Collaboration

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CS 376

CSCW: Computer-supported cooperative work

- The traditional definition...
  - Computer-supported: technology is mediating the conversation
  - Cooperative: typically teams or groups of coordinating people
  - Work: tasks, as opposed to play or socializing

Time

Synchronous   **Asynchronous**

Colocated

Space

Remote

3

Goals and theory

Distance matters

[Olson and Olson, HCI Journal '00]

"If, as it is said to be not unlikely in the near future, the principle of sight is applied to the telephone as well as that of sound, earth will be in truth a paradise, and distance will lose its enchantment by being abolished altogether."
– Arthur Mee, 1898

But...colocated software engineering teams outperform the company average by 2:1.

Distance matters

[Olson and Olson, HCI Journal '00]

- So what happened?
  - Remote collaboration is still not nearly as performant as in-person collaboration
- Sources of failure
  - **Common ground**: knowledge that people have in common and know they have in common
  - **Coupling**: how complex the work interdependencies are
- Challenges looking forward: time zone and cultural separation

Why do CSCW applications fail?

[Grudin, CSCW '94]

- Disparity between who does the work and who gets the benefit
  - Project wikis — manager benefits, employees contribute
- Failure to reach critical mass
  - Tragedy of the commons: it's rarely in a single user's best interest to use a new CSCW system

Social translucence

- Give people enough information to let natural social cues take over
- Socially translucent systems embody this approach
  - **Awareness:** others' activity can be seen
  - **Accountability:** others know that their activity can be seen
- Why not **socially transparent** systems?
  - "Michael Bernstein looked at your Facebook profile for four hours yesterday!"

The intellectual challenge of CSCW [Ackerman, HCI Journal 2000]

- CSCW has made clear what the social requirements should be; why aren't we done?
- The core problem is a **socio-technical gap**
  - The distance between what we know we must support socially...
  - And what we can support technically

Beyond being there

[Hollan and Stornetta, CHI '92]

- Computer-mediated communication aims to be indistinguishable from being there
  - e.g., "Could Skype be like sitting in your room?"
- Argument: being there is impossible (or at least unlikely). Instead, we should design **beyond being there**
  - e.g., "How could Skype bring you closer to someone in ways that an in-person conversation never could?"

Distributed cognition

[Hutchins, '95]

- Theory: social and physical environments, not just people, can exhibit intelligence
- Source: ethnography on the navigation bridge of Navy ships
  - Intelligent navigation is emergent — from people who coordinate via structured codes, and from their tools
  - Intelligent navigation does not reside within any single individual

Coordination and awareness

The coordinator

[Winograd, HCI Journal '88]

- Thesis: language is the primary dimension of cooperative activity
- **Speech act theory** suggests that language can be modeled as a set of actions: commit the speaker to a truth, direct the listener...

```
                         C O N V E R S E

  OPEN CONVERSATION FOR ACTION              REVIEW / HANDLE
      Request                                   Read new mail
      Offer                                     Missing my response
                                                Missing other's response

  OPEN CONVERSATION FOR POSSIBILITIES
      Declare an opening                        My promises/offers
                                                My requests
  ANSWER                                        Commitments due: 24-Sep-84

  NOTES                                         Conversation records
```

Awareness in shared workspaces [Dourish and Bellotti, CSCW '92]

- **Awareness** is understanding the activities of others
  - Explicit awareness: code checkins, email broadcasts
  - Permissions awareness: roles
- This paper introduced **shared feedback**: automatically collect and broadcast implicit events to all participants (e.g., IM status, GDocs)

Portholes

[Dourish and Bly, CHI '92]

