HUMAN-COMPUTER INTERACTION THIRD EDITION

DIX FINLAY ABOWD BEALE

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*[1] …
> `The Green' *um*[2] …
> 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 whatsit'
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 ← *deictic reference*
- internal context – reference to previous conversation
  e.g., Alison's '*that*' – the last thing spoken of

Referring 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
⇒ 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* …
… they are *acts*
e.g. '*I'm hungry*'

- propositional meaning – hunger
- intended effect – '*get me some food*'

Basic conversational act the illocutionary point:

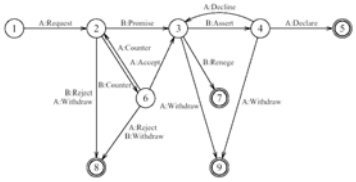
- promises, requests, declarations, …

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?	*request*
Brian:	sure	*promise*
Brian:	there you are	*assert*
Alison:	thanks	*declare*

- More complex routes possible, e.g., 1–2–6–3 …

Alison:	have you got …	*request*
Brian:	I've only got the summary figures	*counter*
Alison:	that'll do	*accept*

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

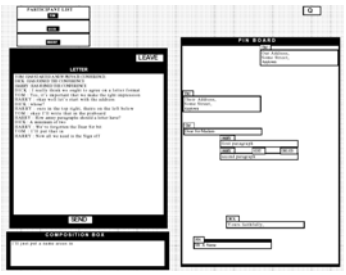
Problems with text

No facial expression or body language
⇒ weak *back channels*

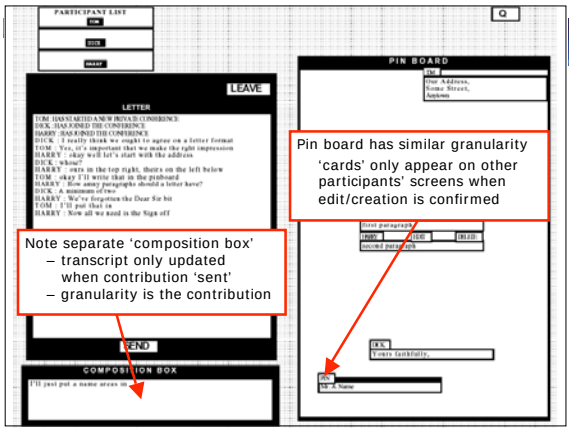
So, difficult to convey:
affective state – happy, sad, …
illocutionary force – urgent, important, …

Participants compensate:
'flaming' and smilies
;-) :-(:-)

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. **Rowena:** please clarify what you mean
4. **Bethan:** I agree
5. **Rowena:** hang on
6. **Rowena:** Bethan what did you mean?

Message pairs 1&2 and 3&4 composed simultaneously
– lack of *common experience*

Rowena: 2 1 3 4 5 6
Bethan: 1 2 4 3 5 6

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

Maintaining context

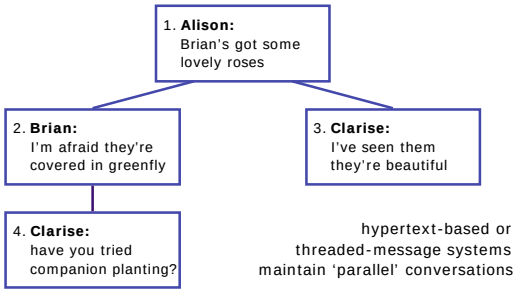
Recall *context* was essential for disambiguation

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



hypertext-based or
threaded-message systems
maintain 'parallel' conversations

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.

The Conversation Game

Conversation is like a game

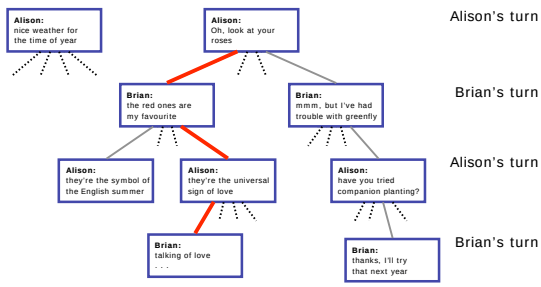
Linear text follows one path through it

Participants choose the path by their utterances

Hypertext can follow several paths at once

… like a game

participants choose the path by their utterances



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

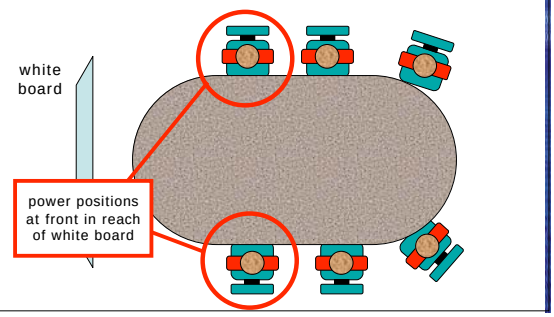
Groups also change in composition
⇒ new members must be able to `catch up'

Physical environment

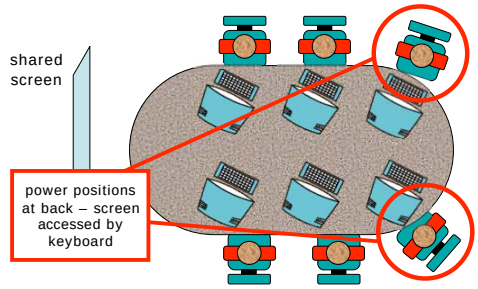
Face-to-face working radically affected by layout of workplace

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

power positions traditional meeting room



power positions augmented meeting room



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