Design of Interactive Systems (DIS)

Lecture 14: Foundations of designing interactive systems– Social interaction

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Part IV Foundations of designing interactive systems

- **Chapter 21**: Memory and attention
- **Chapter 22**: Affect
- **Chapter 23**: Cognition and action
- **Chapter 24**: Social interaction
- **Chapter 25:** Perception and navigation

Introduction

- Human beings are generally social creatures and an understanding of the social side of interactions is a necessary part of designing interactive systems
- Designers should always consider the social impact that their designs will have.
- Disciplines contributing to understanding social issues include (social) anthropology, sociology and social psychology.
- Anthropology has pioneered ethnographic approaches to understanding social settings.
- Psychology tends to favour controlled experiments.
- Sociology takes a stance often focused more towards the needs of societies as a whole.

Aims

- Understand the main issues in human communication
- Understand issues concerned with participating in groups
- Understand presence
- Understand the main issues of identity and culture.

Introduction

- A classic definition of social psychology states that it is: "*an attempt to understand and explain how the thoughts, feelings and behaviors of individuals are influenced by the actual, imagined, or implied presence of others.*"
- Instead of exploring the whole of the world's accumulated knowledge of social issues, we will look at four key aspects of people engaged in social interaction:
- **human communication; participating in groups; issues of presence; and culture and identity.**

Human communication

- Social interaction begins with the ability to communicate.
- Semiotics, or semiology, is the study of signs and how they function. Signs can take a variety of forms such as words, images, sounds, gestures or objects. A sign consists of a signifier and the signified.
- Signs are transmitted from a transmitter to a receiver along a communication channel. Words are transmitted through speech along the auditory communication channel or through writing using the visual channel.