- ...yes, group video chat was invented in 1992.
- Their vision: always-on video for awareness purposes
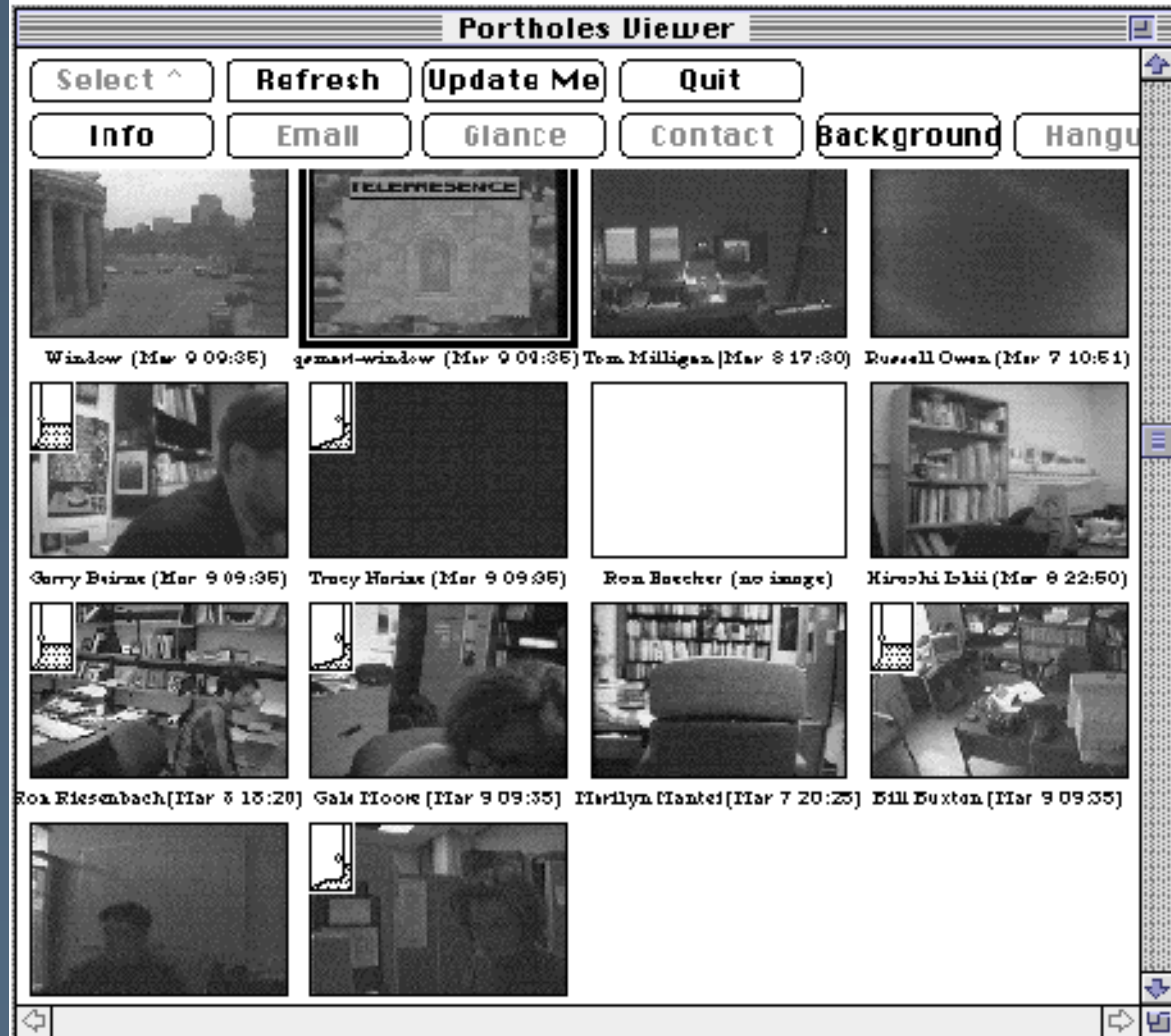
GroupKit

[Roseman and Greenberg, TOCHI '96]

- A fun mix of topics in this course
  - Design and creation: programming toolkits
  - Social computing: CSCW
- Groupware programming abstractions
  - RPC broadcast between application instances
  - Data sharing
- Groupware UI widgets
  - Logged-in participants
  - Remote mouse pointers
  - Multiuser scrollbar

