Human-Computer Interaction

Computer-Mediated Communication

Professor Bilge Mutlu

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

Today's Agenda

» Next Project Milestone: *Determining Method*

» Topic overview: *CMC*

» Discussion

Next Project Milesones

Next Milestone: *Human Subjects Training*

Feb 28 → Due date for completing online training for human subjects research

No prior CITI training

Complete online training (~2 hours) → Upload certificate

Prior CITI training

Upload certificate of trainint completed in the last 3 years

Next, Next Milestone: *Determining Method*

Feasible research templates:

- *Nascent theory* → Ethnography, GT/TA to build new theory
- *Mature theory* → Experimental study extending/testing existing theory
- *Artifact* → New system/extension, preliminary evaluation with users

Research contexts:

- **In-person:** studying phenomena in the real world
- **Virtual:** studying online phenomenon
- **Online:** using online methods to study phenomenon in the real world

What's Next?

Mar 8 → Due date for your method description (you have 3 weeks):

- Updated research question
- A description of your method
- **Study materails** for at least preliminary testing must be ready
  - *Ethnography* → Site identification, permissions, etc.
  - *Experimental study* → Materials, instruments, surveys, etc.
  - *Artifact* → Design requirements, preliminary evaluation plan, etc.

Topic overview: *CMC*

What is CMC?

Definition: Human communication via computers and includes many different forms of synchronous, asynchronous or real-time interaction that humans have with each other using computers as tools to exchange text, images, audio, and video.[1]

[1] Webopedia

What are CMC technologies?

- Email
- Instant messaging
- Text messaging
- Social media
- Hypertext
- Internet forums, newsgroups, bulletin boards, distribution lists
- Online learning
- Online shopping
- Phone conversations
- Videoconferencing
- Robot-mediated communication

What are some characteristics of CMC technologies?

- Temporal structure of the communication:
  - **Synchronous:** Face-to-face, videoconferencing
  - **Asynchronous:** Email, forum discussions
  - **Near-synchronous:** Instant messaging, text messaging
- Social structure of the communication:
  - **One-to-one:** Videoconferencing, email
  - **One-to-many:** Blogs, online learning
  - **Many-to-many:** Social media, chat rooms

2

TABLE 7.1
Technologies and Their Affordances

Affordance		*Interactivity*	
		Interactive	*Noninteractive*
Mode	Linguistic	Phone, audioconference, chat, instant messaging	E-mail, answerphone, voicemail, FAX, letter, Usenet
	Linguistic and visual	Videoconference, videophone, shared workspace	Videomail