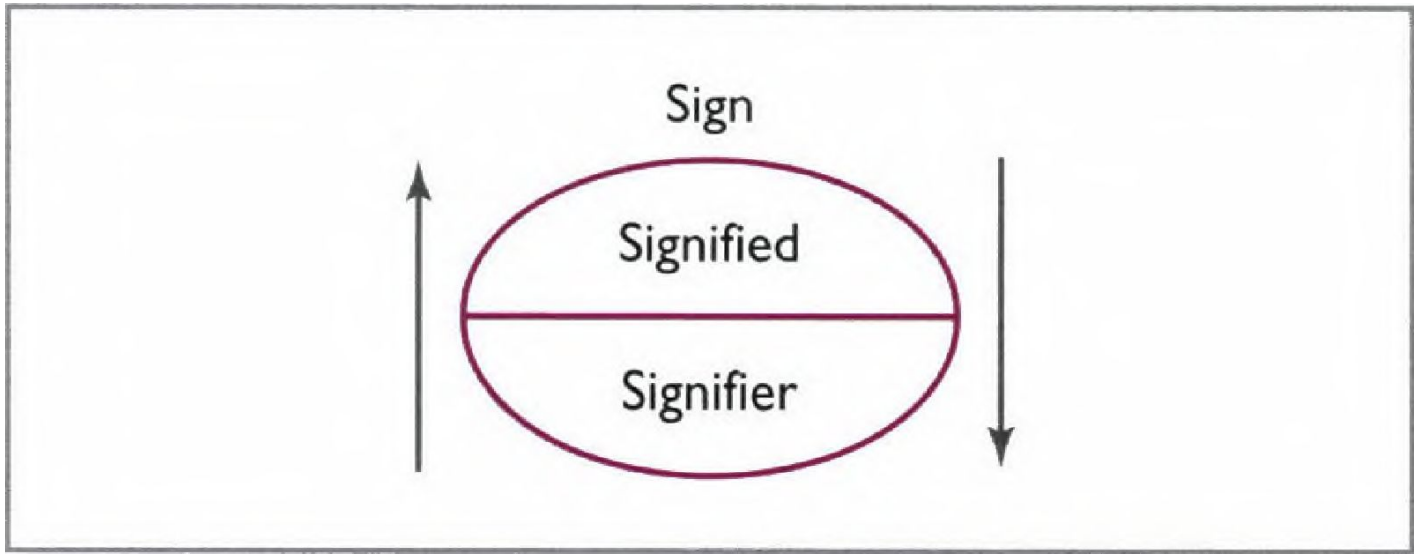


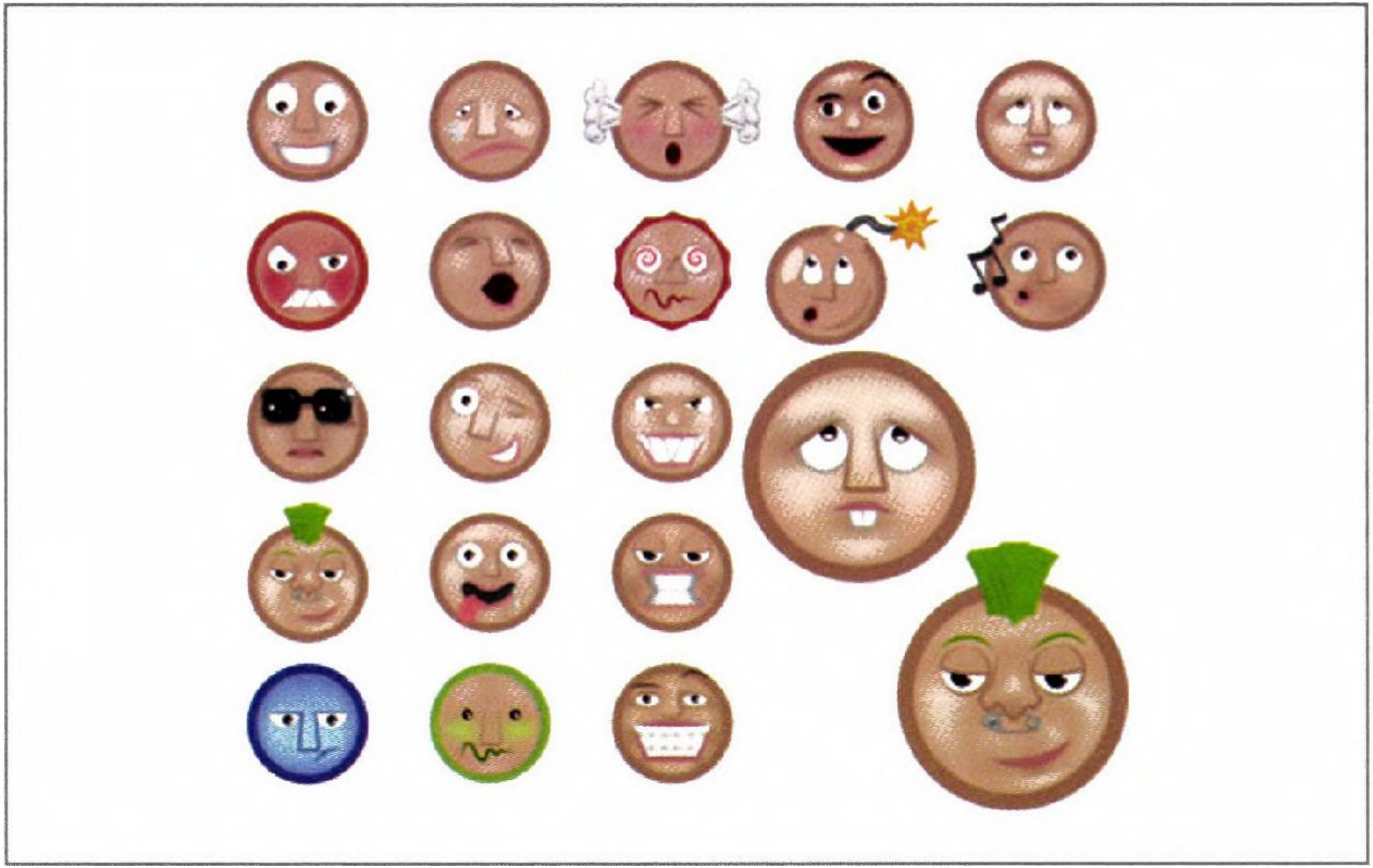
Figure 24.1 A sign consists of a signifier and signified

Human communication

- For human-human communication, there are two key components: a linguistic element and a non-verbal element
- NVC includes movement and body position, eye gaze, touch and gesture
- It also includes aspects of the environment in which any communication takes place, including the distance between the people communicating.
- NVC deals with paralinguistic features of a communication such as prosody (tone, pitch and rhythm of speech) and the use of linguistic acts such as humour and sarcasm
- Communication is necessary if people are to form relationships with each other. Communication is also central to how those relationships are perceived, bringing in issues of trust, negotiation, persuasion and establishing shared and agreed understandings (‘common ground’)
- communication is often mediated by technologies; the effectiveness of the communication depends on how the technologies are designed.

