines—such as the social and behavioral

<https://beta.nsf.gov/funding/opportunities/iis-human-centered-computing-hcc>

# HCI versus UX

## Human-Computer Interaction vs. User Experience

- HCI tends to be more academic, UX more industry-focused
- Improving UX is one of many goals that HCI researchers have
  - More on research contribution styles next class

# Today's class

- Defining Human-Computer Interaction (HCI)
- History of HCI
- Course overview

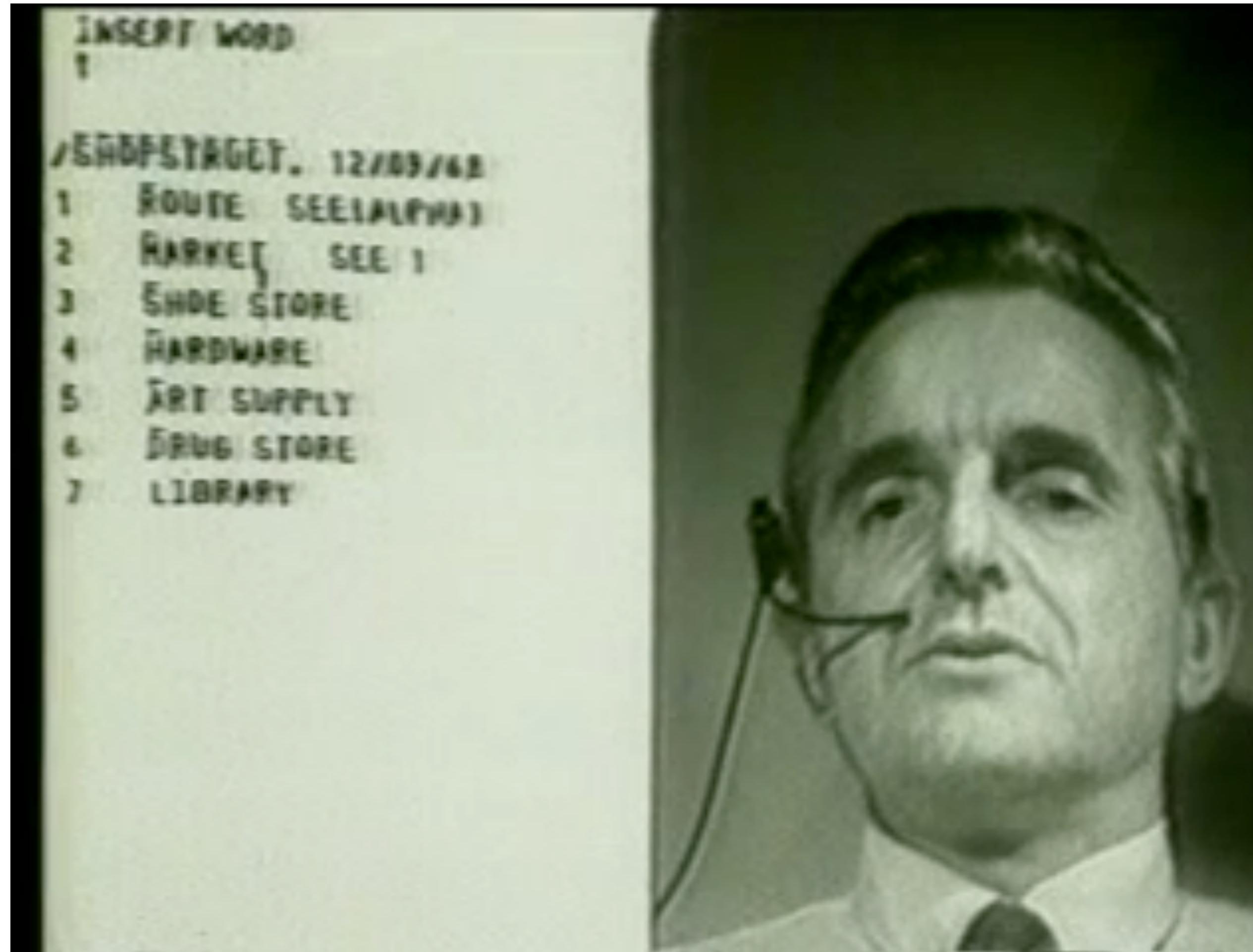
# HCI History

- This is a very quick history lesson.
- My background is in Computer Science, which influences the lens I use

# Pre-History

- People have aimed to improve how people interact with computers ever since they have existed
- One example: Engelbart's NLS

# Doug Engelbart's NLS (1968)



The image is a composite of two photographs. On the left, a screenshot of the NLS (Augment) interface is displayed. The screen shows a menu with the following options:

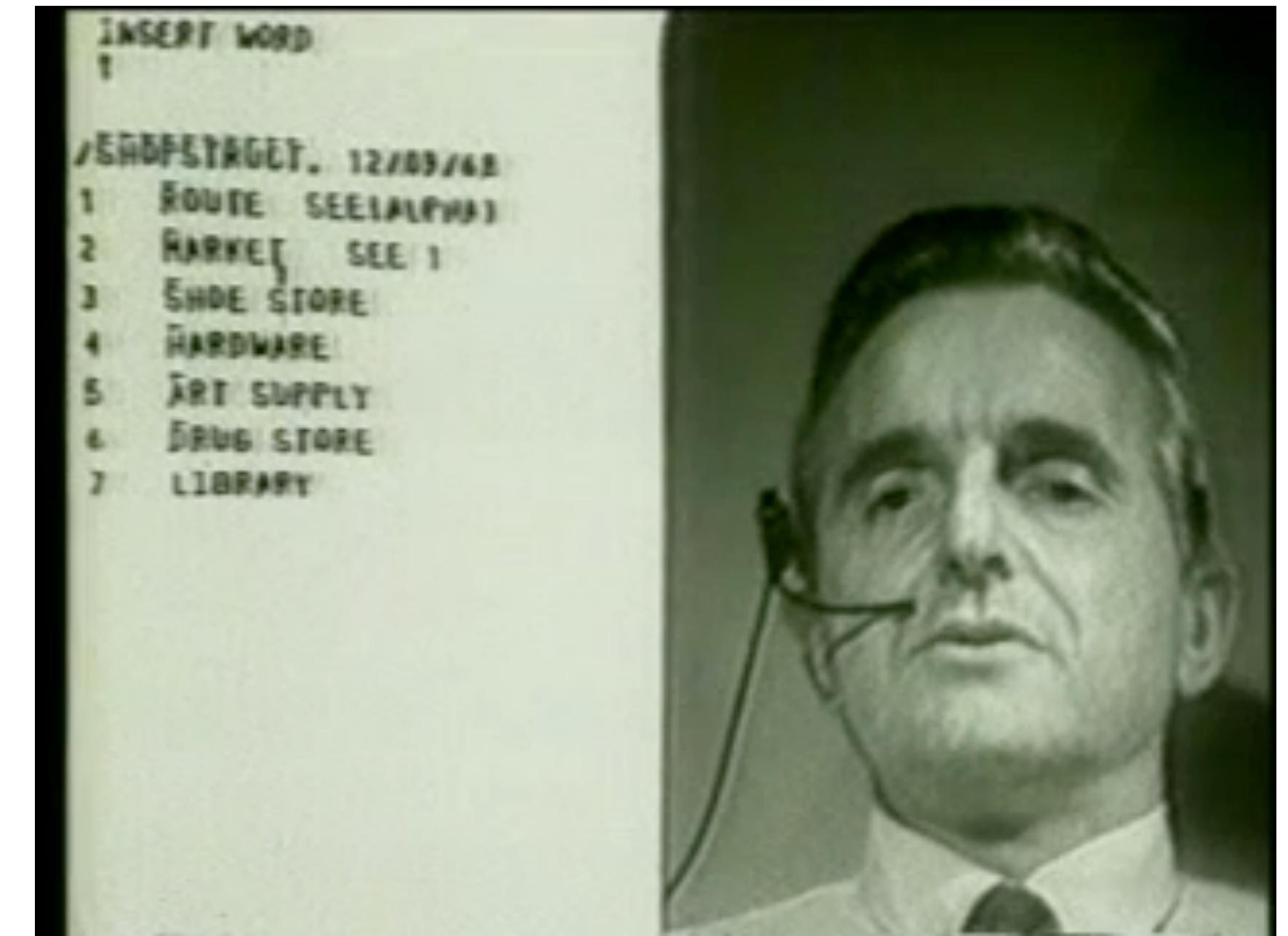
- 1 INSERT WORD
- 2
- 3 /SHOPSTREET. 12/03/68
- 4 ROUTE SEE ALPHABET
- 5 MARKER SEE 1
- 6 SHOE STORE
- 7 HARDWARE
- 8 ART SUPPLY
- 9 DRUG STORE
- 10 LIBRARY

On the right, a black and white portrait photograph of Doug Engelbart is shown from the chest up. He is wearing a light-colored shirt and a dark tie, and has a microphone attached to his shirt.