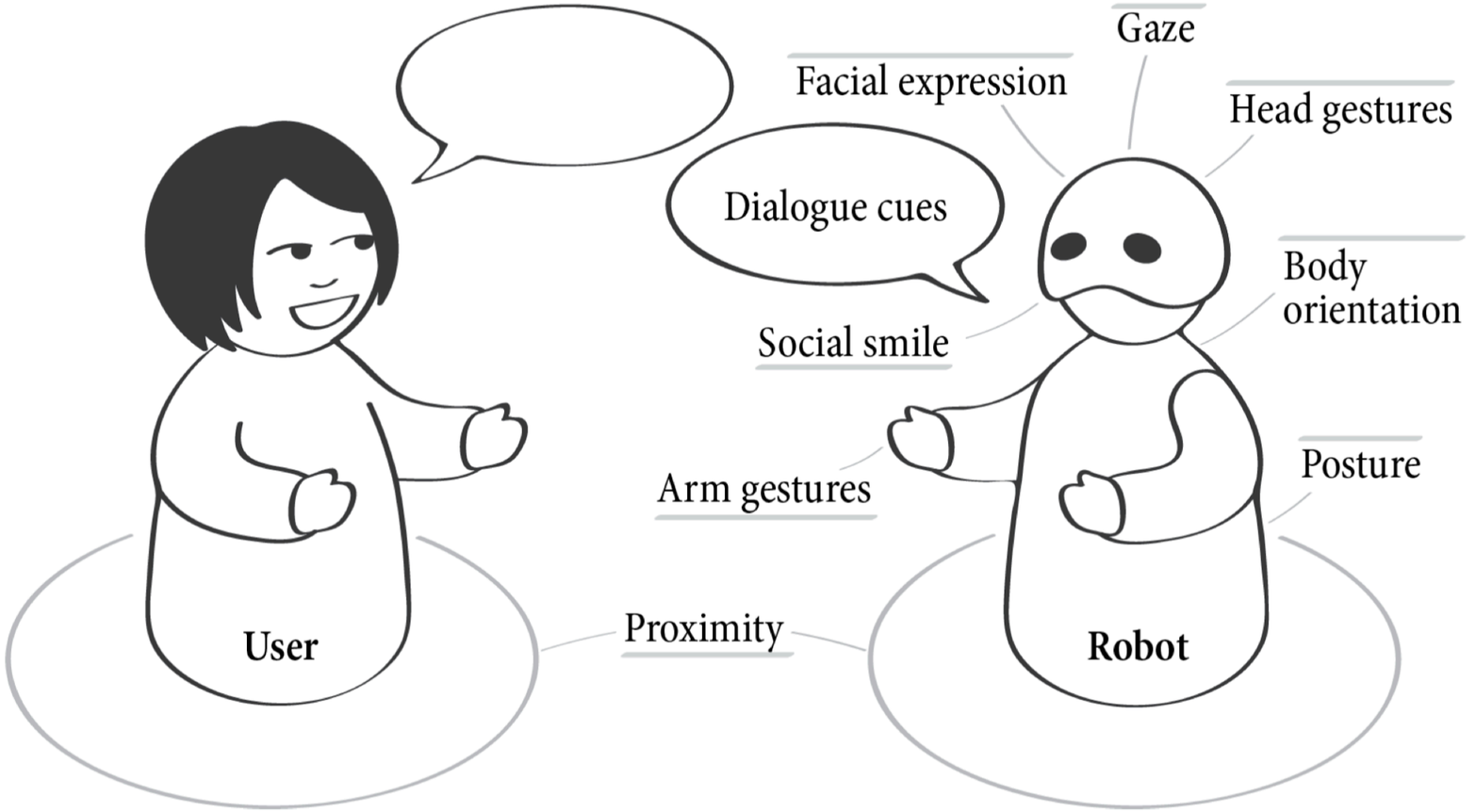
[2] Whittaker, 2003, Theories and methods in mediated communication

2

Affordance Type	*Communication Behaviors Affected by Affordance*	*Core Communicative Phenomena Affected*
VISUAL MODE	Facial expressions	Attention, understanding, agreement
		Conveying affect, attitude
	Head nods	Attention, understanding, agreement
		Turn taking
	Gaze	Attention
		Turn taking, reference
		Conveying affect, attitude
	Gesture	Attention
		Turn taking, reference
	Visual access to objects in a shared physical environment	Reference, attention
	Physical presence	Availability and initiation of impromptu conversation
INTERACTIVITY	Feedback via backchannels, completions, interruptions	Attention, understanding, agreement
		Turn taking, reference, repairs
		Socioemotional feedback

[2] Whittaker, 2003, Theories and methods in mediated communication

3



[3] Mutlu, B. (2011). Designing embodied cues for dialog with robots. *AI Magazine*, *32*(4), 17–30.

What are some CMC theories?

Why do we need so many theories to understand CMC?

» CMC is extremely diverse.

» Technologies are ever changing.

» Outcomes are sometimes counterintuitive.

Deficit vs. Compensation Views

***Deficit* view:** The medium imposes restrictions on communication, and the resulting communication necessarily involves certain *deficits* that require communicators to manage.

***Compensation* view:** People adapt to the restrictions media may impose on communication to *compensate* for the potential deficits, even often using it to their advantage.

*An example **deficit** theory*

Media Richness Model (the Bandwidth Hypothesis); Social Presence Theory

E.g., the *Bandwidth hypothesis* posits taht the closer the modes supported by a technology correspond to those of FtF communication, the more efficient the communication with that technology.

An example ***compensation*** *theory*

Social Information Processing (SIP) Theory; Social Identity/Deindividuation (SIDE) Theory

E.g., *Social Information Processing Theory* posits that communicators exchange social information through the content, style, and timing of verbal messages on-line. People use platform affordances to make up for missing cues.

» Walther (1993)[4] example shows FTF and CMC groups following different trajectories but arriving at similarly detailed impressions of group members.

[4] Wather, 1993, Impression development in computer-mediated interaction

What are some newer forms of CMC?