Visualizing work rhythms

[Begole et al., CSCW '02]
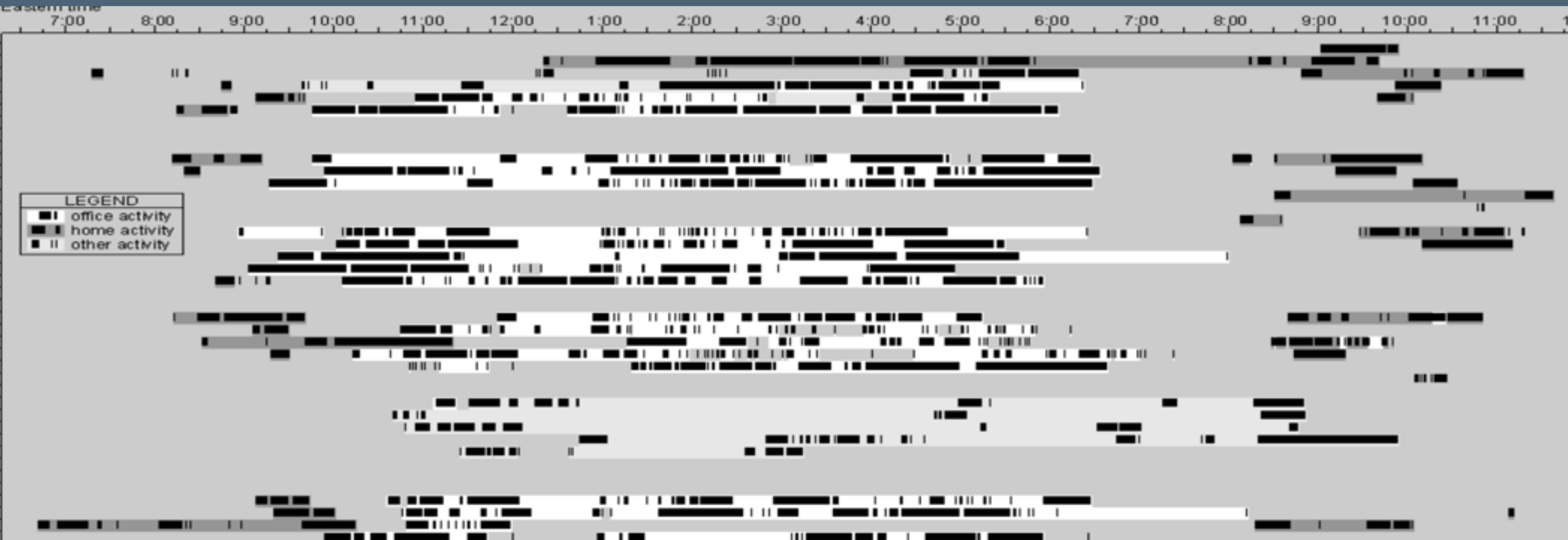
Colors represent places (e.g., at home 8-9am)

Multi-user input techniques

Clearboard

[Ishii and Kobayashi, CHI '92]

- Collocated eye gaze and canvas

Pick-and-drop

- The original Bump idea
- Share files between...
  - My phone and yours
  - My phone and the projector

Conflict resolution in tabletops

[Morris et al., CSCW '04]

- What happens when we both reach for the same object on our tablet or surface?
- Where do we perform UI locking?
  - At the element level?
  - At the global level?
- How do we resolve conflicts?
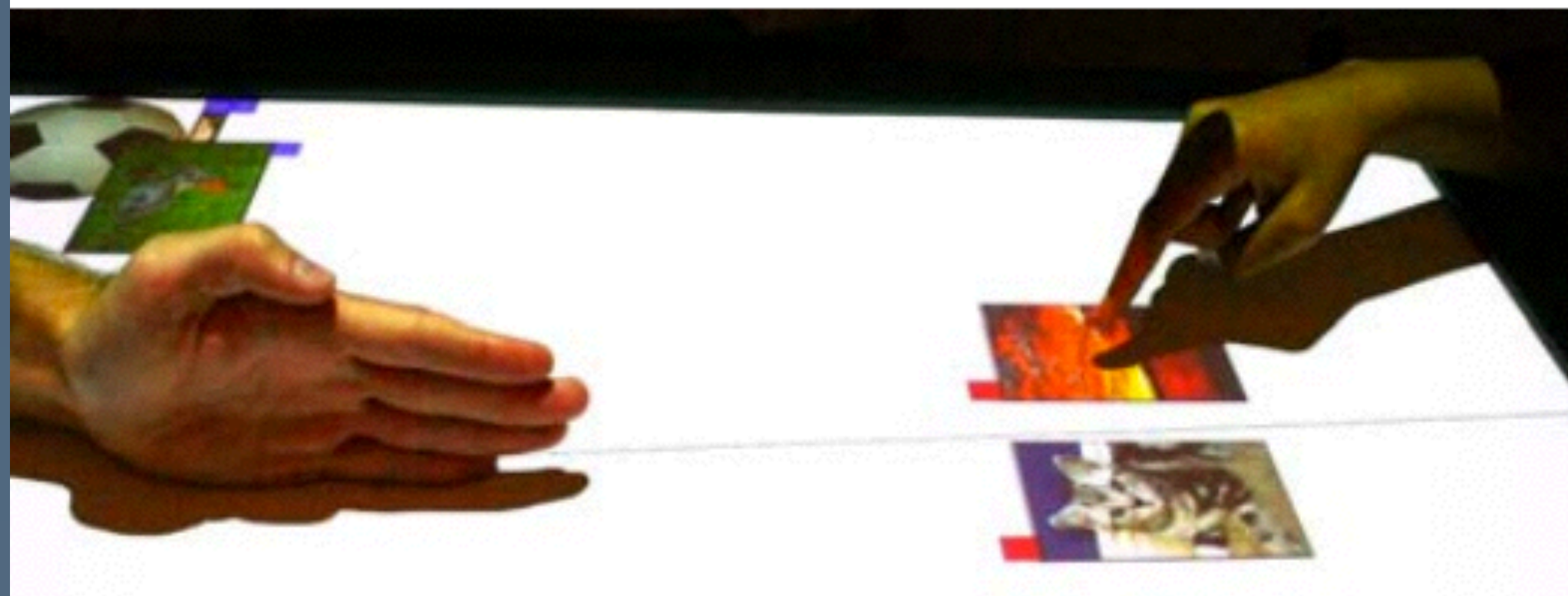 - First finger down?
  - Majority rules?