<http://www.douengelbart.org/firsts/1968-demo-interactive.html>

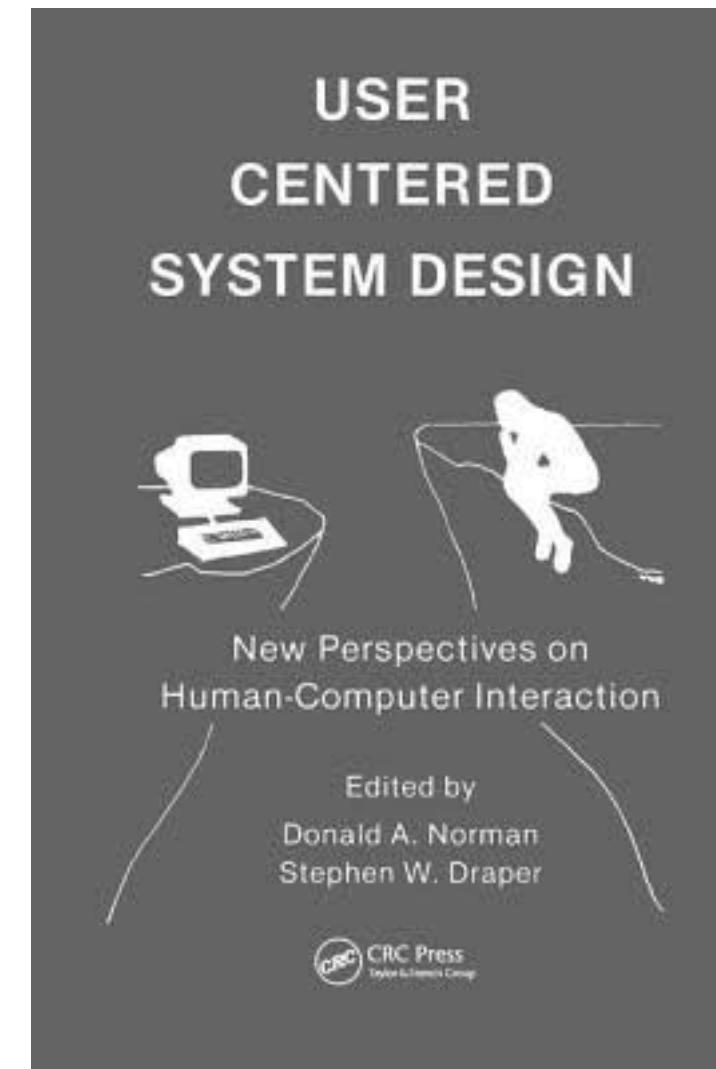
# Doug Engelbart's NLS (1968)

- Direct linking between pages
- Invention of the mouse
- Simple graphics
- A chording keyboard
- Remote collaboration
- Others thought it was irrelevant because “the terminal can do the same”



# Pre-History

- Early 1980's, idea that computers should be usable by *everyone* began to emerge
- Principles like learnability, efficiency, safety, etc. were beginning to be articulated
- Research community on the topic began coalescing



# CHI 1982

- CHI: ACM Conference on Human Factors in Computing Systems
- ACM: Association for Computer Machinery
  - Driven by computer science in the early years
- Human Factors
  - Engineering and design of products, with an eye towards ergonomics, safety, and reducing error



Gaithersburg, MD  
Pioneering researcher  
Alphonse Chapanis (top right) spoke  
at the first conference, which was initiated  
by Ben Shneiderman (bottom center) and Bill  
Curtis (top left, with Jerry Weinberg).

# CHI 1982

- CHI turned 40 in 2022
- Is still the flagship publication venue for HCI research
- CHI -> HCI
  - We moved the “human” first



Gaithersburg, MD

Pioneering researcher

Alphonse Chapanis (top right) spoke  
at the first conference, which was initiated  
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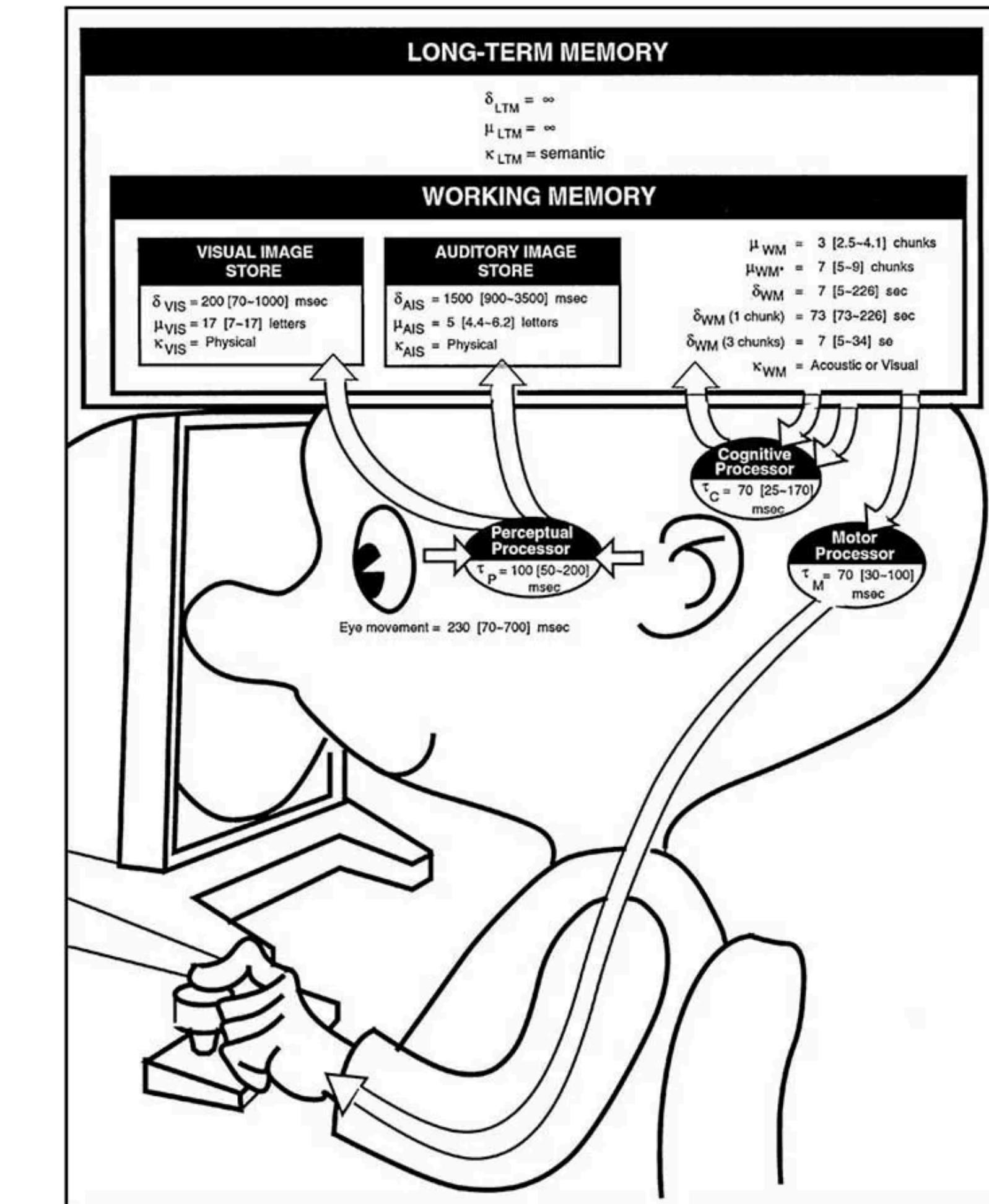
# Three Waves of HCI Research

