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 (i.e., to figure out what a term like ‘here’ refers to)
- 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
- 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
$\Rightarrow$ 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

$\Rightarrow$ 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 acts are "illocutionary points"

- E.g., promises, requests, declarations, ...

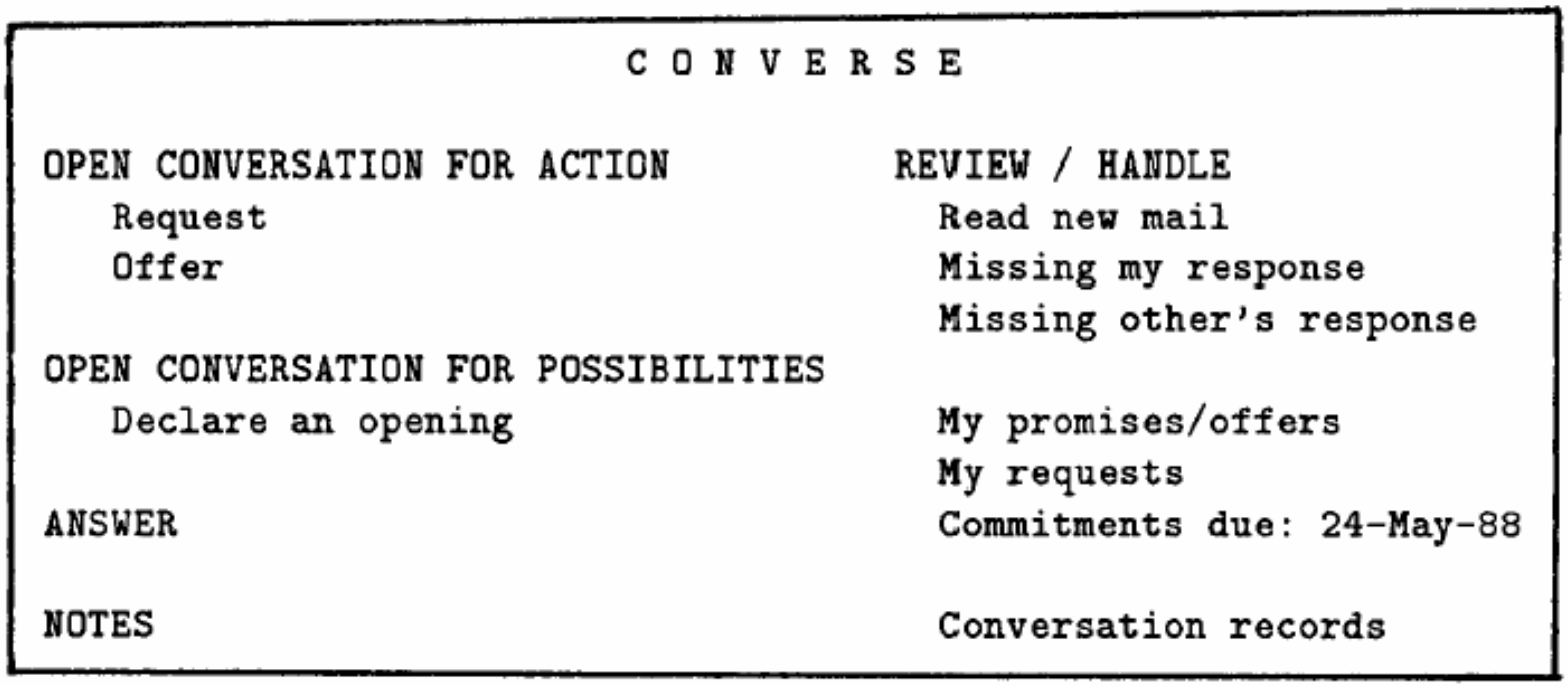
Speech acts need not be spoken

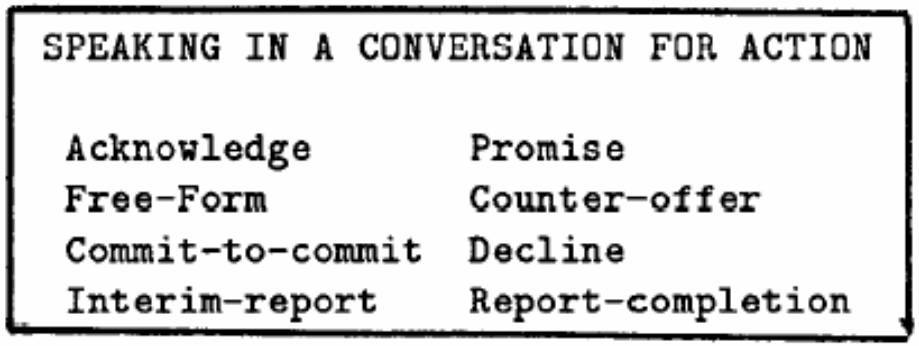
