CS 160: Lecture 18

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Outline

- Some basic concepts from social psychology
- CSCW: Computer-supported Cooperative Work
- Case study: video-conferencing

Social Psychology

- Why study it?
- It helps us understand human collaboration, which is one of the most difficult areas of HCI, but also the most important.
- Most "knowledge work" is collaborative at some level. Organizations can be more or less than the sum of their parts.

Mere presence effects

- Simply being near others can lead to changed performance, e.g. Triplett's fishing observations.

- How would fishermen in a group perform differently from individuals?

Mere presence effects

- A: They catch more fish ***per fisherman***!
- But specifically, which aspects of performance change?

Mere presence

- Stress, anxiety or stimulation increase physiological arousal, and arousal ***speeds up behavior***.
- The presence of others pushes these buttons…
- But increased speed can also increase errors, so it can be ***bad on difficult tasks***.

Mere presence

- Increased arousal generally helps learning
- But, it also heightens response to well-learned stimulae (Zajonic and Sales):

Its an"alpha helix"

Mere presence

- Mere ***presence*** isn't quite the right idea.
- The presence of a blindfolded subject didn't increase arousal, and didn't affect performance.
- The presence of others ***evaluating*** or ***competing*** with us is what matters.

Mere presence – Design Implications

- Increasing the level of group "awareness" should increase mere presence effects:
  - * Heightened arousal
  - * Faster performance
  - * Increased learning
  - * More errors
- Examples:
  - * High awareness – video conferencing, phone
  - * Medium – Instant messaging
  - * Low awareness – Email

Mere presence – Design Implications

- What would be a good medium for:
  - * Routine discussions?
  - * Brainstorming?
  - * Working on difficult tasks, e.g. programming?

Attribution

- How do we attach meaning to other's behavior, or our own?
- This is called attribution.
- E.g. is someone angry because something bad happened, or because they are hot-tempered?

Attribution: ourselves

- Lets start with ourselves, how good are we at figuring out our emotions?
- Schacter: it depends strongly environmental and physiological factors, and others near us.
- The bottom line is that we can feel strong emotion, but struggle to recognize it as happiness or anger.

Schacter's experiments

- Subjects interacted with a confederate, confederate expressed strong emotions (happy, angry, sad).
- Subjects normally mirror such emotion slightly (empathy).
- Injecting a stimulant (epinephrine) causes a physiological state similar to strong emotion. Subjects who received it strongly mimic-ed the confederate.
- Most interestingly, subject's attributed their emotions to all kinds of other factors (than the confederate's state).
- However, knowledge of the effects of the drug reduced subject's response.

Attribution theory

- Attribution theory: was this behavior caused by personality, or environment?
- Fundamental attribution error:
  - * When I explain my own behavior, I rely on external explanations.
  - * When I explain others' behavior, I'm more likely to attribute it to personality and disposition.
  - * e.g. other drivers are either "lunatics" (faster than me) or "losers" (slower than me). Of course, they have the same model about you ☺…

Attribution theory

- How should you design communication systems to minimize attribution errors?

Attribution theory – design implications

- To reduce attribution errors, its important to have as much context as possible.
- E.g. room-scale video-conferencing, or ambient displays:

Non-verbal communication

- In real life, we use a lot more than speech (or sign language) to communicate.
- Non-verbal communication includes:
  - * Gaze, eye contact
  - * Facial expression
  - * Gesture
  - * Posture
  - * Touch
  - * Location (proxemics)
  - * Time
  - * Prosody (speech)

Non-verbal communication

Which of these cues are preserved by:

- Email?
- Instant messaging?
- Telephony?
- Video-conferencing?

Non-verbal communication

Q: What is the role of these cues in normal communication?

A: It depends totally on the role of the communication, e.g.

- Routine (giving information, coordinating)
- Persuading and being persuaded
- Trust, deception and negotiation
- …

Routine communication

- Most of what happens in most organizations.
- Doesn't seem to benefit much from non-verbal cues, and in fact there is evidence that people prefer less-rich media such as email and telephone:
  - Sproull and Kiesler: computer science students did better with email than face-to-face meetings.
  - Connell et al.: Business employees preferred the phone over face-to-face and email for routine communication.

Persuasion

- Seems to be strongly influenced by gaze and facial cues (Werkoven et al.).

Note: Most non-verbal cues are not consciously processed. We transmit and receive without being aware of what we are doing. Most non-verbal cues are strongly influenced by our personality and emotional state.

Facial expression is different however. We consciously manage it, and it shows very little correlation with emotional state.

Trust and deception

- Most people emit easy-to-read non-verbal cues when they try to deceive. These are the basis of "lie detector" tests.
- They include:
  - Prosodic speech variation
  - Skin conduction (due to sweating)
  - Breathing and heart rate changes
  - Particular body gesture cues

Trust and deception

- Facial expression on the other hand, since it is consciously managed, is a poor cue to deception.
- Most deception cues therefore, are "below the neck".