- First Wave ('80s): Cognitive processes and ergonomic perspectives
- Second Wave ('90s and '00s): Groups working with applications
- Third Wave ('10s): Computing in Everyday Life
- I've also seen these separated as the Personal Computing, Groupware, and Ubiquitous Computing eras

<https://dl.acm.org/doi/10.1145/2804405>

# First Wave ('80s)

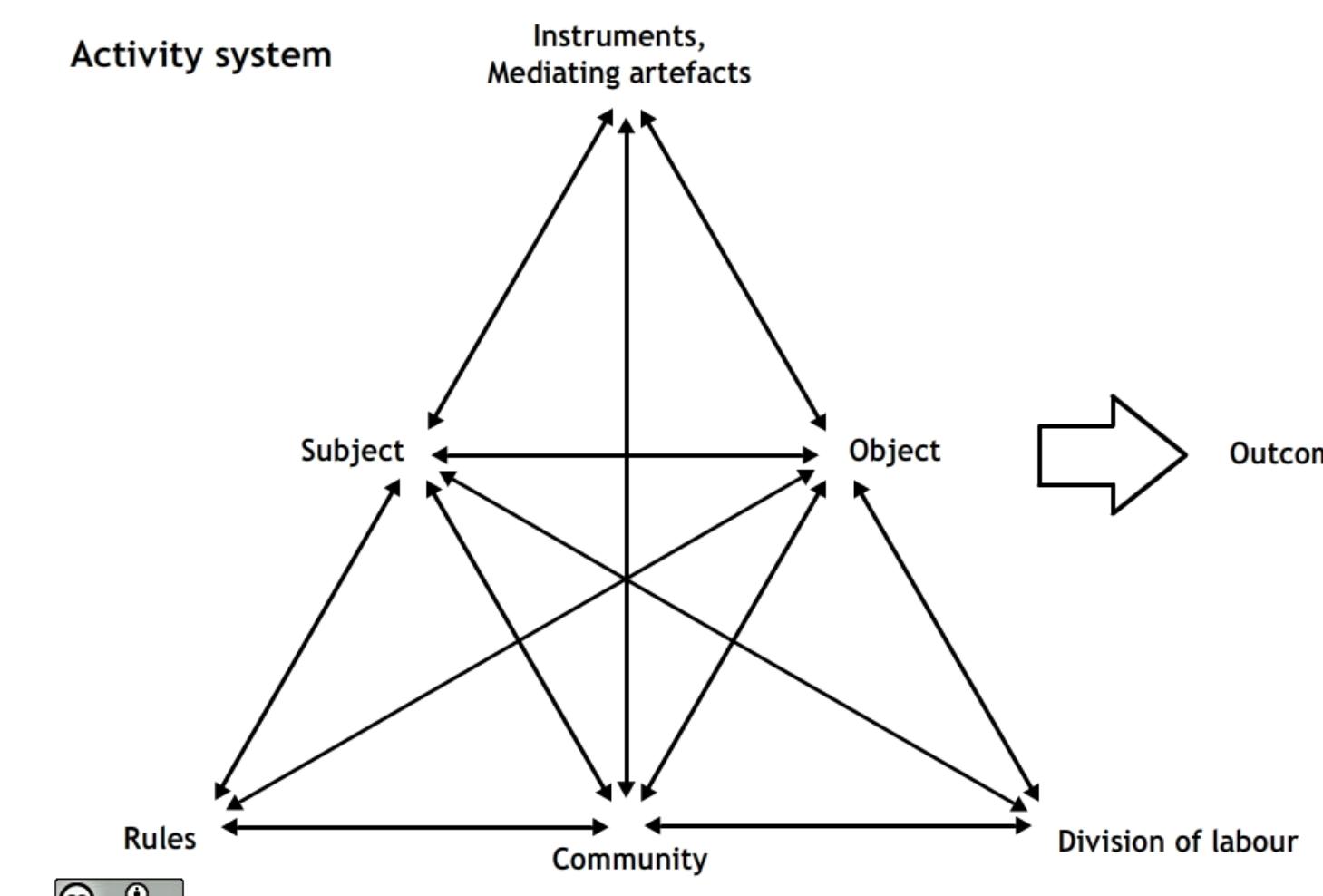
- A person's cognitive processes could be modeled and predicted, enabling software designers to evaluate and improve interface designs
- GOMS Model (Goals, Operators, Methods, Selection rules)
  - A method used to predict where a person might have trouble with an interface



<https://www.amazon.com/Psychology-Human-Computer-Interaction-Stuart-Card/dp/0898598591>

# Second Wave ('90s and '00s)

- Groups working collectively
- Introduction of social psychological theories
  - Distributed cognition: developing shared understanding and action among multiple people
  - Activity theory: considering an individual's practice in the context of the community and environment that they are in



CC BY © Matt Bury 2012

# CHI Growth



The screenshot shows the CHI 2009 website homepage. At the top, the logo "CHI 2009 DIGITAL LIFE NEW WORLD" is displayed. Below the logo is a navigation bar with links: WELCOME, ATTENDING, AUTHORS, SPONSORS, EXHIBITORS, ORGANIZERS, and PRESS. The "AUTHORS" link is highlighted in blue. A sub-menu for authors includes "Call for papers", "Format", "Guides", "Present", and "Madness". The main content area features a photograph of a person's hands using a stylus on a touchscreen device, which displays a colorful interface. The word "AUTHORS" is printed in blue at the bottom left of the image. Below the image, the section "Subcommittees" is introduced, followed by a paragraph explaining the purpose of subcommittees.

**AUTHORS**

**Subcommittees**

CHI 2009 anticipates submission of over 1,000 Papers and Notes. The review process needs to handle this load while also improving the quality of reviews. The organization of the CHI program committee into topical subcommittees helps achieve this by having you, the author, select the best subcommittee to review your submission.

<https://web.archive.org/web/20090321195157/http://chi2009.org/Authors/CallForPapers/Subcommittees.html>

# CHI Growth

## Interaction Beyond the Individual

This subcommittee will focus on papers which consider aspects of interaction which extend beyond a single user. These contributions will be judged in part by their extension of knowledge about large and small groups of people's interaction with technology and with each other through technology and/or by their innovation in creating new systems or techniques to support these interactions.

### **Subcommittee**

Chair: [Wendy Kellogg](#) (IBM)

Associate Chairs:

- Mark Ackerman (University of Michigan)
- Barry Brown (UC San Diego)
- Scott Counts (Microsoft Research)
- Susan Fussell (Cornell)
- Darren Gergle (Northwestern)
- Sara Kiesler (CMU)
- Cliff Lampe (Michigan State University)
- Gloria Mark (UC Irvine)
- Judy Olson (UC Irvine)

## Behavioral Study and Theory

This subcommittee will focus on papers which contribute improved understanding, measures, or models of people and/or context which can be applied to address HCI problems. These contributions will be judged in part by their extension of our basic understanding **of human behavior and/or their context of activity** and the practical impact this may have on HCI practice and research.