e.g. silence often interpreted as acceptance ...

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
    - Must say what kind of illocutionary act they are performing with each e-mail
  - not liked by users!

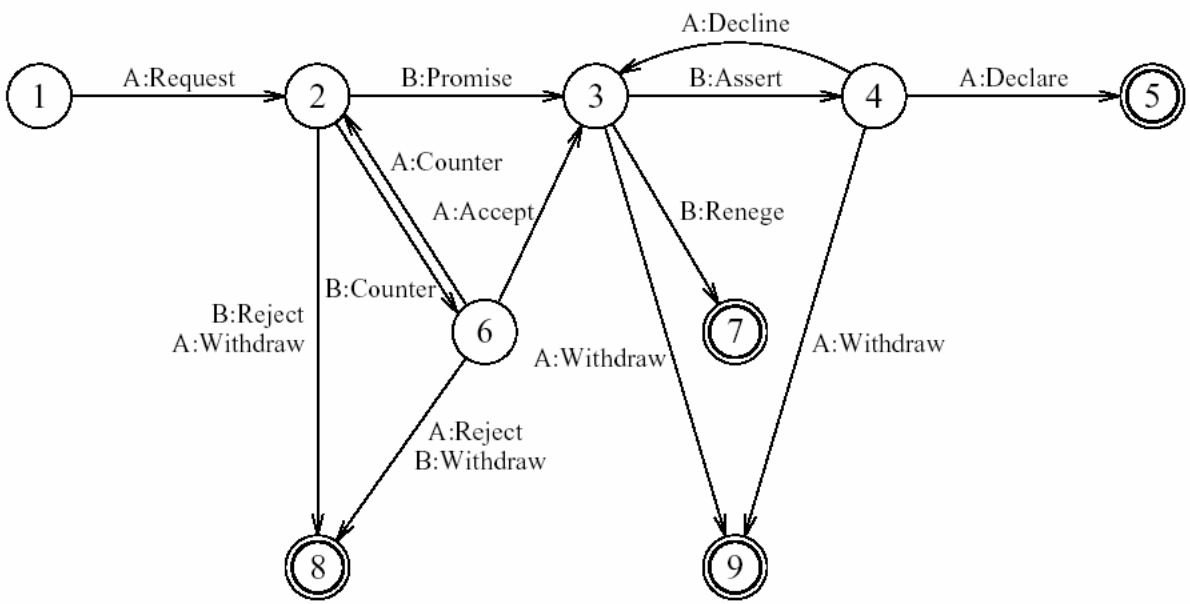
Coordinator





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.

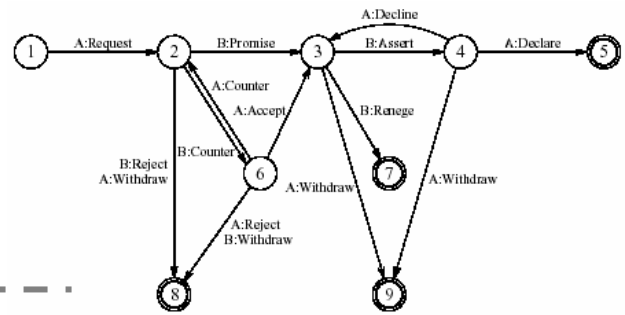
Conversations for action (CfA)



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 the survey results?	*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, ...