Discover
More
on Spatial


Bugs
High priority.
Interactiv
Jinha
Search rev
Glasses
MCU
User data log
I.8 arrows
Jeans
Spatial | 2021


USAHS - INNOVATION
Double Robot

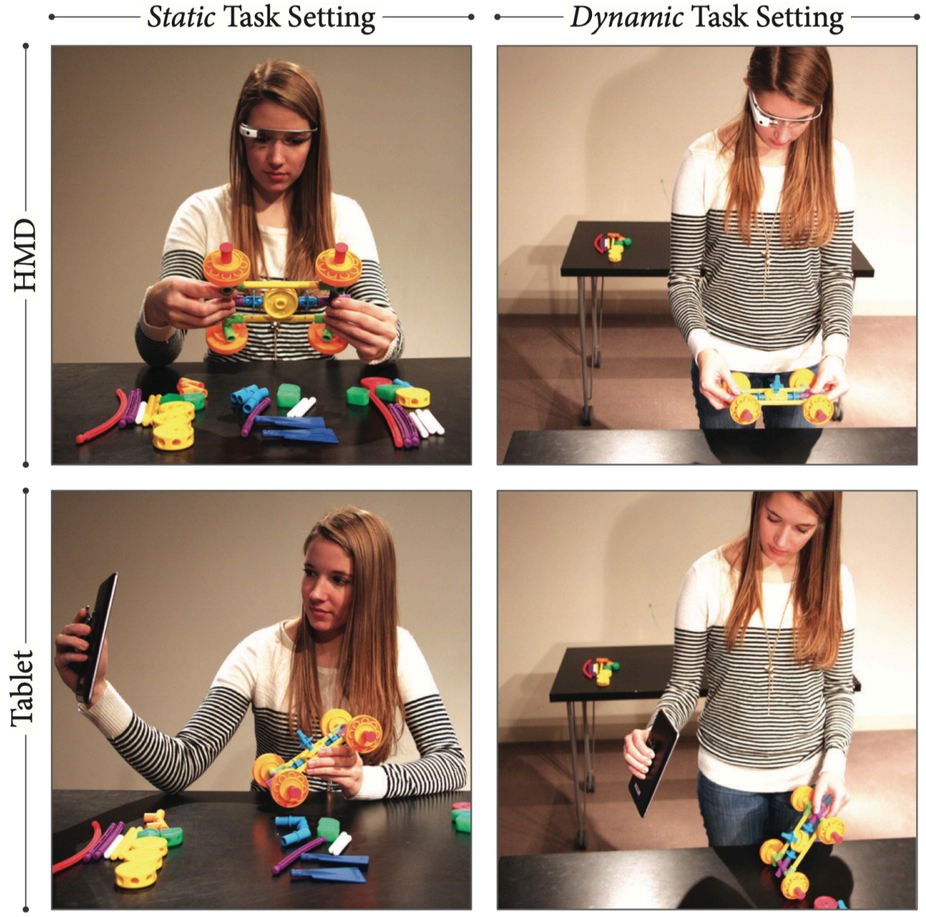
technologies?[^9][^10][^11][^12]

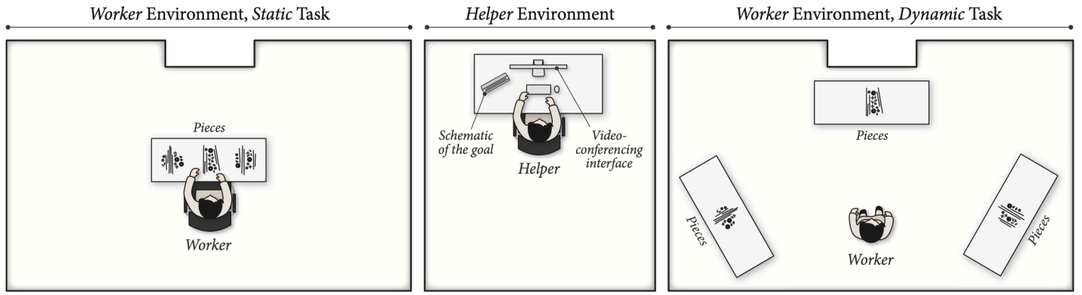
[^9]: Johnson et al., 2015, Handheld or handsfree? Remote collaboration via lightweight head-mounted displays and handheld devices