Speech and language

- Clearly, much communication between people takes place through the use of language, both spoken and written. There is still some controversy concerning whether language is an innate human ability or whether it is something that is learned.
- Speech has many characteristics other than just the words.
- Prosody concerns the rhythm, stress and intonation of speech.
- Variations in pitch and the tone of speech and the speed of delivery all contribute to the meanings that are conveyed.
- Prosody is very important for conveying emotions, and subtle variations of meaning that can be lost in written language.



Non-verbal communication

- Non-verbal communication refers to the host of signs that are used in communication, whether intentionally or not, outside of the spoken channel. There are a number of different forms of NVC.

Facial expressions:

- A very important component of NVC is our range of facial expressions - indeed, significant proportions of the brain are thought to be involved in understanding each other's expressions
- Facial expressions concern changes in the eyes, mouth, cheeks and other facial muscles.

Gestures

- Another key aspect of NVC for many people is the role of gesture. When we speak we move our hands, head and body.
- Gestures can be very effective methods of communication (particularly at a distance) to indicate placement or movement.
- Gestures are not limited to hand movements: whole-body movements are often used to clarify the target of a speech reference - as in the case of someone turning towards a whiteboard when discussing its contents.

Body language

- Body posture and movement express attitudes and moods and the whole range of stronger emotions.
- Bodily posture reveals our attitude and emotional state.
- Confident people are erect and square with shoulders back.
- A positive attitude to others is expressed by leaning forward towards them.
- Bodily contact for most people is confined to shaking hands, patting each other on the back
- Social anthropologists often classify cultures into contact and non-contact cultures.
- Handshakes are often given as an example of the power balance in a relationship.
- Folding the arms is seen as putting a barrier between two discussants.
- Eye contact is important to engender trust and conviction whereas shifting the eyes or looking down conveys insecurity.

Proxemics

- Proxemics by Edward Hall (1966) describe the study of our use of space and how various differences in that use can make us feel more relaxed or anxious.
- Proxemics applies to two main contexts: (a) physical territory and (b) personal territory
- Physical distances between people indicate intimacy and friendship.
- Proxemics tells us that the intimate distance for embracing or whispering is perhaps 15-50 cm
- The personal distance for conversations among good friends is 50-150 cm,
- The social distance for conversations among acquaintances is 1-3 metres,
- The public distance used for public speaking is 3+ metres.

Proxemics

If these spatial norms are violated, we may do one or more of the following:

- Shift position
- Decrease eye contact
- Change orientation (turn away from the other person)
- Decrease duration of responses
- Give fewer ‘affiliative’ responses.

Common ground

- A study of synchronous, co-located work (that is, working together at the same time in the same place) conducted by Gary and Judith Olson and reported in 2000 involved **observing the work of people in nine corporate sites**.
- The Olsons found that the people they observed all normally share office space. Table 24.1 summarizes their findings and is reproduced from Olson and Olson (2000).

Table 24.1 Strengths and advantages of sharing the same space synchronously

Characteristic	Description	Implications
Rapid feedback	As interaction flows, feedback is rapid	Quick corrections possible
Multiple channels	Information from voice, facial expression, gesture, body posture, etc., flows among participants	There are many ways to convey a subtle or complex message (provides redundancy)
Personal information	The identity of the contributors to conversation is usually known	The characteristics of the person can help the interpretation of meaning
Nuanced information	The kind of information that flows is often analogue (continuous) with many subtle dimensions (e.g. gesture)	Very small differences in meaning can be conveyed; information can easily be modulated
Shared local context	Participants have a similar situation (time of day, local events)	Allows for easy socializing as well as mutual understanding about what is on each other's mind
Information 'hall' time before and after	Impromptu interactions take place among participants upon arrival and departure	Opportunistic information exchanges and social bonding
Co-reference	Ease of joint reference to objects	Gaze and gesture can easily identify the referent deictic terms