Cooperative gestures
[Morris et al., CHI '06]

- Multi-user gestures can help disambiguate individual users' intent
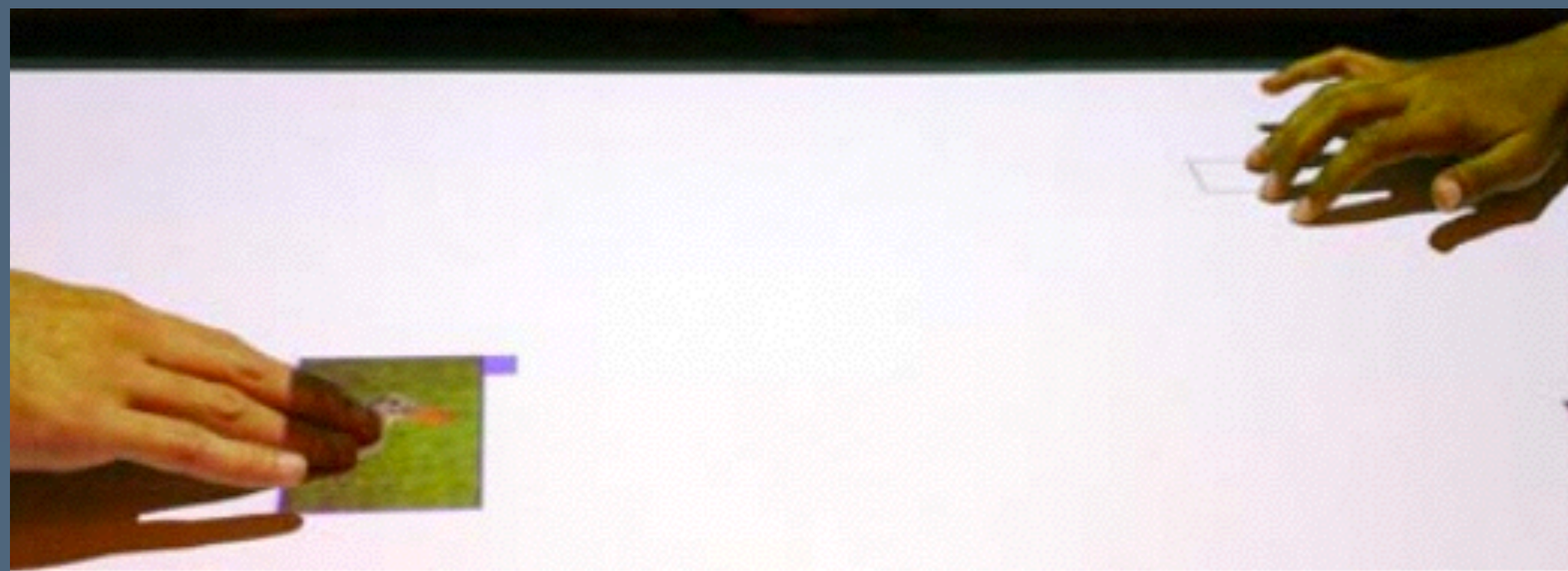
Throw and receive
Makes targeting easier

Pull
Partner disambiguates the target

Time

Synchronous　　　　**Asynchronous**

Colocated

Space

Remote