chapter 14
communication and collaboration models

CSCW Issues and Theory

All computer systems have group impact
– not just groupware

Ignoring this leads to the failure of systems

Look at several levels – minutiae to large scale context:
– face-to-face communication
– conversation
– text based communication
– group working

Face-to-face communication

• Most primitive and most subtle form of communication

• Often seen as the paradigm for computer mediated communication?

Transfer effects

• carry expectations into electronic media ...
  ... sometimes with disastrous results

• may interpret failure as rudeness of colleague
e.g. personal space
  – video may destroy mutual impression of distance
  – happily the ‘glass wall’ effect helps

Eye contact

• to convey interest and establish social presence

• video may spoil direct eye contact
  (see video tunnel, chap 19)

• but poor quality video better than audio only

Gestures and body language

• much of our communication is through our bodies

• gesture (and eye gaze) used for deictic reference

• head and shoulders video loses this

So ...
... close focus for eye contact ...
... or wide focus for body language?
Back channels

- Alison: Do you fancy that film ... err ... 'The Green' um ... it starts at eight.
- Brian: Great!

- Not just the words!
- Back channel responses from Brian at 1 and 2
  - quizzical at 1
  - affirmative at 2

Back channels (ctd)

- Back channels include:
  - nods and grimaces
  - shrugs of the shoulders
  - grunts and raised eyebrows

- Utterance begins vague ...
  ... then sharpens up just enough

Back channels - media effects

Restricting media restricts back channels
- video: loss of body language
- audio: loss of facial expression
- half duplex: lose most voice back-channel responses
- text based: nothing left!

Back channels and turn-taking

in a meeting ...
- speaker offers the floor (fraction of a second gap)
- listener requests the floor (facial expression, small noise)

Grunts, 'um's and 'ah's, can be used by the:
- listener to claim the floor
- speaker to hold the floor
... but often too quiet for half-duplex channels

- e.g. Trans-continental conferences – special problem
  - lag can exceed the turn taking gap
  - leads to a monologue!

Basic conversational structure

- Alison: Do you fancy that film
- Brian: the uh (500 ms) with the black cat
- 'The Green whatsthat'
- Alison: yeah, go at uh ... (looks at watch - 1.2 s) ... 20 to?
- Brian: sure

Smallest unit is the utterance

Turn taking => utterances usually alternate ...

Adjacency pairs

Simplest structure – adjacency pair

Adjacency pairs may nest:
- Brian: Do you want some gateau?
- Alison: is it very fattening?
- Brian: yes, very
- Alison: and lots of chocolate?
- Brian: masses
- Alison: I'll have a big slice then.

Structure is: B-x, A-y, B-y, A-z, B-z, A-x
- inner pairs often for clarification
... but, try analysing the first transcript in detail!
Context in conversation

Utterances are highly ambiguous. We use context to disambiguate:
- **Brian:** (points) that post is leaning a bit.
- **Alison:** that’s the one you put in.

Two types of context:
- **External context** – reference to the environment
e.g., Brian’s ‘that’ – the thing pointed to.
- **Internal context** – reference to previous conversation
e.g., Alison’s ‘that’ – the last thing spoken of.

Refering to things - deixis

Often contextual utterances involve indexicals:
- that, this, he, she, it,
- these may be used for internal or external context.
- Also descriptive phrases may be used:
  - external: ‘the corner post is leaning a bit’
  - internal: ‘the post you mentioned’

In face-to-face conversation can point.

Common Ground

Resolving context depends on meaning and participants must share meaning.
so must have shared knowledge.
Conversation constantly negotiates meaning.
- a process called **grounding**.

- **Alison:** So, you turn right beside the river.
- **Brian:** past the pub.
- **Alison:** yeah ...

Each utterance is assumed to be:
- **relevant** – furthers the current topic.
- **helpful** – comprehensible to listener.

Focus and topic

Context resolved relative to current dialogue focus
- **Alison:** Oh, look at your roses :-
- **Brian:** mmm, but I’ve had trouble with greenfly.
- **Alison:** they’re the symbol of the English summer.
- **Brian:** greenfly?
- **Alison:** no roses silly!

Tracing topics is one way to analyse conversation.
- Alison begins – topic is roses.
- Brian shifts topic to greenfly.
- Alison misses shift in focus – breakdown.

Breakdown

Breakdown happens at all levels:
- topic, indexicals, gesture.

Breakdowns are frequent, but:
- redundancy makes detection easy.
  (Brian cannot interpret ‘they’re … summer’)
- people very good at repair.
  (Brain and Alison quickly restore shared focus)

Electronic media may lose some redundancy.
→ breakdown more severe.