Table 24.2 Achieving common ground

	Co-presence	Visibility	Audibility	Co-temporality	Simultaneity	Sequentiality	Reviewability	Revisability
Face-to-face	✓	✓	✓	✓	✓	✓		
Telephone			✓	✓	✓	✓		
Video-conferencing		✓	✓	✓	✓	✓		
Two-way chat				✓	✓	✓	✓	✓
Answering machine			✓				✓	
E-mail							✓	✓
Letter							✓	✓

Common ground

- **Co-presence** implies access to the same artefacts to support the conversation. Co-presence also implies shared reference and shared context
- **Co-temporality** leads to understanding of the same 'circadian' context (the participants know whether or not it is morning, lunchtime, evening or just much too late).
- **Visibility** and **audibility** provide 'rich clues' to the situation
- **Simultaneity** and **sequentiality** 'relieve the person of having to remember the context of the previous utterance when receiving the current one'.
- **Reviewability** and **reusability** are the means by which people can review and revise carefully what they mean and have opportunities to make sense of what is being communicated to them.

People in groups

- The behavior towards one another of two or more persons who have convergent interests (positive interdependence). Each perceives that progress towards his own goal will be enhanced by the progress of the other person or persons as well and each expects reciprocation.
- Cooperation is not an unselfish behaviour, but depends on the recognition of mutual benefits.

Group formation

- Groups do not just pop into existence, they need to be formed
- Studies by social psychologists suggest that most groups (larger than two people - which is a special case) go through a series of predictable phases.

