

IN4MATX 241: Ubiquitous Computing

Class 2:

Visions of Ubiquitous Computing

Daniel Epstein

Announcements

- Fill out discussion leading preferences
- Post project ideas to Slack, particularly if you're looking for a partner(s)
- Happy to meet to talk through a project idea
 - I'd like to hear from everyone in some capacity by the end of this week
- I teach back-to-back, so I'll aim to wrap up right at 10:50

Computer for the 21st century

About the author

- Mark Weiser
- Chief scientist, Xerox PARC
- Widely regarded as the identifier of ubiquitous computing
- Passed away in 1999



Computer for the 21st century

- Scientific American is a “pop science” magazine
 - Article is intentionally visionary, with few references
- Part of a special issue on Communications, Computers, & Networks
 - Some other big-name authors: Al Gore, Alan Kay (Turing award winner), Nicholas Negroponte (MIT Media Lab former head), Sara Kiesler (CHI Academy, NSF program officer)
 - *“If you purchase a single issue of a magazine this year, this should be it”*
—UC Berkeley “Current Cites” journal, 1991

https://en.wikipedia.org/wiki/Communications,_Computers,_and_Networks

Computer for the 21st century

Motivating work

- Active Badge, detecting location within a building
 - Used an IR light which flashed every ~10 sec
 - Could also enable authenticated interaction with the environment



<https://dl.acm.org/doi/10.1145/128756.128759>

Computer for the 21st century

Motivating work

- Early prototypes for things we've seen commercialized today
 - Scratchpads resembling today's tablets
 - Remote whiteboards

Computer for the 21st century

- The “Sal” vignette describes goals still pursued by technology today
 - Finding my phone
 - Using an application across multiple devices
 - Connected personal IoT devices
 - Sensing in the environment
 - Multi-factor authentication

Computer for the 21st century

- Tabs, pads, and boards: do we have these today?
- Calm computing: rarely achieved, often not the goal
- Networked computing: short range (bluetooth), wifi, fast connection (wired)
- Devices tend to be owned rather than shared
- Device addiction is still very much a concern

Charting the past, present, and future

- Progress in three areas, though there are still open challenges:
 - Natural interfaces
 - Context-aware computing
 - Automated capture and access
- A need to push toward everyday computing,
which is informal and less structured

Charting the past, present, and future

About the authors

- Gregory Abowd
- J.Z. Liang Professor, School of Interactive Computing, Georgia Tech -> Dean of Engineering, Northeastern University (March 2021)
- Modern leader in the field
- Advises many Ubicomp Ph.D.'s, including Gillian Hayes
- Elected to the CHI Academy in 2008



Charting the past, present, and future

About the authors

- Elizabeth Mynatt
- Distinguished Professor,
School of Interactive Computing,
Georgia Tech
- Leader in personal health
informatics
- Elected to the CHI Academy in
2009



Charting the past, present, and future

- Transactions on Human-Computer Interaction
- Published in a special issue on Human-Computer Interaction in the New Millennium
- Issue included many other highly-influential papers
 - Past, present, and future of user interface software tools
 - Social translucence: an approach to designing systems that support social processes
 - Distributed cognition: toward a new foundation for human-computer interaction research

Charting the past, present, and future

Motivating work

- Flatland
 - Interactions to manage space & history of a whiteboard
 - Observed people's real-world use of whiteboards to inform digital features
 - Formulation of HCI methods like contextual inquiry