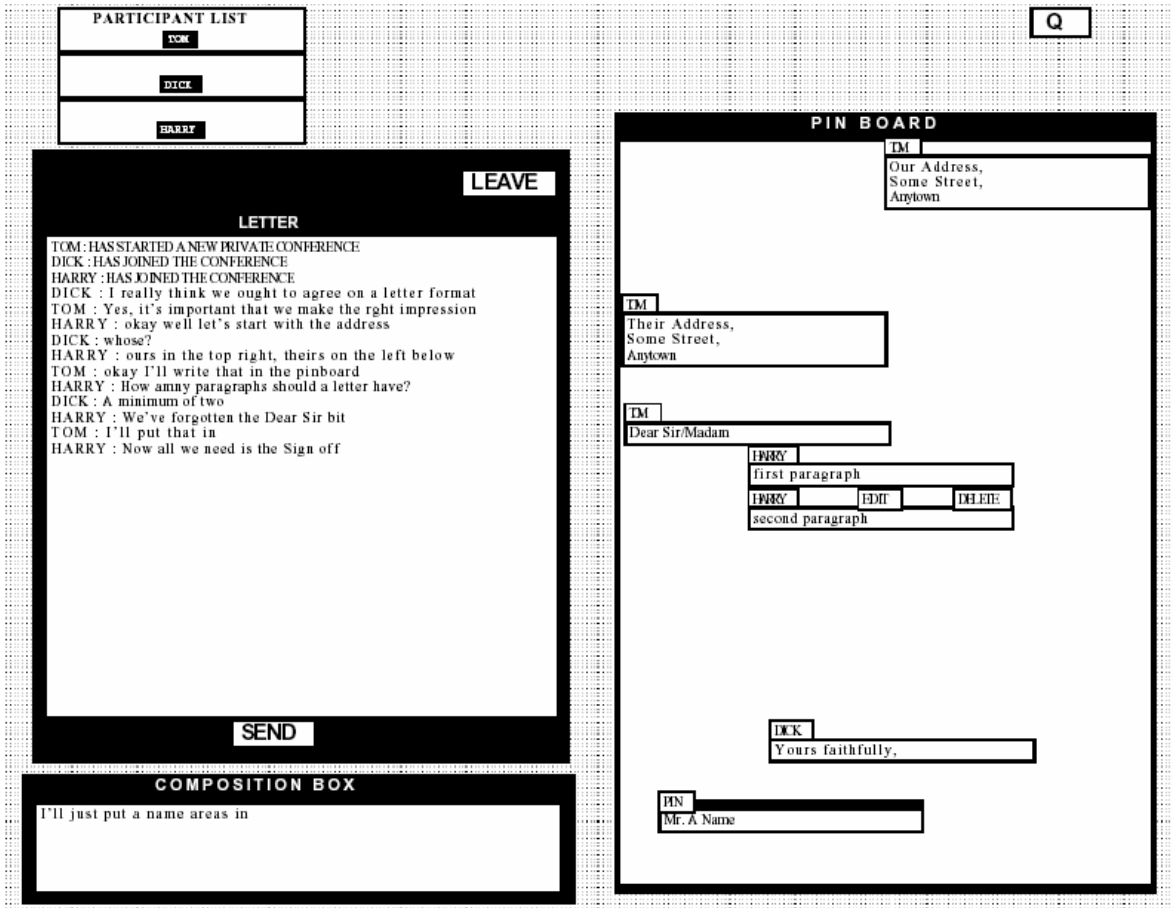
illocutionary force – urgent, important, ...

Participants compensate:

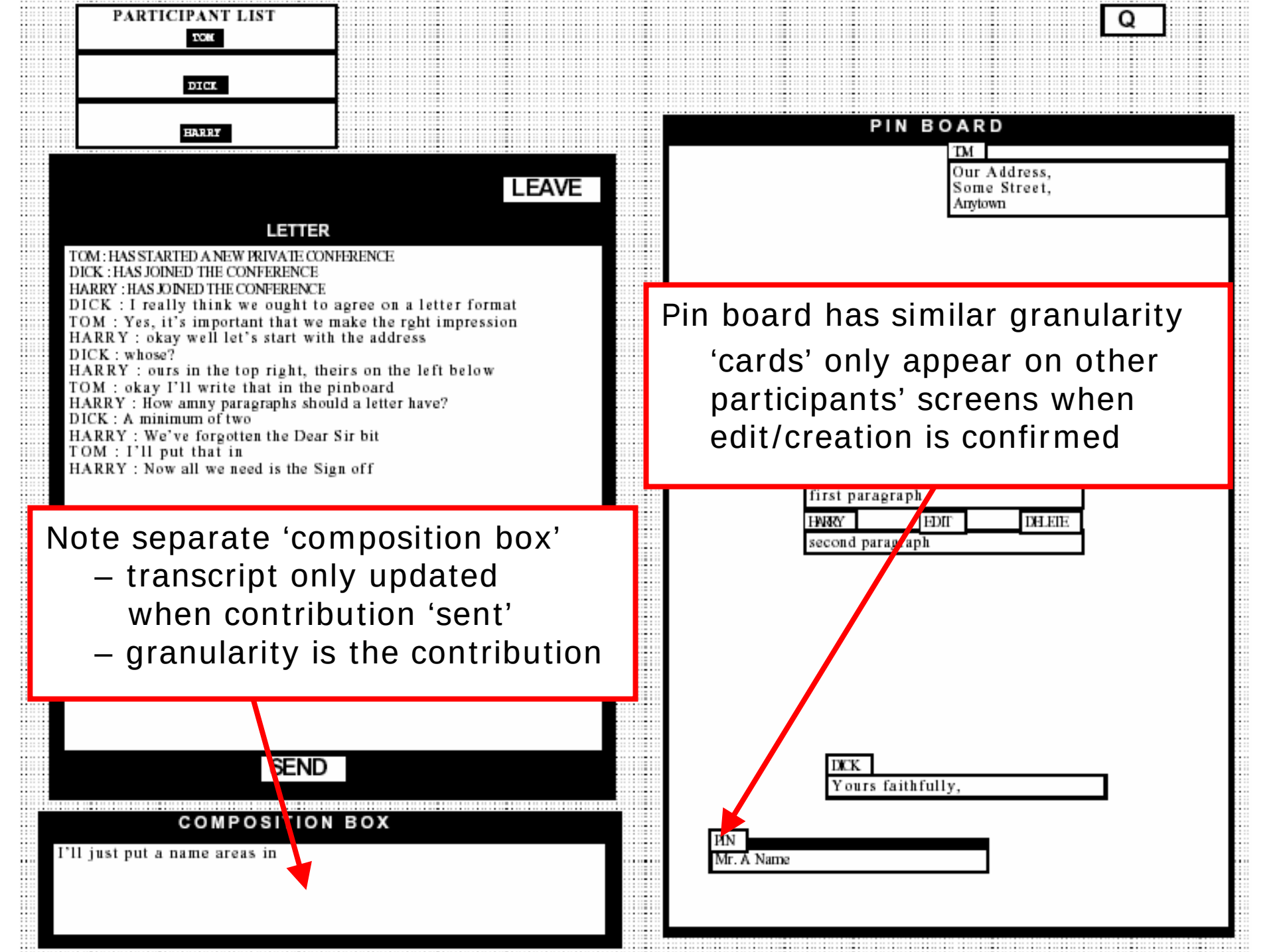
'flaming' and smilies

;-) :-( :-)

example – 'Conferencer'



linear conversation area – LHS RHS – spatial simulated pinboard


PARTICIPANT LIST
TOM
DICK
HARRY
Q
LEAVE
LETTER
TOM : HAS STARTED A NEW PRIVATE CONFERENCE
DICK : HAS JOINED THE CONFERENCE
HARRY : HAS JOINED THE CONFERENCE
DICK : I really think we ought to agree on a letter format
TOM : Yes, it's important that we make the rght impression
HARRY : okay well let's start with the address
DICK : whose?
HARRY : ours in the top right, theirs on the left below
TOM : okay I'll write that in the pinboard
HARRY : How amny paragraphs should a letter have?
DICK : A minimum of two
HARRY : We've forgotten the Dear Sir bit
TOM : I'll put that in
HARRY : Now all we need is the Sign off
SEND
COMPOSITION BOX
I'll just put a name areas in
PIN BOARD
TM
Our Address,
Some Street,
Anytown
first paragraph
HARRY
EDIT
DELETE
second paragraph
DICK
Yours faithfully,
PIN
Mr. A Name
Pin board has similar granularity
'cards' only appear on other participants' screens when edit/creation is confirmed
Note separate 'composition box'
– transcript only updated when contribution 'sent'
– granularity is the contribution