### **Subcommittee**

Chairs:

[Geraldine Fitzpatrick](#) (University of Sussex)

[Carl Gutwin](#) (University of Saskatchewan)

Associate Chairs:

- Anthony Hornof (University of Oregon)
- Dave Kirk (Microsoft Research)
- Bonnie Nardi (University of California, Irvine)
- Stephen Payne (Bath University)
- Mark Rouncefield (Lancaster University)
- Louise Barkhuus (University of California, San Diego)
- Kenton O'Hara (HxI Initiative, Australia)

<https://web.archive.org/web/20090321195157/http://chi2009.org/Authors/CallForPapers/Subcommittees.html>

# CHI Growth

- In making a subcommittee choice you should make careful consideration of what the most central and salient contribution of your work is, even if there are several different contributions... Should it be evaluated in terms of the usage context for the target user community? The novel methodology developed for your study? The system and interaction techniques you have developed?... Even if there are several subcommittees that could offer fair and expert assessments of this work, go with the one that really fits the most important and novel contributions of your paper.

<https://web.archive.org/web/20090321195157/http://chi2009.org/Authors/CallForPapers/Subcommittees.html>

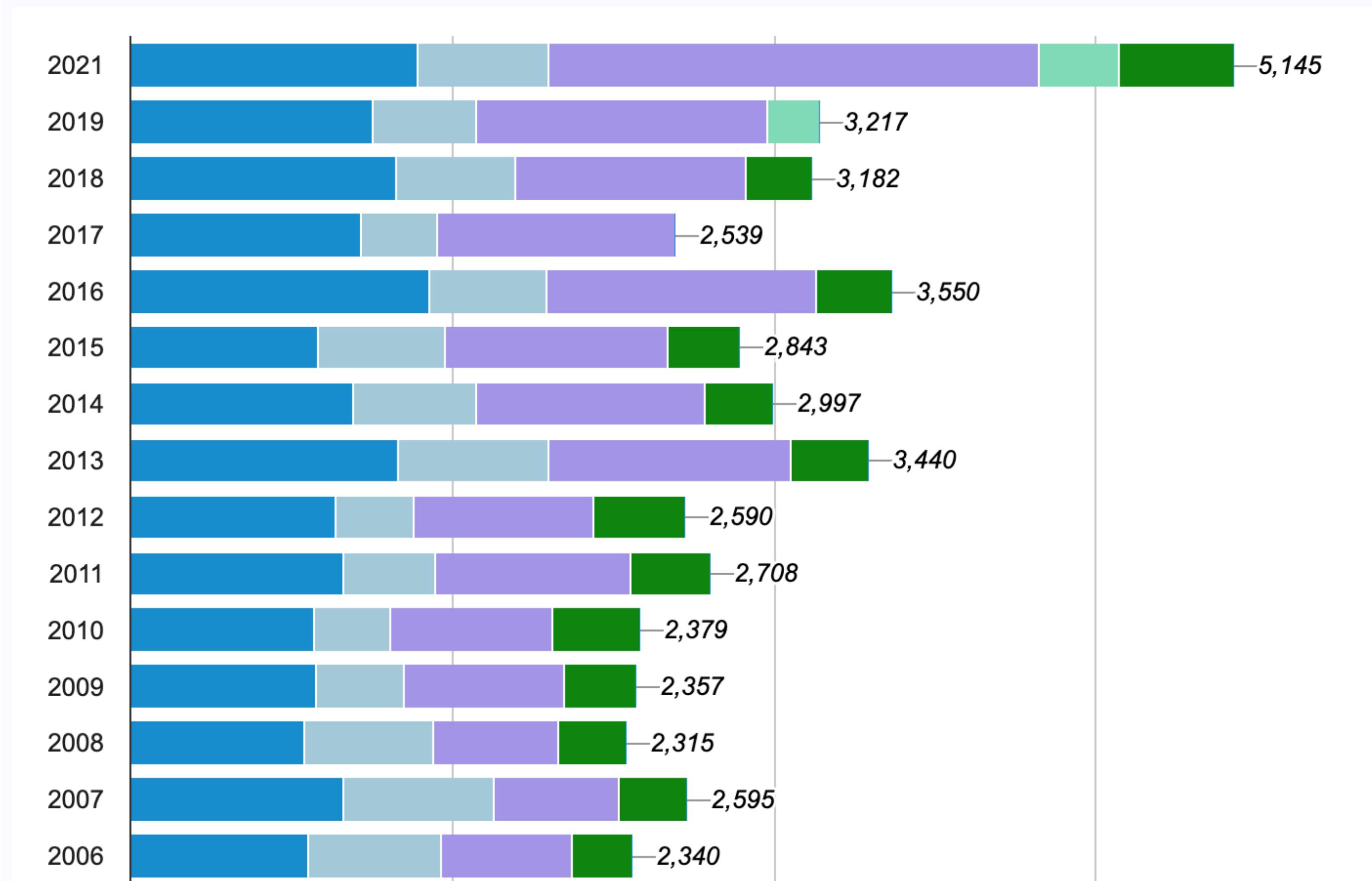
# Third Wave ('10s)

- Computing blends professional and personal lives
- Evolution spurred on by changes in the kinds of computers people use
- Research begins examining computing use beyond productivity
  - Entertainment
  - Health
  - Education



# CHI Growth, continued

## CHI Attendance



<https://sigchi.org/conferences/conference-history/chi/>

# In Parallel Worlds...

- Emergence of researchers examining the creation and consequences of technology
  - Science, Technology, and Society (STS)
- Increasing technology adoption in application areas
  - Health
  - Learning sciences
- Regulation of industry to support the rights of individuals
  - Americans with Disabilities Act (ADA)
  - Privacy law

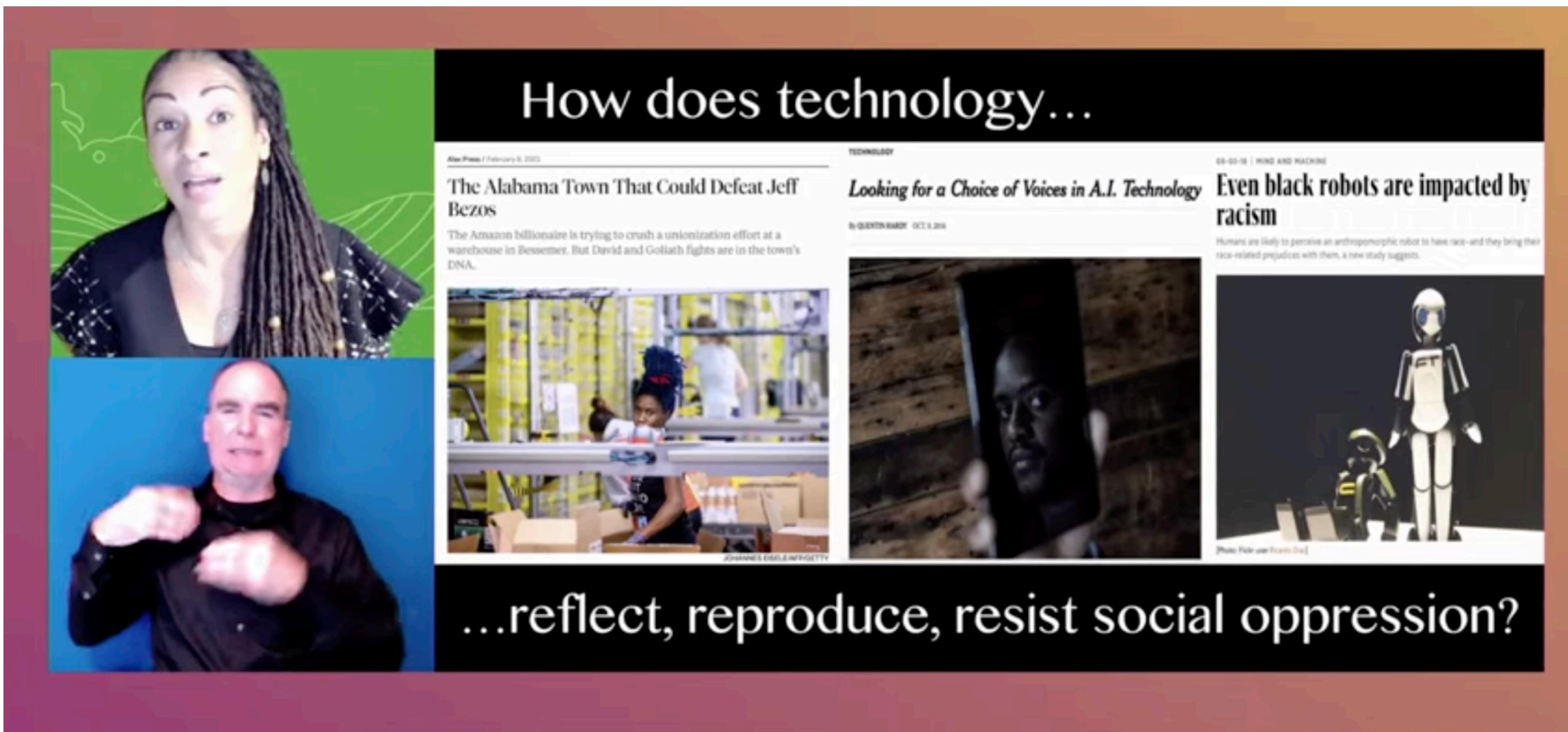
# Fourth Wave? ('20s)