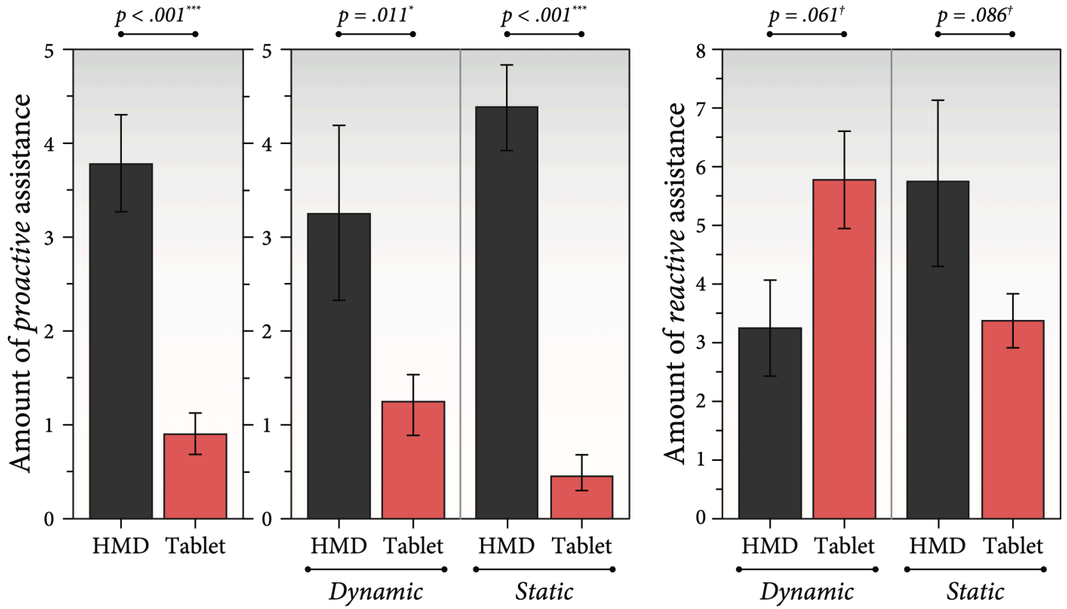
[^10]: Rae et al., 2013, The influence of height in robot-mediated communication

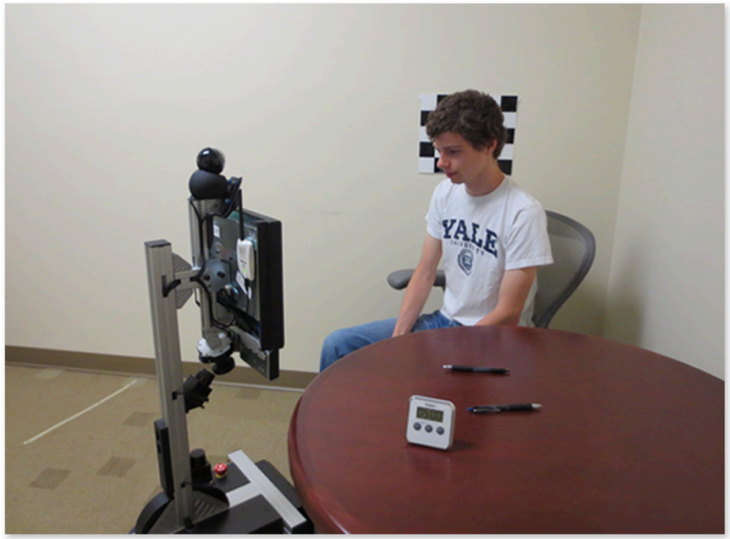
[^11]: Johnson et al., 2015, Can you see me now? how field of view affects collaboration in robotic telepresence.