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Trust and deception

- A former president:

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Trust and deception

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Break

CSCW: Computer-Supported Cooperative Work

- Its about tools that allow people to work together.
- Most of the tools support remote work
  * video, email, IM, Workflow
- Some tools, e.g. Livenotes, augment local communication.
- Can be synchronous (live) or asynchronous

Asynchronous Groupware

- Email: still a killer app
- Newsgroups: topical messaging
- Cooperative hypertext/hypermedia authoring: e.g. Wikis, Blogs
- Structured messaging: e.g. Workflow – messages route automatically.
- Knowledge repositories: Answergarden, MadSciNet, Autonomy…

Automation

Blogs and Wikis

- Hybrids between mail/news and web sites.
- Posting capabilities make the site dynamic.
- Web presence makes it accessible+searchable
- Usually create a hierarchy among the user group (posting, commenting, reading).
- See e.g. swiki from Georgia Tech http://minnow.cc.gatech.edu/swiki

Content-Management Systems

- CMSes (like Plone) go a step further.
- They include fancier publishing options (templates) and site navigation widgets.
- They also include more groupware features, scheduling, news, comments, etc.

Language/Action Analysis

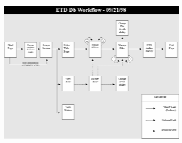
- Early studies of CSCW noticed that human dialogue at work was "transactional":
- It comprised a few categories of "speech acts", like ask, propose, accept, acknowledge..
- i.e. user action and form of dialogue were closely coupled.

Language/Action Analysis

- Systems were built to support specific acts and to follow and help the work.
- BUT: they were ***too*** restrictive.
- E.g. the ***Coordinator*** forced users to identify the speech act they were using to the system.
- Finally a compromise was found: Workflow.

Workflow

- Documents carry meta-data that describes their flow through the organization:
  - * Document X should be completed by Jill by 4/15
  - * Doc X should then be reviewed by Amit by 4/22
  - * Doc X should then be approved by Ziwei by 4/29
  - * Doc X should finally be received by Don by 5/4
- The document "knows" its route. With the aid of the system, it will send reminders to its users, and then forward automatically at the time limit.



Workflow

- There are many Workflow systems available. Lotus notes was one of the earliest.
- Workflow support now exists in most enterprise software systems, like Peoplesoft, Oracle, SAP etc.

Knowledge repositories

- AnswerGarden (Ackerman): database of commonly-asked questions that grows automatically.
- User poses question as a text query:
  - * System responds with matches from the database.
  - * If user isn't satisfied, system attempts to route query to an expert on the topic.
  - * Expert receives query, answers it, adds answer to the database.

Trends

- There is a trend toward "do everything" systems like Autonomy:
- Autonomy includes:
  - * Automatic expertise profiling
  - * Social networks (communities of practice)
  - * Document clustering and categorizing
  - * Search and browse
  - * Automatic cross-referencing & hyperlinking
- i.e. no boundary between "content management" and "people management"

Video Conferencing

- The ultimate collaboration technology of tomorrow, …since the 1940's.
- There is still steady growth in video systems, and its available on some phones now.

- But growth in corporate settings has been much slower than expected.
- Many experiments have shown that video meetings are a poor substitute for face-to-face.

Persuasion (Werkhoven et al., 2001)

- 2 participants and 1 confederate performed a collaborative task
- The confederate tries to influence the other's choices
- Persuasive power measured as the change in those choices in response to group discussion

Key result:
Gaze-preserving V.C. was as good as F2F
But the non-gaze-preserving video system was much worse

Trust Formation (Bos et al., 2002)

- 3-person groups
- 4 conditions – text, audio, video, face-to-face
- Played 30 rounds of a game called Daytrader
- Trust development was delayed in audio/video
- Defections were more likely with video/audio than FTF communication.
- Little difference between video and audio

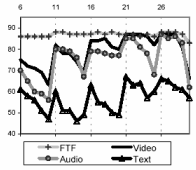


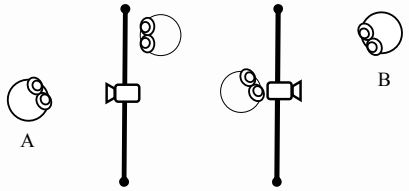
Figure 3. Comparison of round-by-round group investment in four communication conditions

Trust Formation (Bos et al., 2002)

- Summary: the Bos system (which looks like the Werkoven one) was very poor for trust-based collaboration.
- Reasons?:
- Gaze: the experimenters tried to faithfully reproduce gaze, but its not clear whether their design actually did.
- Below-the-neck cues. People usually present only face or face/shoulder images. This hides deception cues.

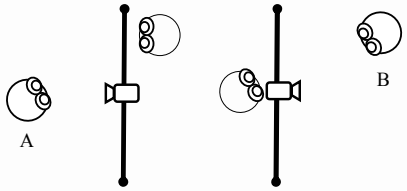
Gaze distortion

- Its physically impossible with standard video displays to preserve gaze for a ***group*** of people on either side of a video connection. Unfortunately, that is the most common case in commercial settings.