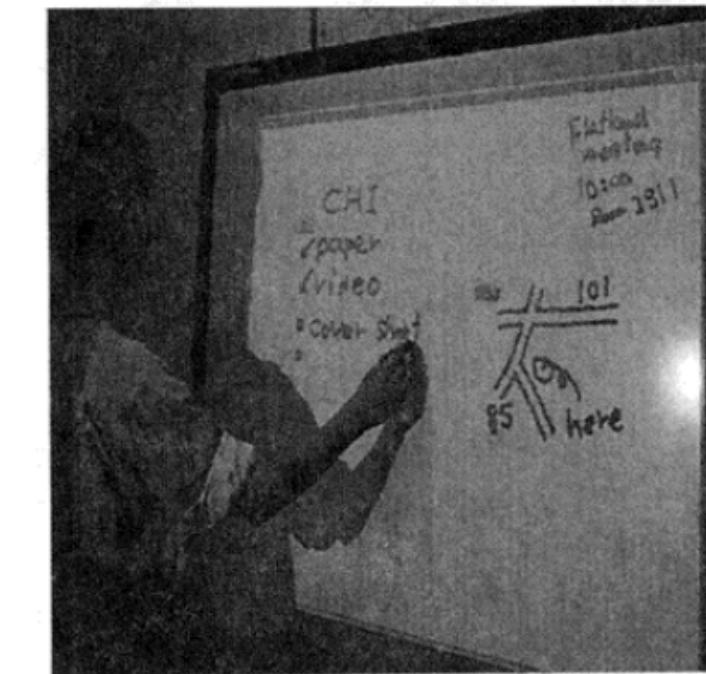


FIGURE 1. Using Flatland

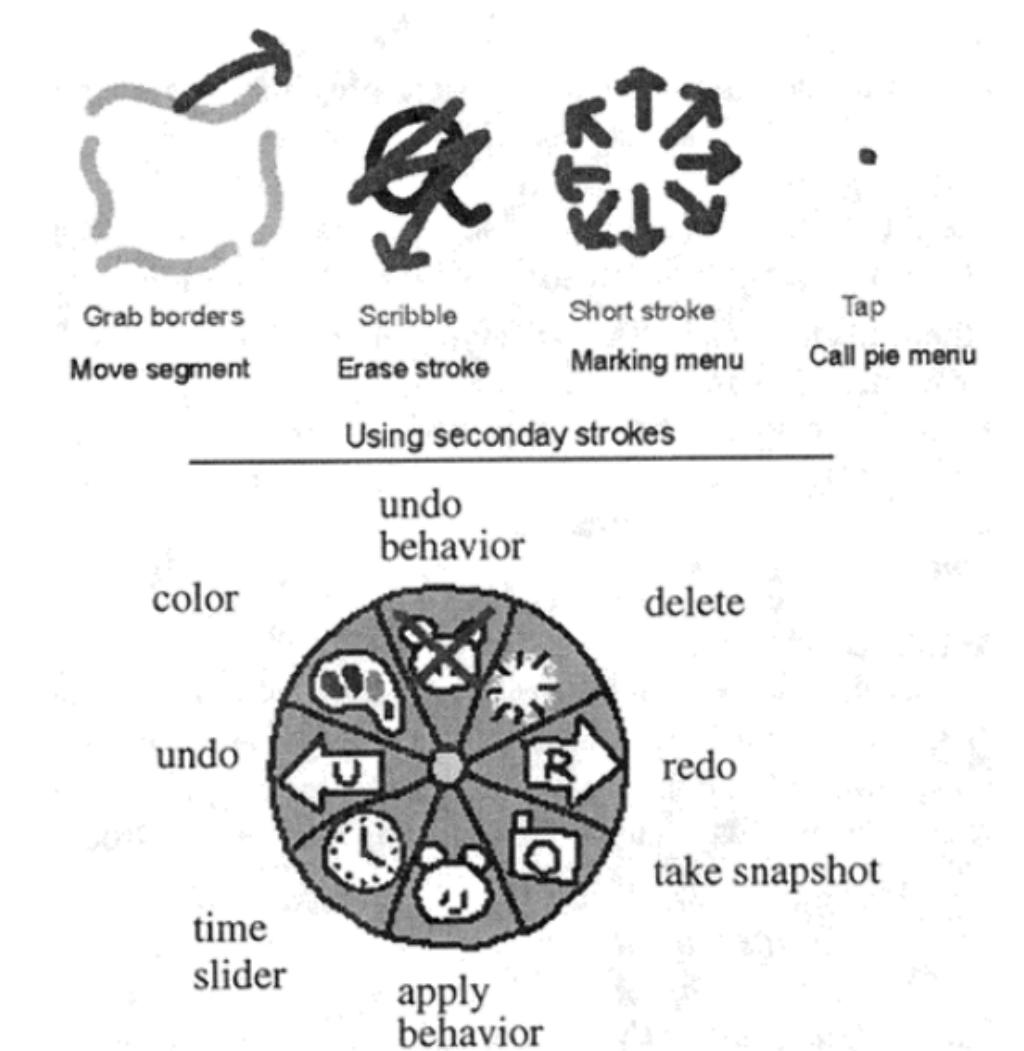


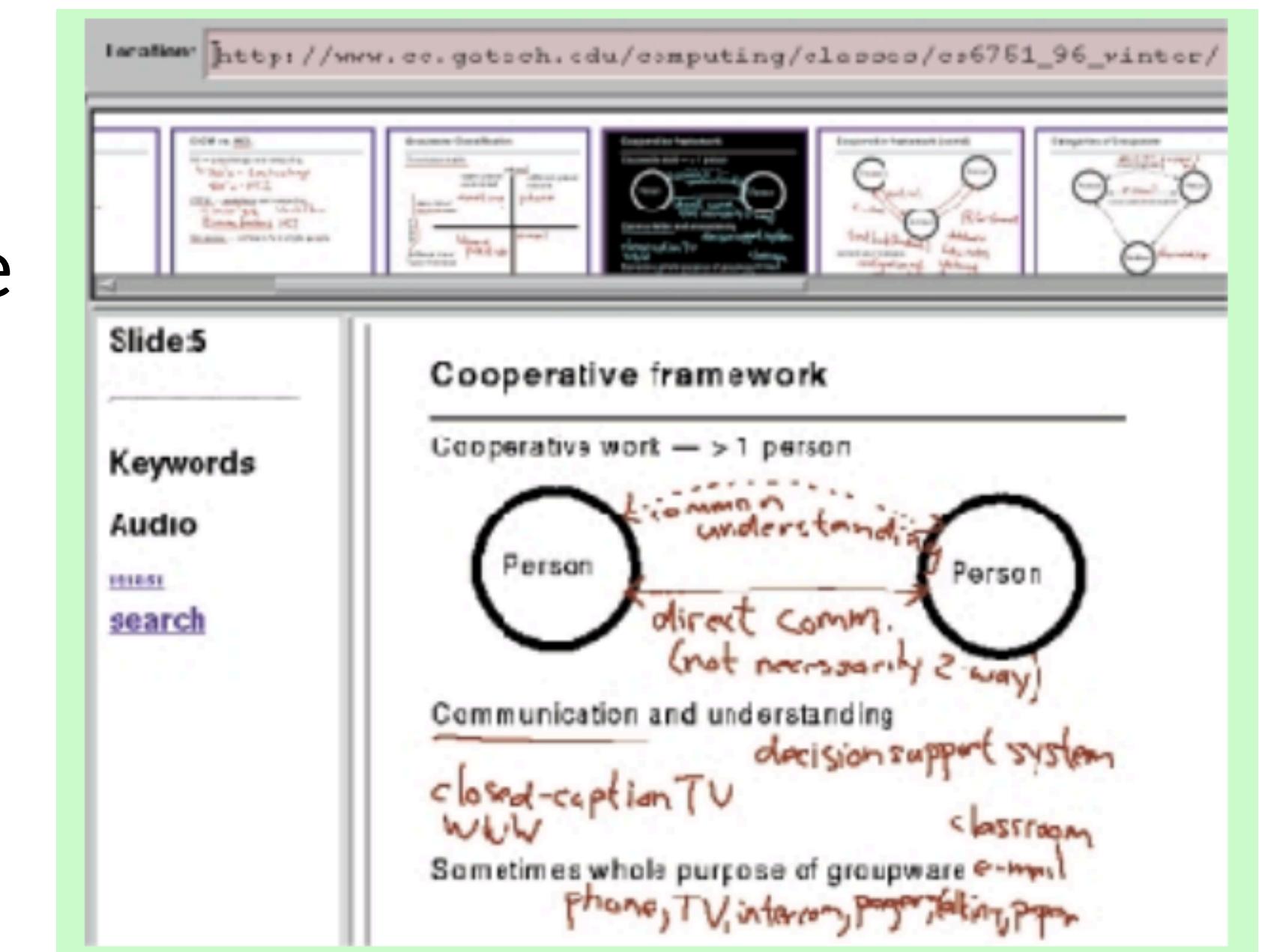
FIGURE 2. Gestures and Pie Menus

<https://dl.acm.org/doi/abs/10.1145/302979.303108>

Charting the past, present, and future

Motivating work

- Classroom 2000
 - Goal of capturing the classroom lecture experience for students & instructors to review
 - Notetaking devices were distracting for students
 - Highlights the importance of in-situ evaluation



<https://ieeexplore.ieee.org/abstract/document/5387044>

Charting the past, present, and future

Motivating work

- NaviCam
 - Early augmented reality implementation
 - Used IR receivers similar to Active Badge