## Critical computing?

- Deeper reflection on computing and society
  - Who we are designing technology to support (wealthy people, corporations)
  - When technology is causing harm rather than benefit
- It could be argued that this wave isn't new
  - STS has been doing it for decades
  - But its uptake in HCI is relatively new, and spreading rapidly

# Fourth Wave? ('20s)

## Critical computing



With that I'm going to pause just a minute before heading into the second part of my talk by sharing a short video clip from a film titled *Sleep Dealers*. It offers another window into this way that global

Ruha Benjamin: Which Humans? Innovation, Equity, and Imagination in Human-Centered Design (Keynote)

<https://www.youtube.com/watch?v=kDcz44ifdQw>

# Fourth Wave? ('20s)

AI?

- What computing “is” is changing
  - Algorithmically-generated content
  - Algorithmic personalization
- It could be argued that this wave isn’t new
  - Social media feeds have been around for a decade+
  - NLP and Computer Vision have researched text/image generation for decades

# HCI happens outside of CHI

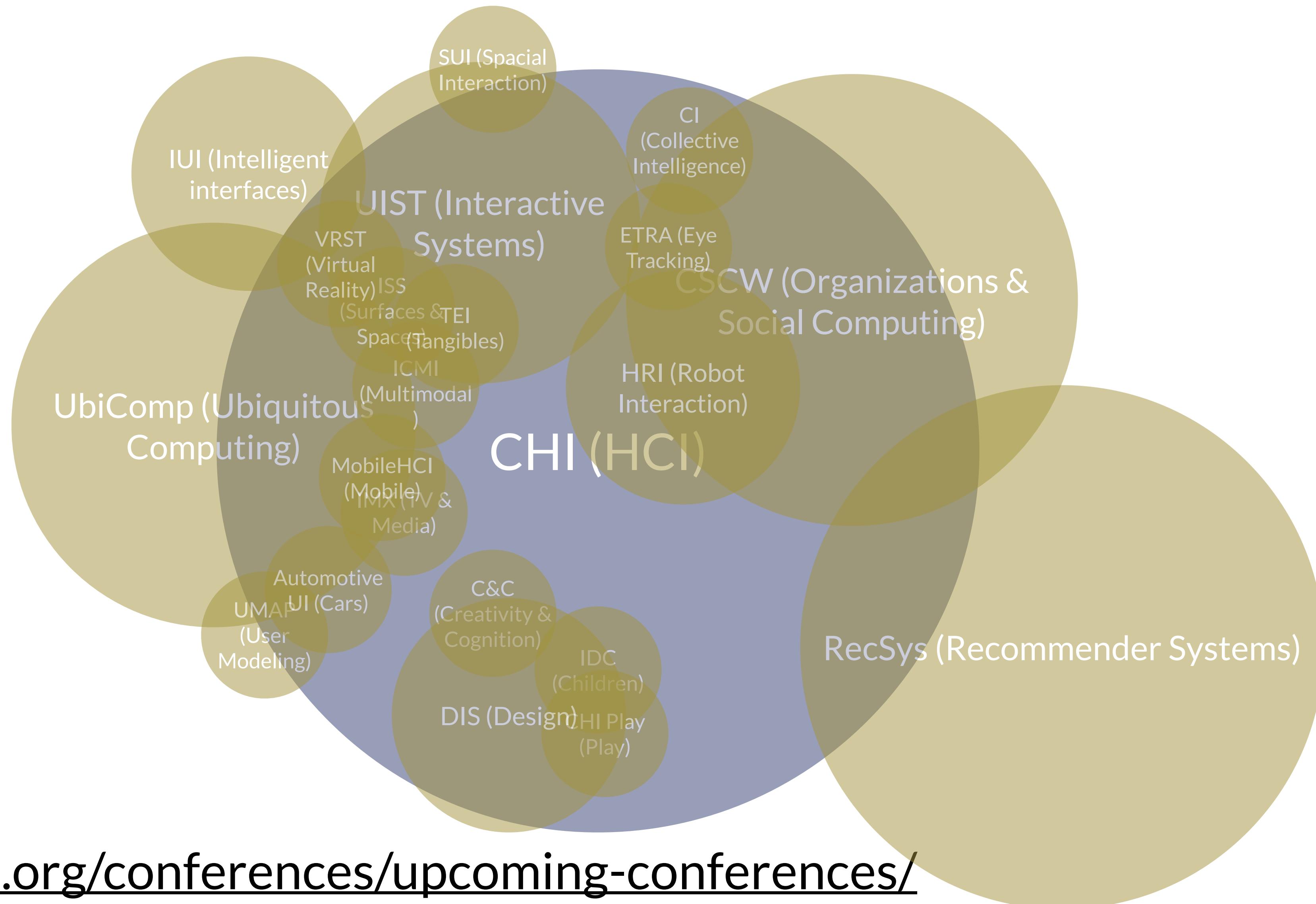
- SIGCHI: ACM's Special Interest Group for HCI
  - The organizational body that sponsors HCI conferences
- CHI is useful for looking at HCI research because *all* of CHI is HCI
  - Other venues publish a significant amount of HCI literature, with no or little difference in quality

