Interaction Design
DECO 1200
Outline

Introduction
Communication and collaboration between people.

Communication
What are the rules of communication?

Collaboration
How can design support collaboration?

Conceptual Frameworks
Frameworks for thinking about communication.
Social Mechanisms

What social mechanisms do people use when communicating and collaborating?
   Social mechanisms include rules, procedures and etiquette that people use to communicate.

Conversational Mechanisms
   Help conversions flow and overcome breakdowns.

Coordination Mechanisms
   Allow people to work and interact together.

Awareness Mechanisms
   Help find out what is happening, what others are doing or let others know what is happening.
Sacks, Schegloff & Jefferson (1978) suggest the following rules to describe how people coordinate conversations.

Rule 1: The current speaker chooses the next speaker by asking an opinion, question, or request.

Rule 2: If the invited person does not start speaking then another person may decide to start speaking.

Rule 3: If no other person decides to start speaking then the current speaker continues talking.
Conversational Mechanisms

Non-linguistic mechanisms for controlling coordination of conversations

- Back channelling: uh-huh, mmm, ...
- Body orientation: moving towards, moving away, ...
- Gaze: looking straight at someone, glancing away, ...
- Gesture: raising arms, chin scratching, ...
Conversational Mechanisms

Conversations are made up of adjacency pairs: the first part sets up the second
A: So shall we meet at 8:00?
B: Um, can we make it a bit later, say 8:30?

Sometimes adjacency pairs can become embedded inside each other
A: So shall we meet at 8:00?
B: Wow, look at him.
A: Yes, what a funny hairdo!
B: Um, can we make it a bit later, say 8:30?
Conversational Mechanisms

People aren’t aware that they are following these rules and sometimes they break them

- People may interrupt each other
- People talk over each other
- People may not start speaking when invited
Conversation Mechanisms

Why do conversations break down?
Ambiguity on the part of the speaker
Misunderstanding on the part of the listener

Conversation Repair Mechanisms
Speakers provide opportunities for listeners to provide additional information to repair the conversation
Listeners provide immediate feedback either through utterances (Huh?) or gestures (frown)
Restating the previous utterance as it was understood e.g. “So you mean...”
Kinds of Conversations

Conversations can take many forms
e.g. arguments, discussions, debates, chats, etc.

Formal vs Informal Conversations
Formal communication involves assigning certain roles to take in the conversation, e.g. at a committee meeting, it is decided who is allowed to speak, who speaks when, who controls the turn-taking, and what the participants are allowed to talk about.
Supporting Conversation

Technologies supporting communication
  e.g. communication between physically distant locations; telephone, fax, email, videoconferencing, videophones, telegraph, chatrooms, text messaging

Collaborative Virtual Environments (CVEs)
  Virtual worlds where people meet and chat, e.g. 3D worlds, online games, multi-user domains (MUDs, MOOs), virtual whiteboards
Computer Mediated Communication

Computer Mediated Communication (CMC)
CMC covers many technologies designed to facilitate communication in a variety of ways.

Synchronous vs Asynchronous
CMC systems can be classified depending on whether they support synchronous (phones, videoconferencing) or asynchronous (email, messaging) communication.

Augmented Communication
CMC systems can often be combined with other technologies to support richer communication.
Synchronous Communication

Synchronous Communication Technologies

Examples: phones, video phones, video conferencing, media spaces, instant messaging, chatrooms, CVEs

New Functionality: choosing/managing a virtual identity; managing multiple conversations at once

Benefits: shy people can prefer virtual public spaces; instant messaging can be quicker than email/phone

Problems: bandwidth required can be considerable (bandwidth); lack of personal contact (no eye contact); anonymity of users can cause behavioural problems
Asynchronous Communication

Asynchronous Communication Technologies

Examples: email, bulletin boards, newsgroups

New Functionality: rich media types in communications; messages can be archived and searched

Benefits: ubiquity (any place any time); flexibility (control of when, what and how to communicate); powerful (send one-to-one, one-to-many)

Problems: flaming (behaving inappropriately); overload (too many message/day to read); expectations (ubiquity leads to an expectation of quick responses)
Augmented Communication

Augmented Communication Technologies

Examples: electronic meeting rooms, networked classrooms, shared authoring tools (whiteboards)

New Functionality: collaboratively creating documents; new forms of collaborative learning

Benefits: multi-tasking; efficiency (many hands make light work); awareness of progress

Problems: difficulty working out what other people can see; conflicts over shared resources (too many chefs?)
Coordination Mechanisms

Coordination mechanisms include:

Verbal and non-verbal communication
“Down a bit, left a bit, now straight forward ... ”

Agendas, memos and minutes in meetings

Hand signals / gestures (e.g. airport ground crew)

Schedules, rules and conventions
Schedules (e.g. lecture timetables)
Rules (e.g. compulsory attendance)
Conventions (e.g. quiet in library)

Shared external representations
  e.g. shared calendars, rosters, checklists
Supporting Coordination

Technologies support coordination
  e.g. shared calendars, electronic schedulers, project management tools, and workflow tools

Problems with conventions
  People often fail to follow conventions that aren’t rigourously enforced
  People find conventions that are rigourously enforced to be frustrating
Awareness Mechanisms

Awareness mechanisms include:

Direct Observation
What is Rob saying about the class? How does this affect me?

