

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?
- Dialog rules? (Sacks, Schegloff and Jefferson 1978)
 - Rule 1: the current speaker chooses the next speaker by asking an opinion, question, or request
 - Rule 2: another person decided to start speaking
 - Rule 3: the current speaker continues talking

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!

Coordinator

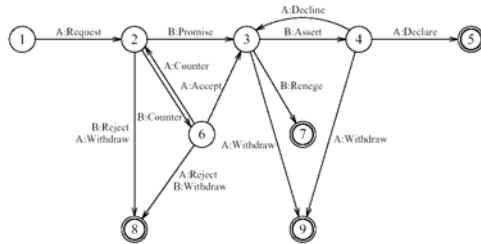
C O N V E R S E	
OPEN CONVERSATION FOR ACTION	REVIEW / HANDLE
Request	Read new mail
Offer	Missing my response
	Missing other's response
OPEN CONVERSATION FOR POSSIBILITIES	
Declare an opening	My promises/offers
	My requests
ANSWER	Commitments due: 24-May-88
NOTES	Conversation records

SPEAKING IN A CONVERSATION FOR ACTION

Acknowledge	Promise
Free-Form	Counter-offer
Commit-to-commit	Decline
Interim-report	Report-completion

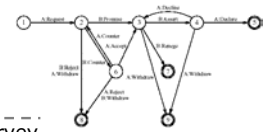
Flores, F., Graves, M., Hartfield B. and Winograd, T. (1988) Computer System and the Design of Organizational Interaction, in ACM Trans. On Information Systems, Vol. 6, No. 2, 153-172.

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

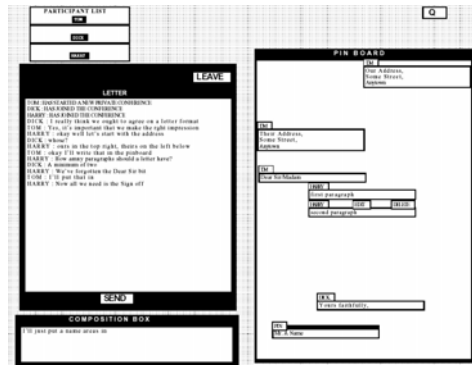
Problems with text

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

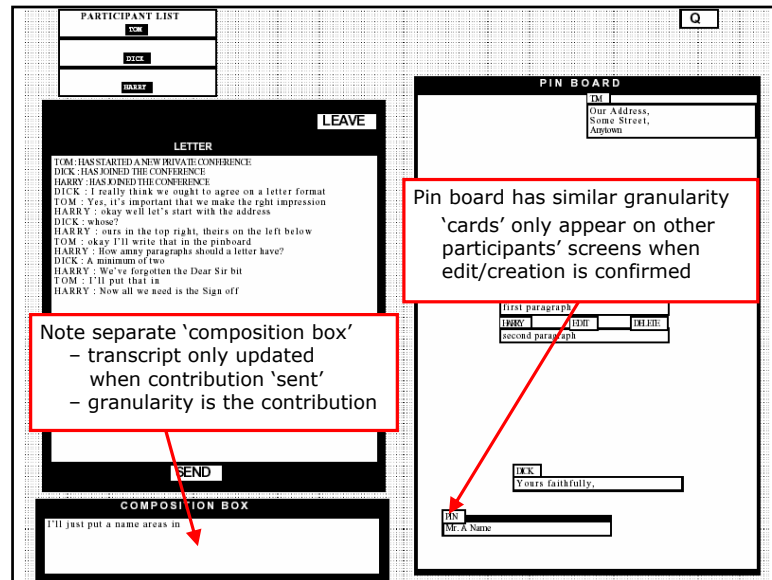
So, difficult to convey:
affective state - happy, sad, ...
illocutionary force - urgent, important, ...

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 \Rightarrow *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

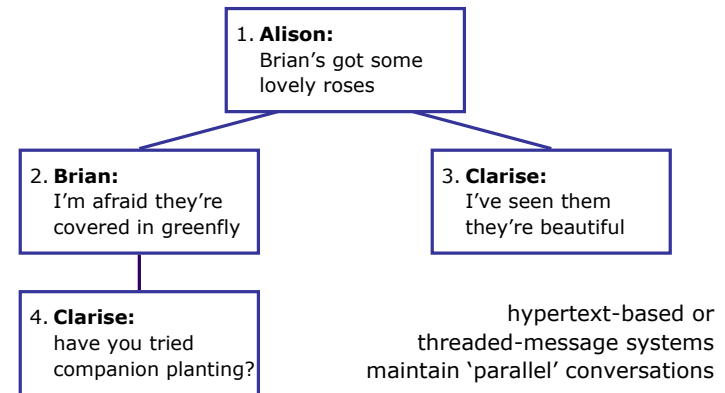
Recall *context* was essential for disambiguation

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



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

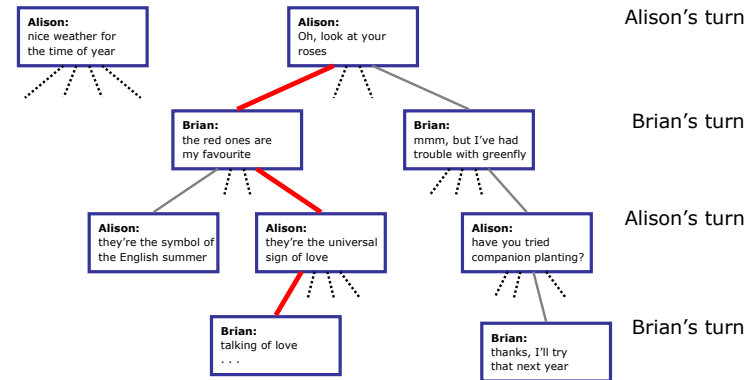
Linear text follows one path through it

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'

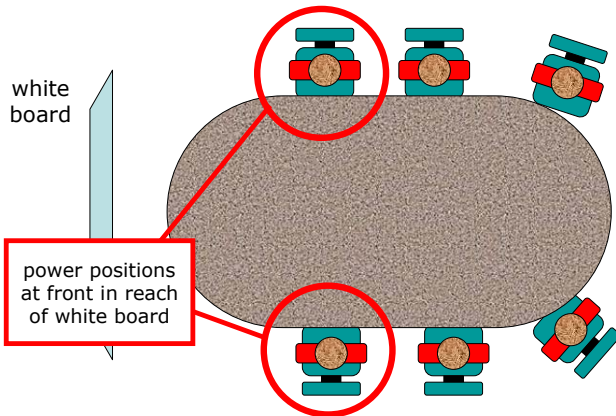
Physical environment

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

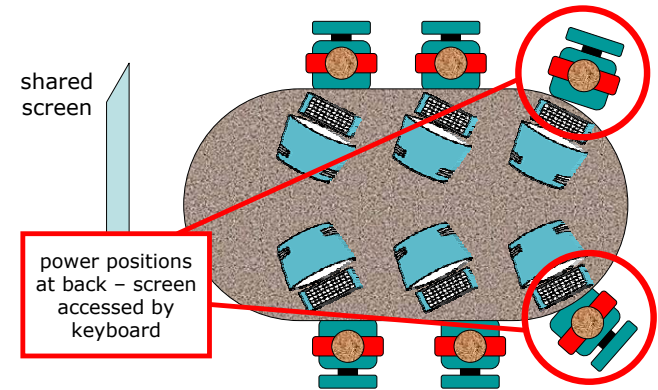
e.g. meeting rooms:

- 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