## 2023 Specialized Conferences

Conference Name	Dates	Location	Co-sponsor(s)
GROUP '23: The 2023 ACM International Conference on Supporting Group Work <a href="http://group.acm.org">group.acm.org</a>	01/08 - 01/11	Sanibel Island, Florida, USA	100% SIGCHI
TEI '23: Seventeenth International Conference on Tangible, Embedded, and Embodied Interaction <a href="http://group.acm.org">group.acm.org</a>	02/26 - 03/01	Warsaw, Poland	100% SIGCHI
IUI '23: 28th International Conference on Intelligent User Interfaces <a href="http://iui.acm.org">iui.acm.org</a>	03/28 - 04/01	Sydney, Australia	SIGCHI 50% SIGAI 50%
HRI '23: ACM/IEEE International Conference on Human-Robot Interaction <a href="https://humanrobotinteraction.org/2023/">https://humanrobotinteraction.org/2023/</a>	03/13-03/16	Stockholm, Sweden	SIGCHI 50% SIGAI 10%
IMX '23: ACM International Conference on Interactive Media Experiences	06/13 - 06/15	Nantes, France	SIGCHI 100.00%
C&C '23: Creativity and Cognition <a href="https://cc.acm.org/2023/">https://cc.acm.org/2023/</a>	06/19 - 06/21	Online	SIGCHI 100.00%
IDC '23: Interaction Design and Children	06/19 - 06/22	Evanston IL, USA	SIGCHI 100.00%
UMAP '23: 31st ACM Conference on User Modeling, Adaptation and Personalization	06/26 - 06/29	Limassol, Cyprus	SIGCHI 50.00% SIGWEB 50.00%
EICS '23: ACM SIGCHI Symposium on Engineering Interactive Computing Systems <a href="https://eics.acm.org/2023/">https://eics.acm.org/2023/</a>	06/27 - 06/30	Swansea, United Kingdom	SIGCHI 100.00%
COMPASS '23: ACM SIGCAS/SIGCHI Conference on Computing and Sustainable Societies	08/22 - 08/25	Cape Town, South Africa	SIGCHI 50.00% SIGCAS 50.00%
AutomotiveUI '23: 15th International Conference on Automotive User Interfaces and Interactive Vehicular Applications <a href="http://auto-ui.org/23">auto-ui.org/23</a>	09/18-09/21	Ingolstadt, Germany	100% SIGCHI
MobileHCI '23: 25th International Conference on Mobile Human-Computer Interaction <a href="https://mobilehci.acm.org/2023/">https://mobilehci.acm.org/2023/</a>	09/18-09/22	Athens, Greece	100% SIGCHI

<https://sigchi.org/conferences/upcoming-conferences/>

# HCI happens outside of CHI



# Today's class

- Defining Human-Computer Interaction (HCI)
- History of HCI
- Course overview

# Course Overview

- Learning objectives
- Who I am
- Staying in touch
- Structure & readings
- Assignments
- Grading
- Website overview

# Learning Objectives

- By the end of this course, you should be able to:
  - Analyze the motivation and contribution of any Human-Computer Interaction research paper, describing how it extends the field of literature.
  - Articulate how Human-Computer Interaction relates to other areas of research, both within Informatics and in academia at large.
  - Develop proposals for research projects which develop new knowledge to one or more areas of Human-Computer Interaction.
  - Appreciate different methods of inquiry, topics, and objectives used in different Human-Computer Interaction research areas.

# Learning Objectives

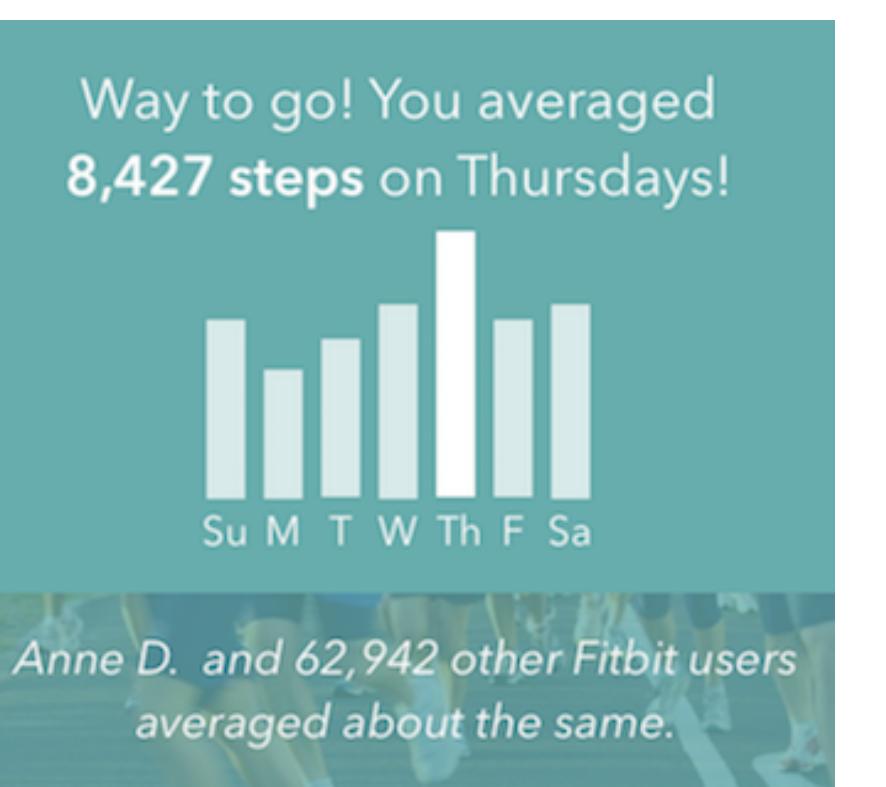
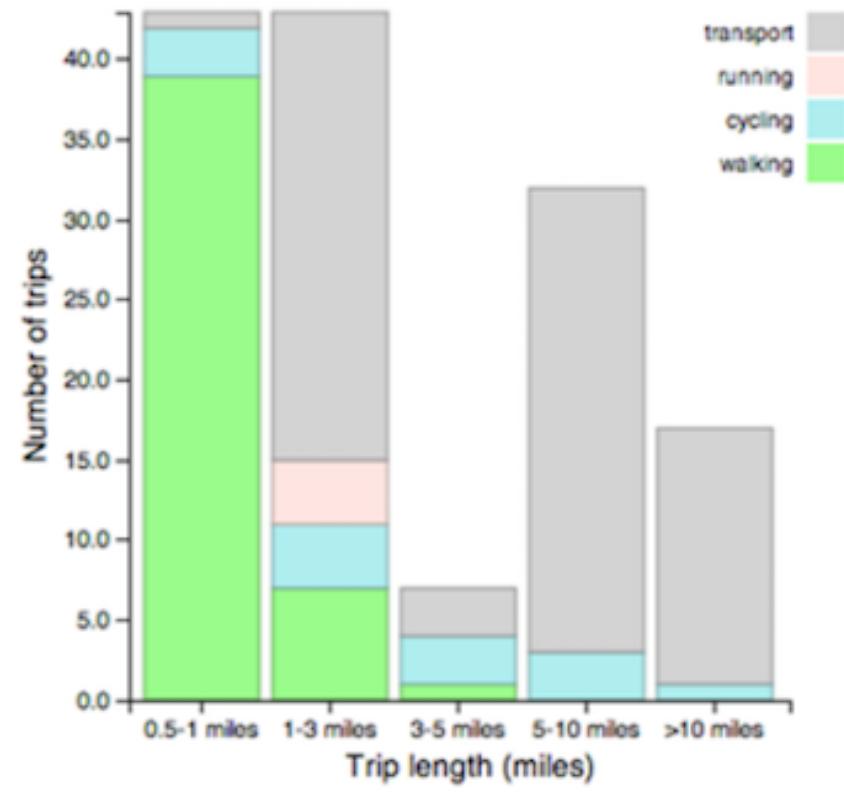
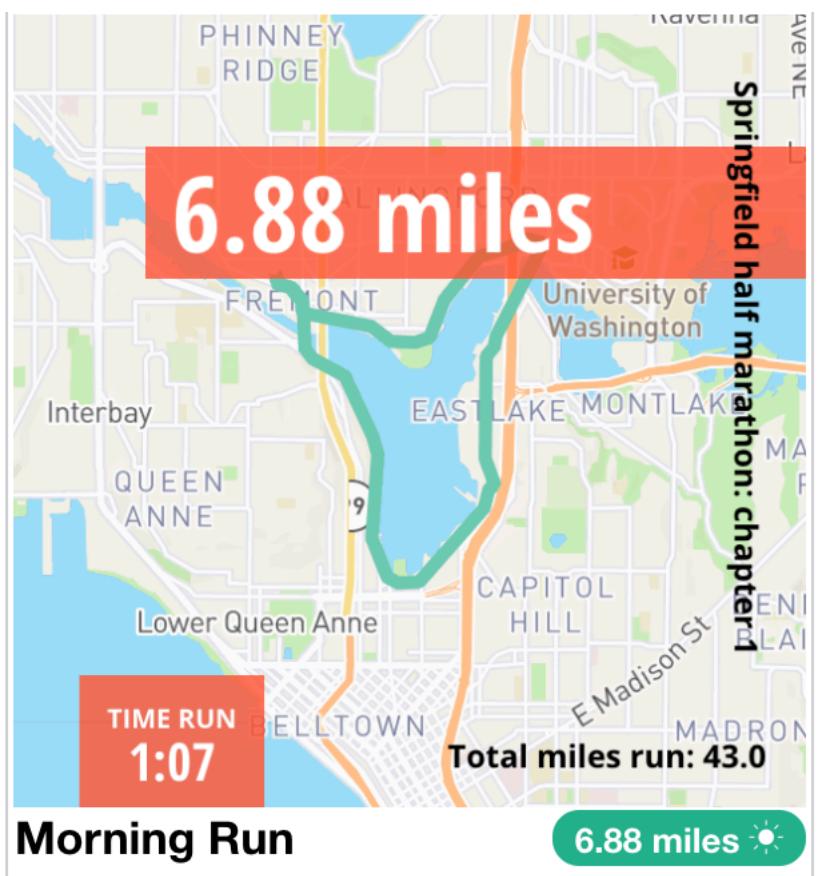
- This is *not* a course on methods used in HCI research
  - Those are largely covered by Qualitative (203) and Quantitative (205) Methods
- This is *not* a course on applying HCI principles to the design of software, apps, etc. in industry
  - That is largely covered by User Interface Design (231)
- Instead, this class aims to give background on what contributions are core to HCI research and how to motivate them in writing
  - This class prioritizes breadth (more topics) over depth
  - CSCW (251), Ubicomp (241), and many special topics (295) provide greater depth