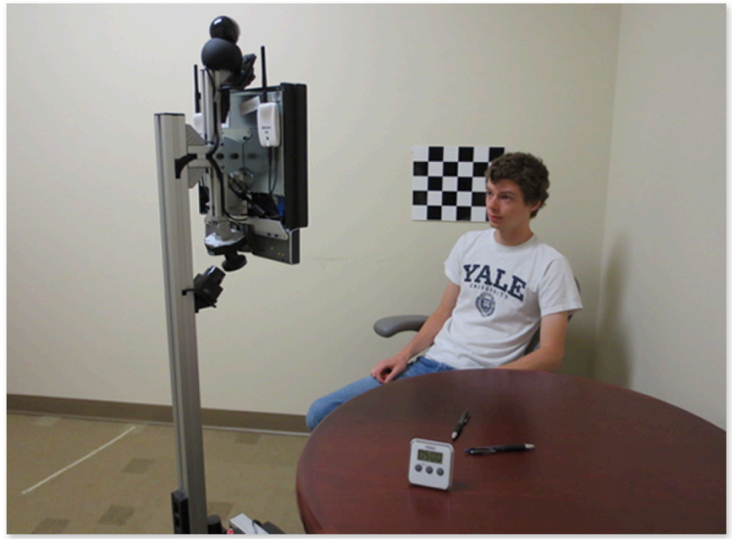
[^12]: Pejsa et al. ,2016. Room2room: Enabling


Static Task Setting
Dynamic Task Setting
HMD
Tablet


Worker Environment, *Static* Task
Helper Environment
Worker Environment, *Dynamic* Task
Pieces
Worker
Schematic of the goal
Helper
Video-conferencing interface
Pieces
Pieces
Worker
Pieces


$p < .001^{***}$
$p = .011^{*}$
$p < .001^{***}$
$p = .061^{\dagger}$
$p = .086^{\dagger}$
Amount of *proactive* assistance
Amount of *reactive* assistance
HMD Tablet
Dynamic
Static