Grounding constraints

Establishing common ground depends on the properties of the channels through which you communicate, *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)

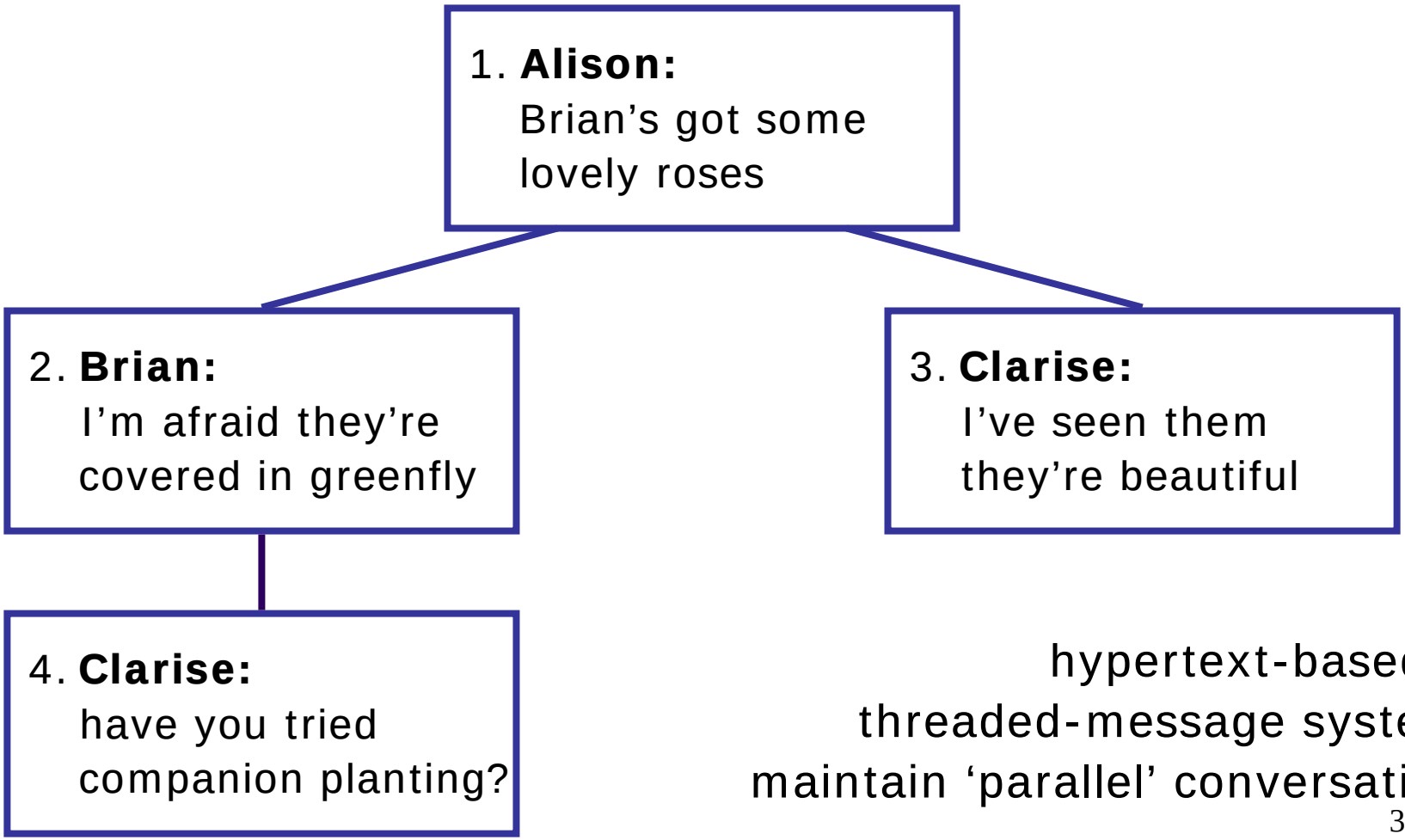
1. **Alison:** Brian's got some lovely roses
2. **Brian:** I'm afraid they're covered in greenfly
3. **Clarise:** I've seen them, they're beautiful

Both (2) and (3) respond to (1)

... but *transcript* suggests greenfly are beautiful!