# Who I am

- Ph.D. Computer Science & Engineering,  
University of Washington 2018
- B.S. Computer Science,  
University of Virginia 2012
- Joined UCI Informatics in 2018  
Assistant Professor
- Internships at Microsoft & Adobe,  
collaborations with Snap(chat)



# Who I am



# Who I am

- I consider HCI my primary research area
- I regularly publish at and review for HCI venues
- Within HCI, I focus on Health, Social Computing, and Ubiquitous Computing



**Around the room!  
Say your name, program & year,  
and something fun about you**

# Staying in touch

- Web: <http://inf232-sp23.depstein.net/>
- Email me: [epstein@ics.uci.edu](mailto:epstein@ics.uci.edu)
- Office hours: generally by appointment (send me an email)

# Staying in touch

- I have a two-month old at home
- I just returned to work, so I'm still learning how to simultaneously be a parent and a professor
  - I may need to cancel class or move it online on short notice
- If I had my way, I'd be spending time with him instead of with you
  - No offense!



# Structure & Readings

- In-person, synchronous, no recording, no hybrid
  - Discussion is a key component of the class
  - Quality hybrid discussions are hard to pull off
  - To be honest, I have little capacity for experimentation this quarter
- Let me know if you need to miss a class
  - I expect many of you will need to miss a few
  - If you miss a week or less, your grade won't be impacted

# Structure & Readings

- Topics will be organized by CHI's subcommittees
- There are not enough weeks to cover each subcommittee
- Poll is up to help determine which subcommittees to focus on (complete it by Thursday)

## List of the Subcommittees

Sixteen subcommittees are listed and described below. Each has a title, short description, and an indication of who will Chair and serve on the subcommittee and if a subcommittee consists of multiple tracks. Subcommittees have been constructed with an eye to maintaining logically coherent clusters of topics.

- [User Experience and Usability](#)
- [Specific Applications Areas](#)
- [Learning, Education, and Families](#)
- [Interaction Beyond the Individual](#)
- [Games and Play](#)
- [Privacy and Security](#)
- [Visualization](#)
- [Health](#)
- [Accessibility and Aging](#)
- [Design](#)
- [Building Devices: Hardware, Materials, and Fabrication](#)
- [Interacting with Devices: Interaction Techniques & Modalities](#)
- [Blending Interaction: Engineering Interactive Systems & Tools](#)
- [Understanding People: Theory, Concepts, and Methods](#)
- [Critical Computing, Sustainability, and Social Justice](#)
- [Computational Interaction](#)

# Structure & Readings

- Each week will cover a different subcommittee/topic at CHI
- First day: an overview of the topic
  - What disciplines it draws from
  - Core problems or research questions
  - Comparison between HCI research on the topic and research in related communities
- Second day: discussion of recent papers on that topic
  - What contributions are made and how they are made
  - What makes a problem on this topic worthy of study

# Structure & Readings

- “Overview Day” readings:
  - *Calls for papers* from the CHI subcommittee and related publication venues
  - *Framing* papers which introduce a concept or approach commonly used
- “Discussion Day” readings:
  - *Recent contributions* which will be used to better understand the topic
- Doing the reading is a major component of the course
  - No exams, no quarter-long project

# Structure & Readings

- Going to use Perusall, a collaborative reading/commenting tool
- Comments graded binary 0/1 to simplify grading, but more and deeper comments will lead to better discussion and thus better learning