Peripheral Monitoring
What sort of mood is Rob in today? Would this be a good time to ask or an extension?

Gossip
Second-hand information that spreads quickly through a company.

Physical Organisation
Is a lecturer available for a meeting? Is there door open, partially open, or closed?
Overhearing & Overseeing

Teams that work closely together often develop a good “spider sense” of what is happening around them.

- Overhearing a colleague’s conversation can alert a team member to a problem before it affects them directly.
- Possibly without them having to pay explicit attention to the content of the conversation.

The Cocktail Party Effect

- You’re at a party, it’s noisy, and you’re having a conversation with someone. On the other side of the room, someone else mentions your name in passing. You will immediately pick up on the fact that your name has been mentioned and “tune in” to the distant conversation.
Supporting Awareness

Technologies supporting awareness
e.g. surveillance cameras, webcams, scrolling displays, newsfeeds, ambient displays

Passive Monitoring
Provide a display that presents the current state of a number of different locations / people / processes

Streaming Messages
Provide a constant stream of information that may be of interest but is peripheral to the context

Status Notification
Provide people with a way to let others know what their status is, e.g. instant messaging status display
Babble

Visualises a person’s engagement with an conversation and allows them to notifies others of their current interest
Ethnographic studies is the observation of a place (home, work, school, public space) and the practices that people engage in the place.

Ethnographic studies can reveal how people behave (rather than how they say they behave).

Ethnographic studies have been used to observe how people engage with technology.

Ethnographic studies can help designers by exposing problematic assumptions.

Finding out what people do rather than what they say they do can really help produce better designs.
Conceptual Frameworks

The Language/Action Framework
A model of the way people communicate used to inform the design of collaborative technologies

Distributed Cognition
A theory used to analyse how people carry out their work using a variety of technologies
The Language/Action Framework

Based on the premise that people act through language
   Originally developed to inform the design of systems to help people work more effectively

Based on theories of how people use language in their everyday activities
   In particular the speech act theory of language

Language/Action developed into the Conversation for Action (CfA) framework
   Describing sequences of actions that follow from a speaker making a request of someone else
The Speech Act Theory

Speech act theory is concerned with the function of utterances in a conversation:

- **Assertives**: commit the speaker to something being so
- **Commissives**: commit the speaker to some future action
- **Declarations**: pronounce that something has happened
- **Directives**: get the listener to do something
- **Expressives**: express a state of affairs, e.g. apologizing
Conversations for Action

Conversations are depicted as a kind of “dance” involving a sequence of steps that are seen as following various speech acts.
Conversations for Action

CfA was used to develop software that allowed people to be explicit in the types of speech acts used to coordinate their work.

Coordinator allowed people to use seven different types of speech acts to communicate:

- Request: sender wants a receiver to do something
- Offer: sender offers to do something
- Promise: sender promises to do something
- What if: sender opens up exploration of possibilities
- Inform: sender provides information
- Question: sender requests information
- Note: sender exchanges a simple message
Coordinator was a controversial system

Many people were upset by the system requiring them to be explicit about their speech acts.

Coordinator was a mixed success

Many organisations that tried to use Coordinator gave up or just ended up using the notes to pass all messages. Some organisations (large, highly structured ones) used it successfully to replace existing ad-hoc systems.
Traditional vs Distributed Cognition

Traditional models of cognition focus on what goes on inside a person’s head
  Dissatisfaction with this approach: it ignores how people interact with each other and how they use artefacts and external representations

Distributed cognition describes what happens in a *cognitive system*
  A cognitive system consists of people interacting with each other and their environment
Traditional vs Distributed Cognition
Distributed Cognition

Distributed cognition models describe how information propagates through interactions. Information may be represented in many different media and a distributed cognition model describes how the information is represented and re-represented across the system (e.g. maps, instrument readings, scribbles, spoken word).

Transformations of information are referred to as changes in the representational state.
Distributed Cognition

Distributed cognition analysis examines:

- **Distributed problem solving**: how people work together to solve a problem
- **Verbal and non-verbal behaviour**: what is said, what is implied by glances, winks, etc. and what it not said
- **Coordinating mechanisms**: rules, procedures, conventions and explicit coordinating actions
- **Communication pathways**: the paths that information takes between people
- **Knowledge sharing**: how knowledge is stored, shared and accessed
- **Breakdowns**: problems in communication and how they are resolved
Other Conceptual Frameworks

Other conceptual frameworks used to analyse how people communicate and collaborate

Activity Theory: “you are what you do”
Ethnomethodology: the mechanisms of social order
Situated Action: common sense actions in context
Common Ground Theory: shared understandings
Summary

**Conversational Mechanisms**
Designing technologies to support conversation

**Coordination Mechanisms**
Designing technologies to support coordination

**Awareness Mechanisms**
Designing technologies to support awareness

**Conceptual Frameworks**
The language/action framework, distributed cognition