This sort of thing can get very messy, bulky and confusing to fix in conventional email exchanges!

Non-linear conversation



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

The Conversation Game

Conversation is like a game

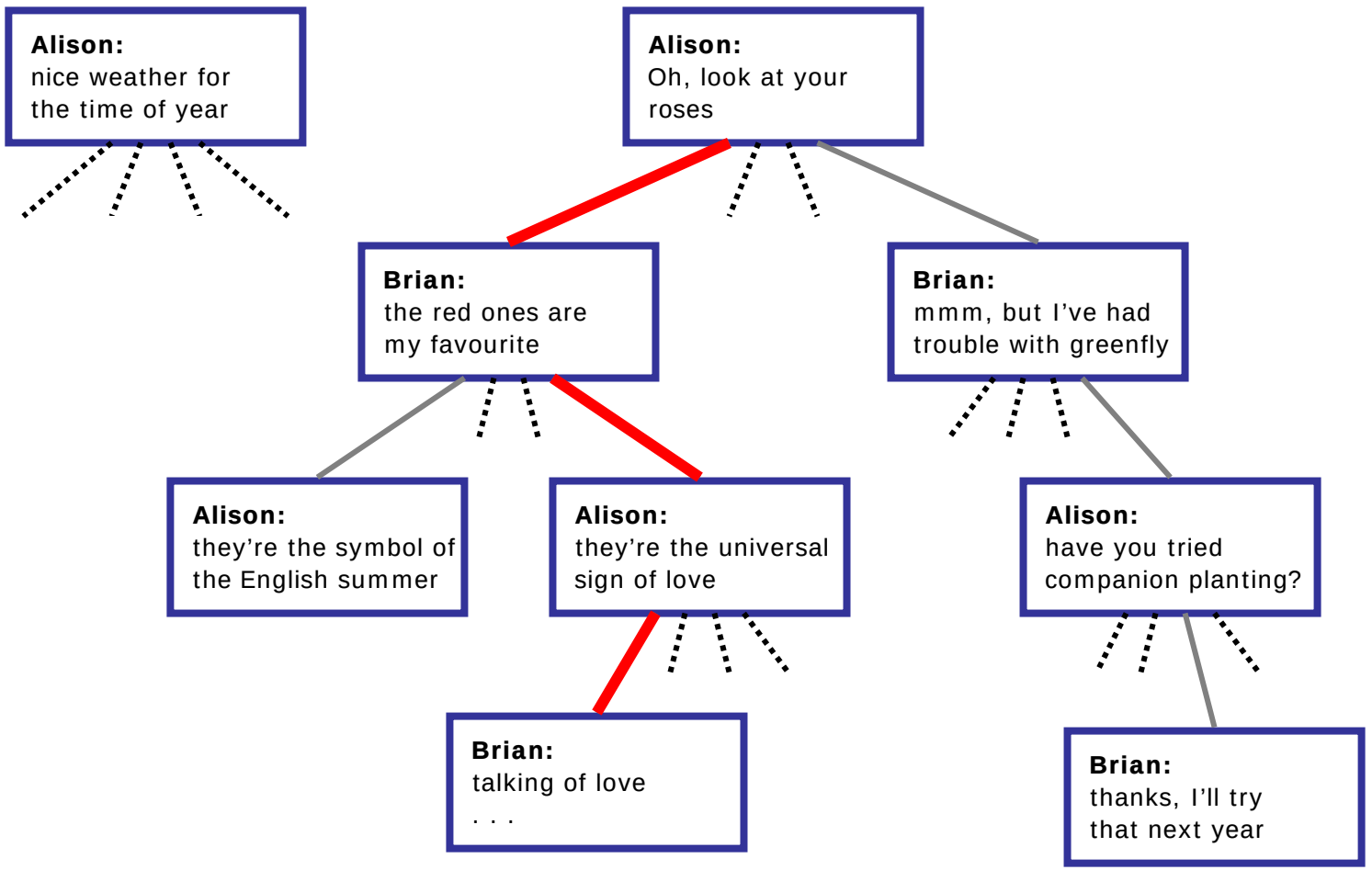
Linear text follows one path through it

Participants choose the path by their utterances

Hypertext can follow several paths at once

… like a game

participants choose the path by their utterances



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 online version of the game *Diplomacy* offers a lot of examples of conversational strategies