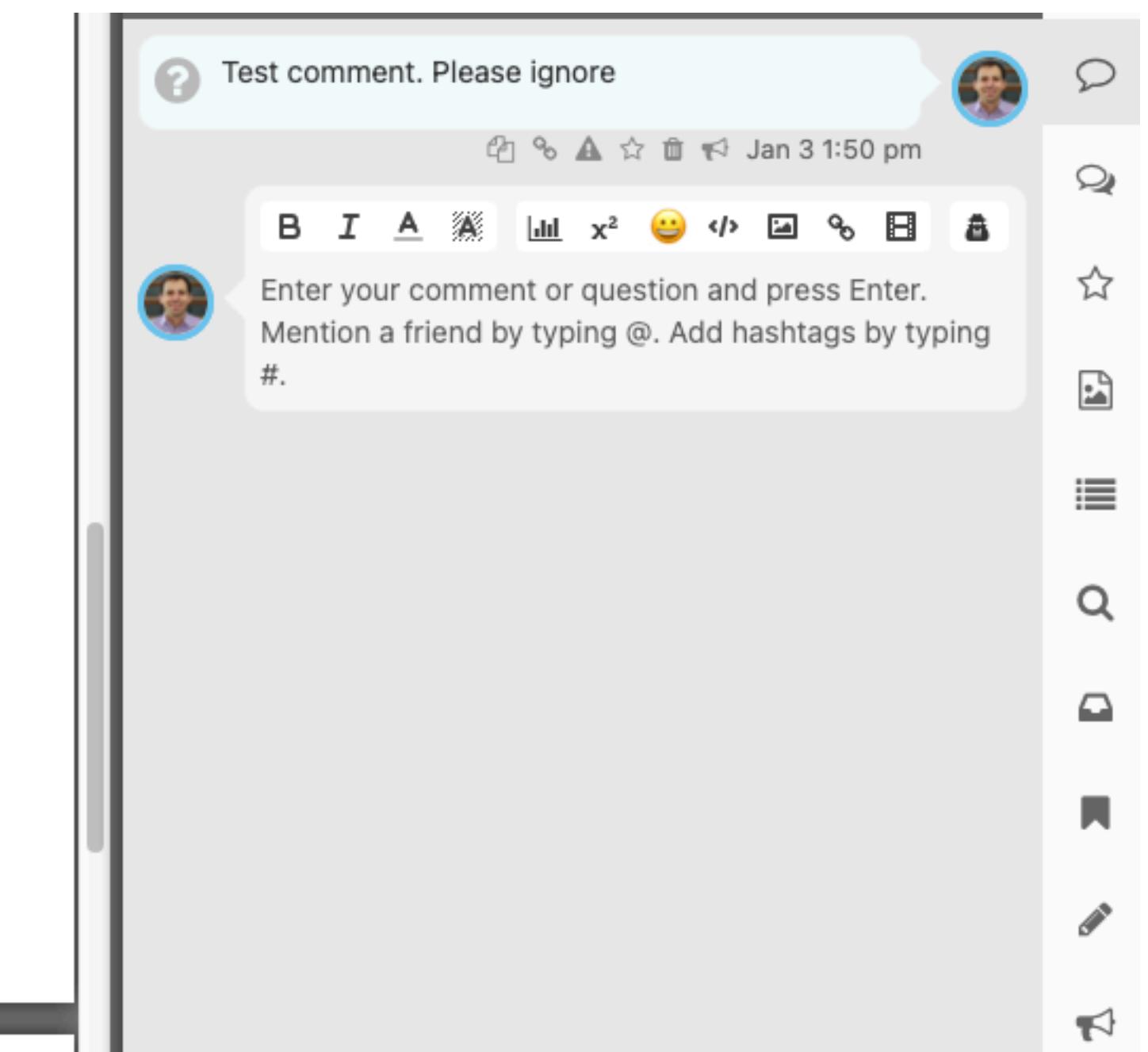
## Insights

- Knowledge generated by HCI research can be categorized into certain contribution types.
- Each contribution type has key characteristics that imply how it is judged.
- The contribution types used for submissions to the CHI conference have evolved over time to distill types of knowledge from other concerns.

All scholarly fields strive to contribute new knowledge. In the field of human-computer interaction (HCI), this new knowledge increasingly comes in rich forms like videos and demos, but the archival research paper remains the most widely used and accepted capture and delivery mechanism for research knowledge. The knowledge contribution made by a research paper—or more precisely, made by the work a research paper describes—is any research paper's central feature. For example, a theoretical physics paper may contribute a new mathematical model for the behavior of light near black holes. A civil

engineering paper may contribute a new method for stress-testing bridges. A social anthropology paper may contribute an account of people's reactions to teen pregnancies in rural religious communities. Whatever the field of inquiry, whatever the phenomenon of interest, every research paper strives to make a research contribution by offering new knowledge. In an effort to distinguish this kind of knowledge from everyday know-how, some scholars even capitalize the term: Knowledge.

In the whole of human inquiry, there are, of course, countless specific research contributions to be made. But



# Structure & Readings

- Each subcommittee will have a group of ~4 in charge of leading discussion
- You will present on each week's readings
  - On “Overview Day”, providing some additional background on the topic and its history in HCI
  - On “Discussion Day”, picking the recent papers and being the expert on their motivation and takeaways

# Structure & Readings

- Read smart
  - No need to read the formatting expectations, submission method etc. in calls for papers, unless you're curious
  - Can gloss over recent papers' methods, someone else reviewed them and felt they were conducted rigorously enough
- There are required readings for Thursday
- Again, fill out the discussion leading preferences poll ASAP

# CHI 2023



- Will happen during Week 4 of the quarter
- We will watch and discuss CHI talks that week in lieu of class
  - Any Informatics/adjacent PhD student, faculty, etc. is welcome to attend
  - I'm happy to buy bagels/pastries for breakfast, but need help coordinating
- Some of you will be at the conference, nothing needed from you that week
  - No need to tell me, either

# Assignments

- 3 assignments, giving practical experience assessing and producing motivations for HCI contributions
  - Reverse outline (individual): Pick two papers, deconstruct its motivation, contribution, and methods
  - Research proposals (groups, 2x): Write proposals for two different “calls” at the intersection of different subcommittees

# Grading

- 45% assignments
  - 15% reverse outline, 15% proposal 1, 15% proposal 2
- 45% readings
  - 20% reading reports, 25% leading discussion
- 10% participation

# Course Overview

- Learning objectives
- Who I am
- Staying in touch
- Structure & readings
- Assignments
- Grading
- Website overview

# Website overview

## INF 232 - Research in HCI - Spring 2023

[Home](#) | [Assignments](#) | [Readings](#) | [Calendar](#)

### Basic Information

Class Time: TuTh 9:30-10:50

Perusall:

<https://app.perusall.com/courses/in4matx-232-spring-2023>

Canvas:

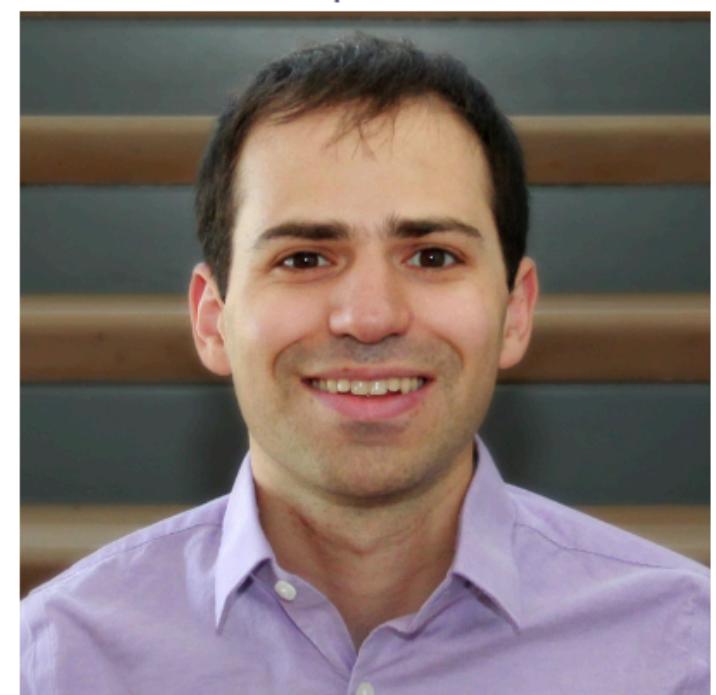
<https://canvas.eee.uci.edu/courses/53657>

Email: [epstein@ics.uci.edu](mailto:epstein@ics.uci.edu)

Office hours: By appointment

### Course Staff

Professor Daniel Epstein



Welcome! This class focuses on research topics in Human-Computer Interaction (HCI), focused on developing appreciation for and expertise in different kinds of research contributions in HCI. HCI spans over four decades as a research field, evolving from understanding and improving computer use in traditional workplace settings to developing, studying, and critiquing the wide range of computing devices that people use in their everyday lives.

This course will require a substantial amount of reading, as well as analysis of literature and writing. While there will be a few lectures dedicated to giving background on the field, in most weeks we will instead look to understand the research literature through discussion.

We will emphasize open discussion and feedback in all aspects of the course.

### Learning Objectives

By the end of this course, you should be able to:

- Analyze the motivation and contribution of any Human-Computer Interaction research paper, describing how it extends the field of literature.
- Articulate how Human-Computer Interaction relates to other areas of research, both within Informatics and in academia at large.
- Develop proposals for research projects which develop new knowledge to one or more areas of Human-Computer Interaction.
- Appreciate different methods of inquiry, topics, and objectives used in different of Human-Computer Interaction research areas.

<https://inf232-sp23.depstein.net/>

# Final thoughts

- Since this class is required for the Informatics PhD, your interests are diverse
  - Some of you self-identify as HCI researchers, others do not
  - But I believe that all of you can connect your research interests to HCI, if you wish to
  - My goal is to help you find your connection, or broaden your background if you already have one

# Final thoughts

- As much as I can, I will share what I know about HCI
  - I think I have a relatively broad understanding of the HCI literature and community
  - But there are plenty of areas where I have limited knowledge
  - Please establish your expertise when you have it, disagree with me, etc.
- You'll get out of this class what you put in
  - You can pass the class by minimally engaging with the readings and not asking questions during class, but you'll learn less
  - Again, I'm here to share what I know and provide some structure for you to learn

# **IN4MATX 232: Research in HCI**

**Class 1:**  
**History & Course Overview**

**Daniel Epstein**