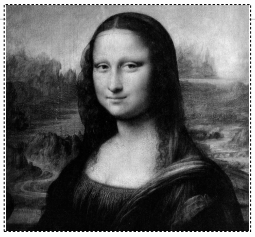


Gaze distortion

- Only A believes that the other person is looking at them!
- This is because of the Mona-Lisa effect.



Mona Lisa Effect



Other Group Breakdowns

- Misunderstandings, talking over each other, losing the thread of the meeting.
- People are good at recognizing these and recovering from them "repair".
- Mediated communication often makes it harder.
- E.g. email often escalates simple misunderstandings into flaming sessions.

Solutions

- Sharing experiences is very important for mutual understanding in team work (attribution theory).
- So context-based displays (portholes) work well.
- Video shows rooms and hallways, not just people or seats.

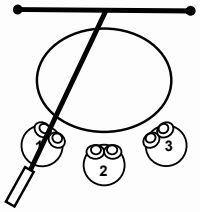
Solutions

- Props (mobile presences) address many of these issues. They even support exploration.

Solutions

- Ishii's Clearboard: sketching + presence

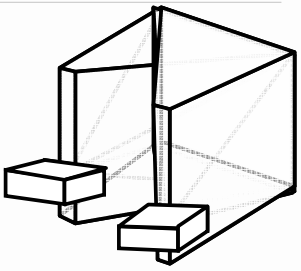
MultiView Display (UCB)

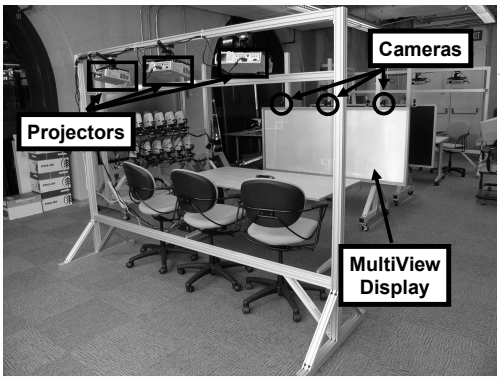


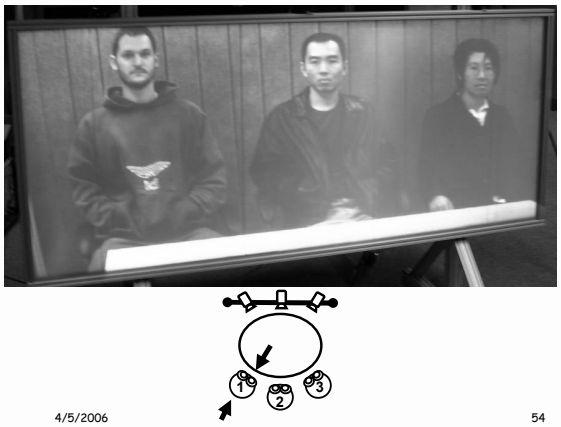
Light is retroreflected toward the source in the horizontal direction.
Each user has their own projector, sees their own image.

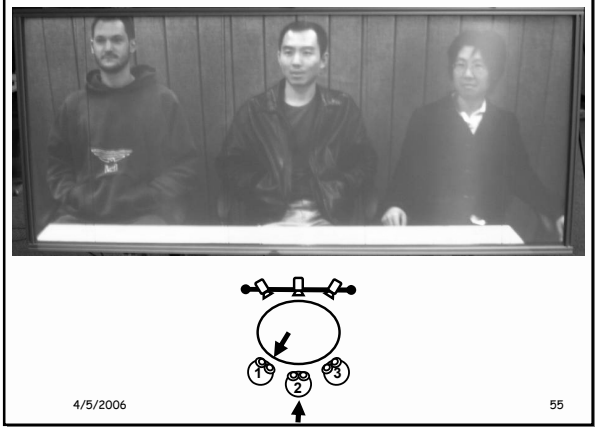
MultiView Directional Display

- Each view is provided by a projector
- The projected image is reflected directly back in the direction of the projector
- The image can be seen at varying heights *only* behind the projector
- Each user gets video from a unique camera at the other end.









MultiView Display

- The Multiview design fully preserves gaze cues between all pairs of participants, on both sides of the connection.
- It also reproduces everything that's visible above the table at the other end (same deception cues as a face-to-face meeting).
- Goal is to see if we can reproduce persuasion **and** trust cues.

Summary

- Social psychology principles for design of CSCW systems: presence, attribution, deception, non-verbal communication
- Asynchronous groupware: email → knowledge managers
- Design guidelines for collaboration systems
- Issues with video-conferencing and solutions
- There is no "best collaboration technology". The most appropriate technology depends on the task, e.g.:
  - * Routine coordination and communication
  - * Persuasion
  - * Trust and deception