YALE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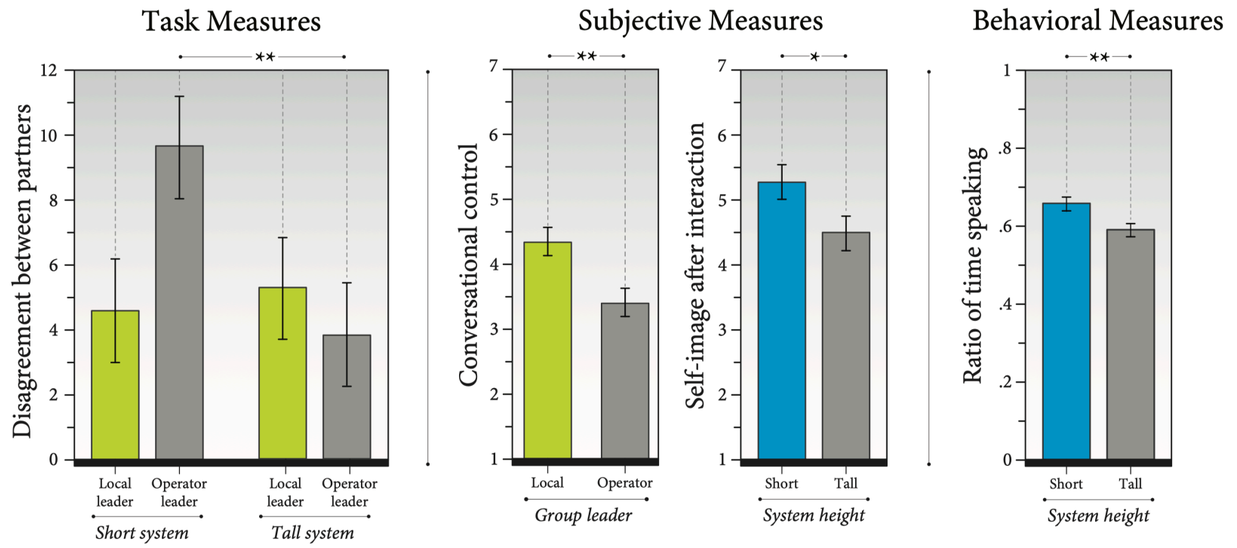
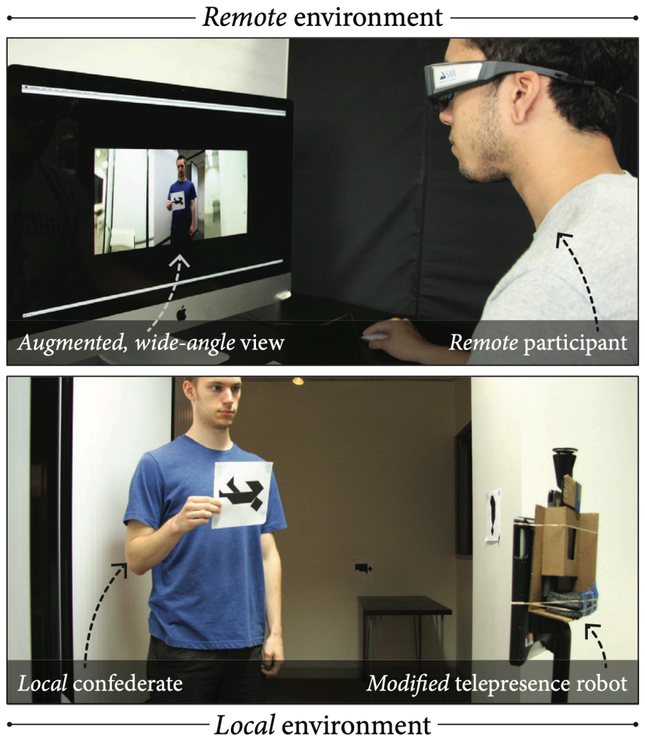
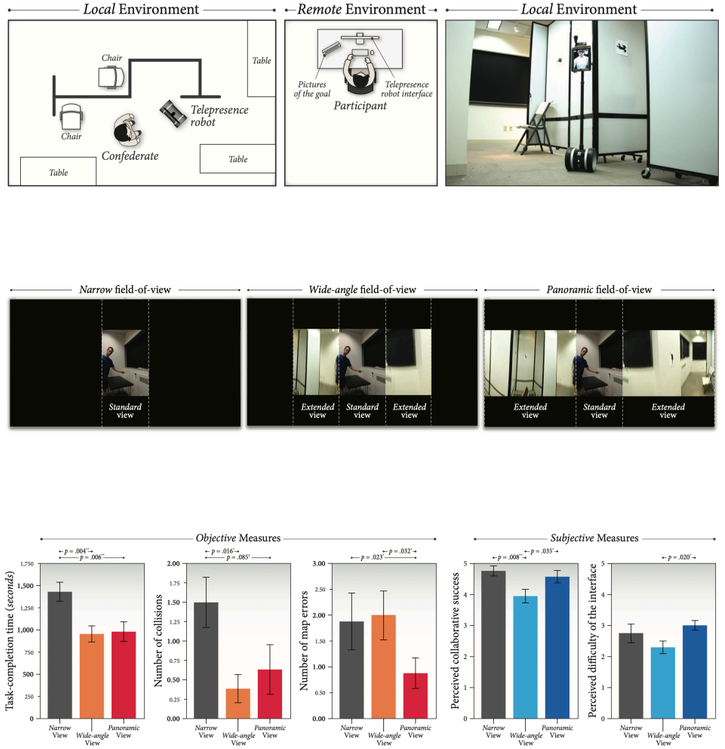

Task Measures
Subjective Measures
Behavioral Measures
Disagreement between partners
Conversational control
Self-image after interaction
Ratio of time speaking
**
**
*
**
Local leader
Operator leader
Short
Tall
Short system
Tall system
Group leader
System height





Prior result	Comparison	Explanation
Keyhole effect	*Supported*	Increased collisions, slower completion times in narrow view
Cognitive tunneling	*Supported*	Errors in distance/depth judgments increased collisions in narrow view
Wide views increasing cognitive workload	*Supported*	Perceived interface difficulty increased in panoramic condition
Wide views distort velocity perception, reducing driving speed	*Unsupported, Contrasting*	Wide-angle and panoramic views support faster task completion than narrow views
Wider views associated with motion sickness	*Unsupported*	No participants commented on feeling motion sickness
Impoverished video inhibits mental map formation	*Unsupported, Contrasting*	Low-quality periphery improved mental map formation over wide-angle and narrow views

Discussion Format

- Group discussion ~15 minutes
  - Separate to 9 groups randomly
  - Discuss with your group members
  - Take notes in the shared doc – pick your group number
- Summary from each group & discussion ~15 minutes

Discussion Questions

- What other forms of CMC have you used that are not discussed in the readings?
- In your use of CMC technologies, what are examples of these theories holding or not holding?
- What external resources have you found that supported/challenged these theories?
- How do you think we could use these theories?
- ...