Group dynamics

Work groups constantly change:

- in structure
- in size

Several groupware systems have explicit roles

- But roles depend on context and time
  - e.g., M.D. down mine under authority of foreman
- and may not reflect duties
  - e.g., a doctor can become a patient when ill

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

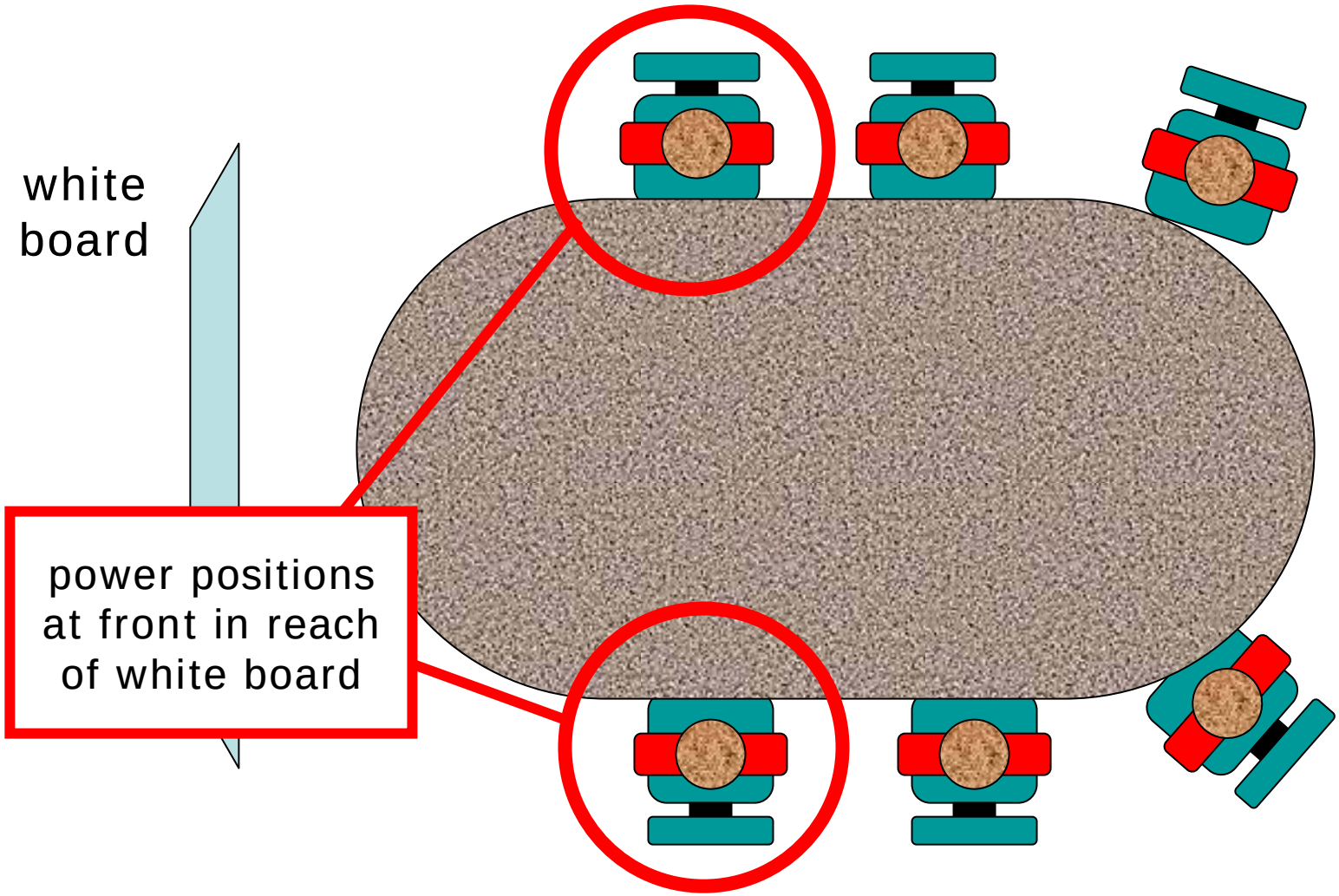
e.g. meeting rooms:

– recessed terminals reduce visual impact

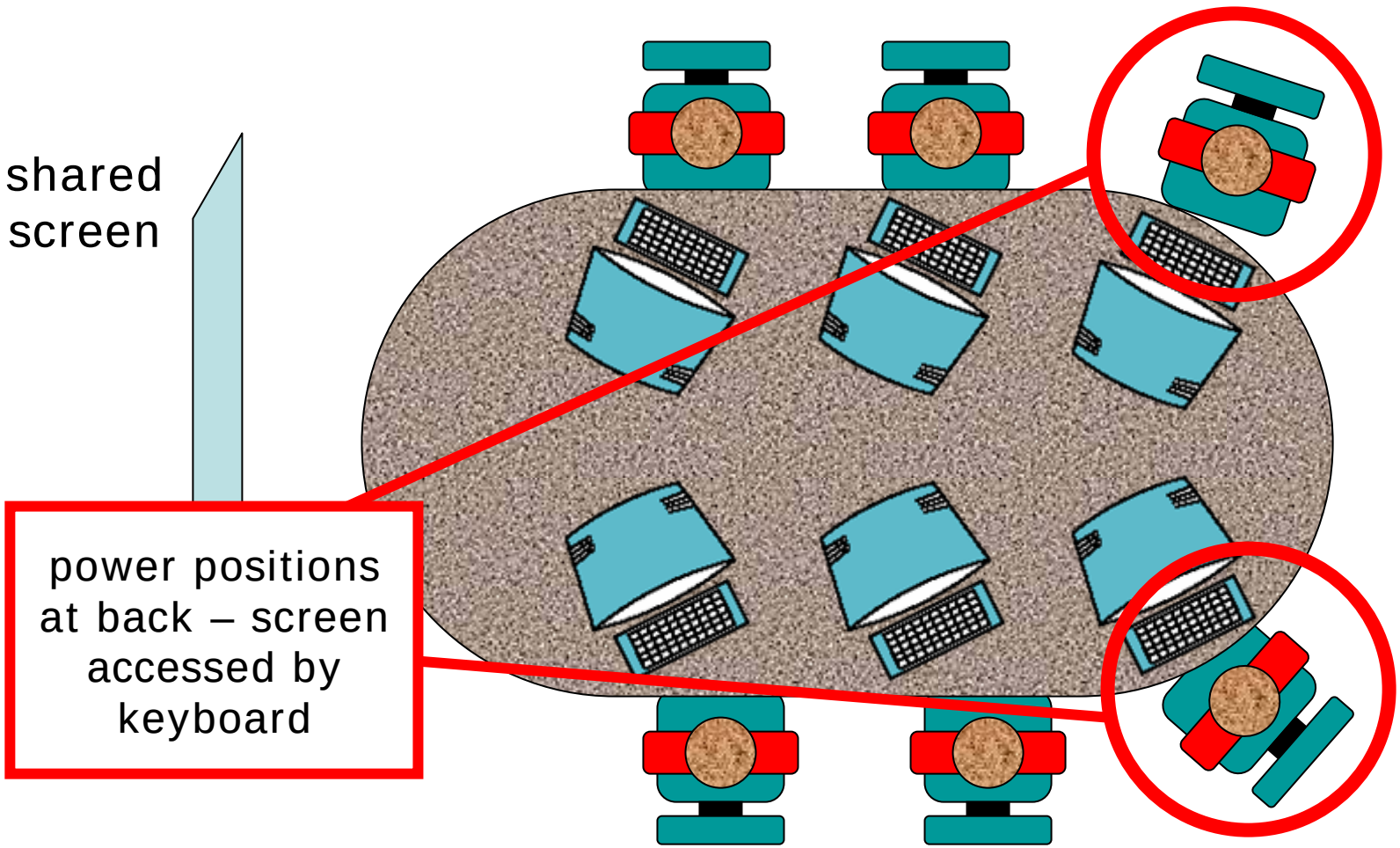
– inward facing to encourage eye contact

– 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

- A lot of people look to things like the Wikipedia and other group 'conversations' as potentially extending (and improving) **democracy**