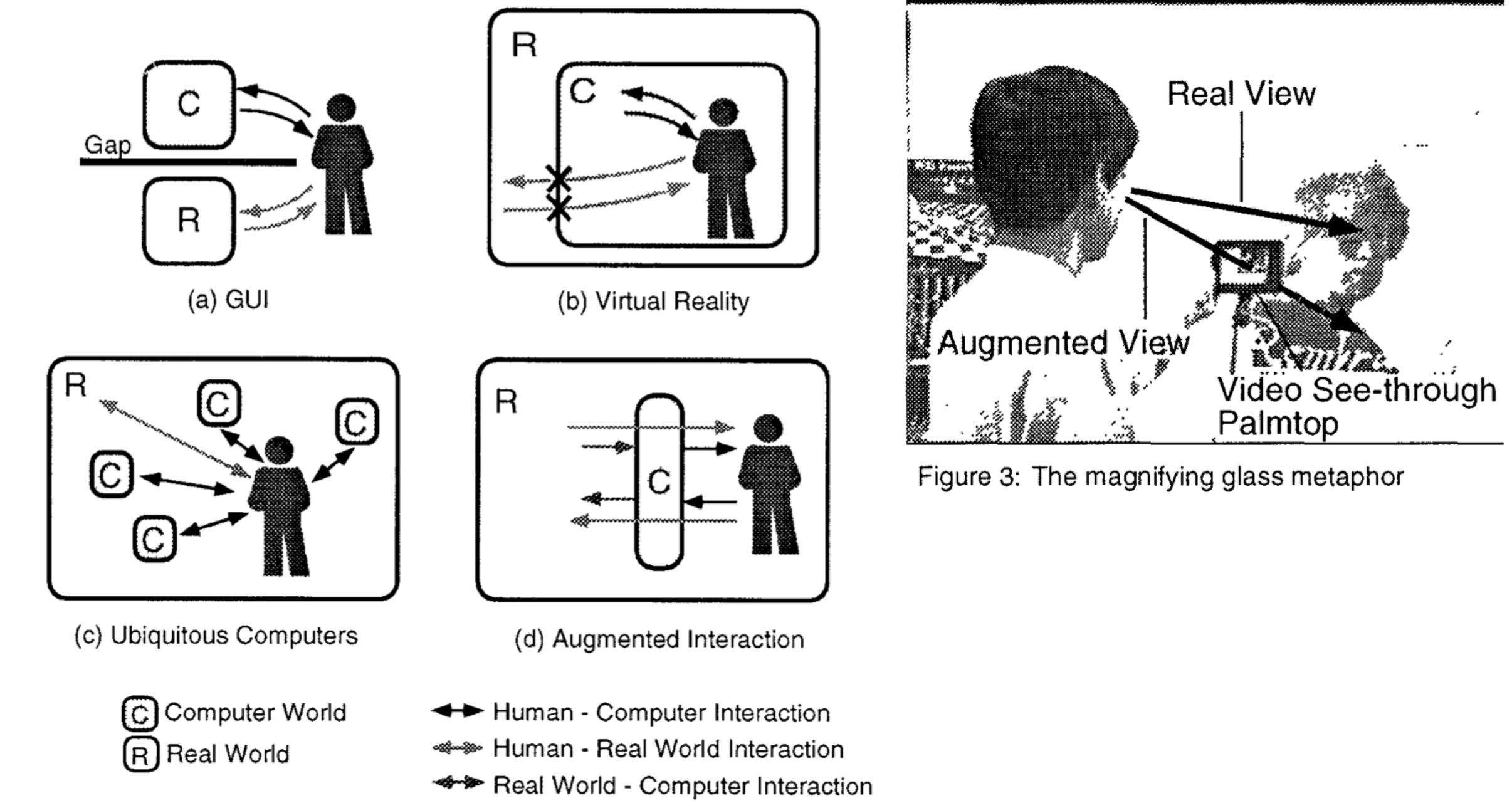


Figure 1: A comparison of HCI styles

<https://dl.acm.org/doi/abs/10.1145/215585.215639>

Charting the past, present, and future

- No solution for how to represent context
- Is “everyday computing” calm?
 - Calm computing might violate people’s trust because they do not know it is there
- It is difficult to effectively develop *and* evaluate a ubicomp system

Future research

- Not going to call out specific papers
 - These visions influenced much of Ubiquitous Computing research today
- Some trends
 - Internet of Things, smart environments, tangible interaction, context-aware computing, self-reflection, feminist HCI
 - <https://scholar.google.com/scholar?cites=17862031580506211335>
 - <https://scholar.google.com/scholar?cites=16634336695443596142>

Having a good discussion

- I'll make you co-host for the session you're leading discussion, you can facilitate however you'd like
- I haven't organized these types of discussions over Zoom before, so I'm trying things out, too
- We'll try breakout rooms for a bit today, then come back for a broader discussion

Having a good discussion

- Be engaged, actively listen
- Be courteous to others, help make sure everyone gets a chance to speak
- Understand that there are a diverse set of perspectives in the class
- When possible, support your statements from the readings
- We are all trying to learn here! It's okay to change your perspective or say something that others disagree with

Themes for Today

- I drew 3 themes from your reading queries
- We'll try ~5 minute breakouts on each,
then discuss as a larger group for ~5 minutes

Themes for Today

- Is Ubicomp too techno-centric versus user-centric?
 - Lika, Myles

Themes for Today

- Is “calm computing” realistic?
 - Arthur, Dennis, Colby, Jason

Themes for Today

- Why is detecting and understanding context so central to Ubicomp?
 - Elaine, Jo, Neeraj

Themes for Today

Other questions

- Did you notice the UCI connection in the Weiser article?
- 100 tabs, 10-20 pads, 1-2 boards: digital waste?
- Is Ubicomp only a vision intended for the well-off?

Themes for Today

Other questions

- What about the Sal scenario in Weiser's article does and does not hold up today?
- Have we achieved "*Unified and continuous interaction between humans & computational services?*" Is this desirable?

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