Speech act theory

A specific form of conversational analysis.
Utterances characterised by what they do ...
- e.g. “I’m hungry”
- propositional meaning – hunger
- intended effect – ‘get me some food’

Basic conversational act the illocutionary point:
- promises, requests, declarations, ...

Speech acts need not be spoken.
- e.g. silence often interpreted as acceptance …
Patterns of acts & Coordinator

- Generic patterns of acts can be identified
- Conversation for action (CfA) regarded as central
- Basis for groupware tool Coordinator
  - structured email system
  - users must fit within CfA structure
  - not liked by users!

Conversations for action (CfA)

- Circles represent ‘states’ in the conversation
- Arcs represent utterances (speech acts)

CfA in action

- Simplest route 1–5:
  - Alison: have you got the market survey on chocolate mousse?
  - Brian: sure
  - Brian: there you are
  - Alison: thanks

- More complex routes possible, e.g., 1–2–6–3 ...
  - Alison: have you got ...
  - Brian: I’ve only got the summary figures
  - Alison: that’ll do

Text-based communication

- Most common media for asynchronous groupware
- exceptions: voice mail, answer-phones
- Familiar medium, similar to paper letters
- but, electronic text may act as speech substitute!
- Types of electronic text:
  - discrete directed messages, no structure
  - linear messages added (in temporal order)
  - non-linear hypertext linkages
  - spatial two dimensional arrangement
- In addition, linkages may exist to other artefacts

Problems with text

- No facial expression or body language
- weak back channels

So, difficult to convey:
- affective state – happy, sad, ...
- illocutionary force – urgent, important, ...

Participants compensate:
- ‘flaming’ and smilies
  - :) ;-( (:P :-( :-(

example - ‘Conferencer’

- linear conversation area – LHS
- RHS – spatial simulated pinboard
Grounding constraints

Establishing common ground depends on grounding constraints:
- cotemporality – instant feedthrough
- simultaneity – speaking together
- sequence – utterances ordered

Often weaker in text-based communication, e.g., loss of sequence in linear text.

Loss of sequence

Network delays or coarse granularity → overlap
1. Bethan: how many should be in the group?
2. Rowena: maybe this could be one of the 4 strongest reasons
3. Bethan: I agree
4. Rowena: hang on
5. Rowena: Bethan what did you mean?

Message pairs 1&2 and 3&4 composed simultaneously
- lack of common experience
Rowena: 2 1 4 5 6
Bethan: 1 2 4 3 5 6

N.B. breakdown of turn-taking due to poor back channels.

Maintaining context

Recall context was essential for disambiguation
Text loses external context, hence deixis
(but, linking to shared objects can help)
1. Alison: Brian’s got some lovely roses
2. Brian: I’m afraid they’re covered in greenfly
3. Clarise: I’ve seen them, they’re beautiful

Both (2) and (3) respond to (1)
... but transcript suggests greenfly are beautiful!

Non-linear conversation

1. Alison: Brian’s got some lovely roses
2. Brian: I’m afraid they’re covered in greenfly
3. Clarise: I’ve seen them, they’re beautiful
4. Clarise: have you tried companion planting?

Pace and granularity

Pace of conversation – the rate of turn taking
- face-to-face – every few seconds
- telephone – half a minute
- email – hours or days

Face-to-face conversation is highly interactive
- initial utterance is vague
- feedback gives cues for comprehension

Lower pace → less feedback
→ less interactive
**Coping strategies**

People are very clever! they create coping strategies when things are difficult

Coping strategies for slow communication attempt to increase granularity:
- **eagerness** – looking ahead in the conversation game
  - Brian: Like a cup of tea? Milk or lemon?
- **multiplexing** – several topics in one utterance
  - Alison: No thanks, I love your roses.

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**The Conversation Game**

Conversation is like a game

Linear text follows one path through it

Participants choose the path by their utterances

Hypertext can follow several paths at once

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**Group dynamics**

Work groups constantly change:
- in structure
- in size

Several groupware systems have explicit rôles
- But rôles depend on context and time
  - e.g., M.D. down mine under authority of foreman
  - and may not reflect duties
  - e.g., subject of biography, author, but now writer

Social structure may change: democratic, autocratic, ...
and group may fragment into sub-groups

Groupware systems rarely achieve this flexibility

Groups also change in composition
- new members must be able to ‘catch up’

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**Physical environment**

Face-to-face working radically affected by layout of workplace

- e.g. meeting rooms:
  - recessed terminals reduce visual impact
  - inward facing to encourage eye contact
  - different power positions
Distributed cognition

Traditional cognitive psychology in the head

Distributed cognition suggests look to the world

Thinking takes place in interaction
  - with other people
  - with the physical environment

Implications for group work:
  - importance of mediating representations
  - group knowledge greater than sum of parts
  - design focus on external representation