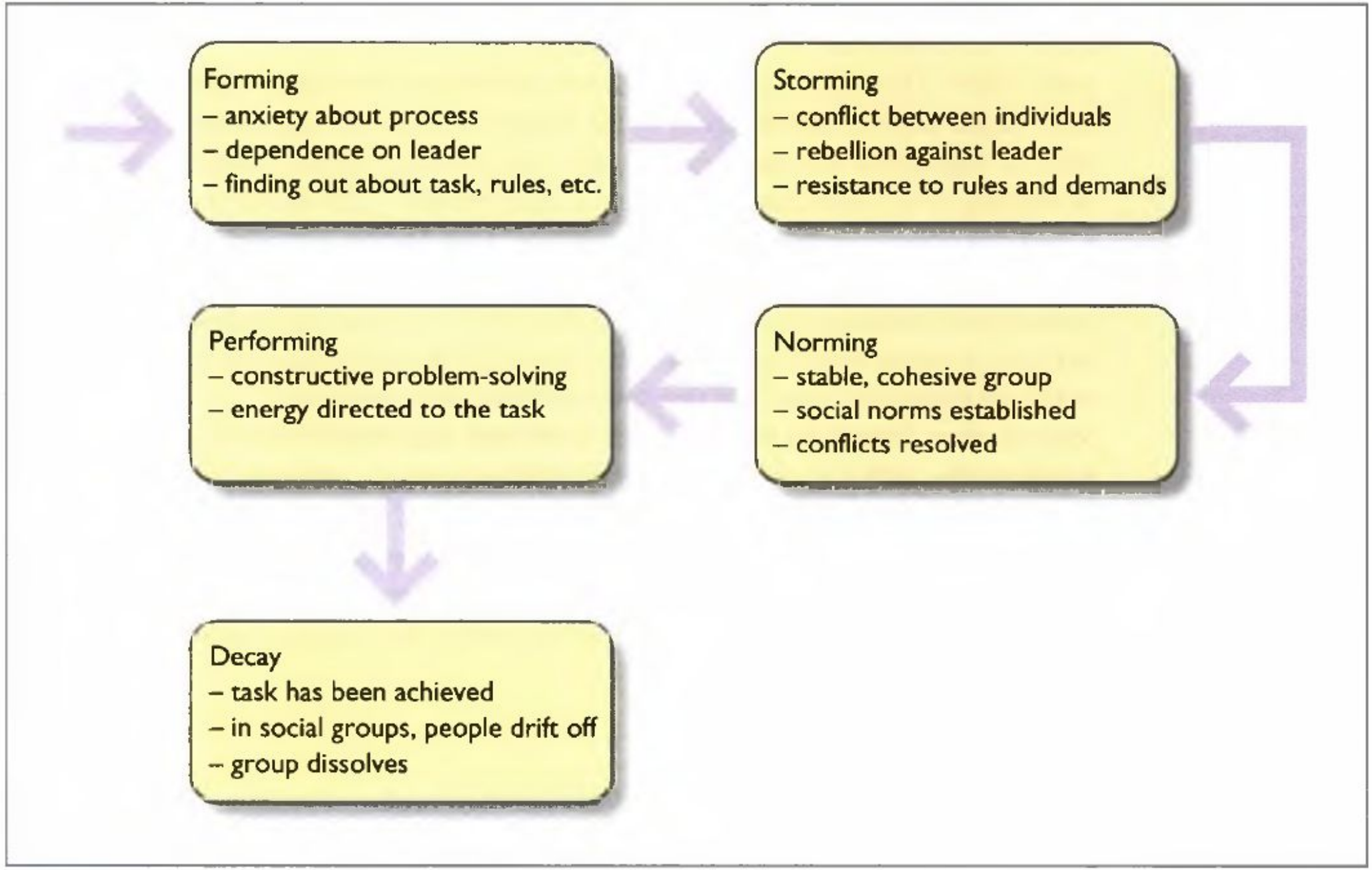


Figure 24.6 Phases in the life of a group

Social norms

- Social norms affect the way people interact in groups.
- In a case study, the original intention was to investigate how improved working conditions might improve productivity in the factory's 'Bank Wiring Room'.
- The variables that the researcher manipulated were the temperature, lighting, humidity and length of working day.
- The workers were placed in a separate experimental room where each of these factors was varied one by one.
- It was found that each change increased productivity.
- As a final test, all of the improvements were removed, yet productivity remained at the same high level.

Social norms

- The workers in the experimental room felt that because their supervisor had been replaced by an observer they were freer to talk to each other and were more cheerful
- Absenteeism had fallen, morale had increased, hard work was the norm

Compliance

- If we are assigned a role, to what extent do we comply with the demands of the role itself, regardless of how arbitrary or unreasonable they may seem?

- Eighteen male undergraduates from Stanford University were selected from a group of volunteers. The 18 were tested to ensure they were 'normal' using interviews and questionnaires (i.e. they had no serious emotional problems). Then a coin was flipped to divide the group into nine guards and nine prisoners. Each student had previously said that they would prefer to be a prisoner.
- *Day 1:* With the cooperation of the local police (and as a surprise) the prisoners were arrested, cuffed, stripped, de-loused and given a smock to wear. They were then herded into 6' X 9' cells. The guards were given khaki uniforms, mirrored shades, a club and a whistle. They were told not to use physical violence.
- *After 2-3 days:* Everyone had adopted their roles. The guards denied prisoners bathing and sleep, and made them do push-ups. The prisoners became compliant and passive, and began to call each other by number rather than by name.
- *After 6 days (of 14):* The prisoners began to show signs of significant emotional stress - bouts of crying, rashes and depression. At this point the experiment was terminated.

Group think

- Group thinking refers to the effect that working in a group can have on people's thoughts and decision making.
- Groups adopt more extreme views than individuals - views which may be highly risky or highly cautious.
- Groups will often accept a higher degree of risk than individuals
- The astronauts of Apollo XI, for example, are reported to have accepted a risk of 50:50 that they would not make it back from the Moon

Conformity

- In the classic study Asch asked participants to decide which of three comparison lines of different lengths matched a standard line.
- To summarize briefly, participants almost always made the right decision when tested on their own.
- When placed in groups with people who had been coached to give the wrong answer, 32 per cent of individuals agreed with the majority
- Reasons given included:
  - Didn’t want to upset the experiment by disagreeing
  - Thought their eyesight might be faulty
  - Not aware of giving the wrong answer
  - Didn’t want to ‘appear different’.

Groups and technology

- Group decision support systems (GDSS) can help to remedy undesirable aspects of group decision making, such as the effects of conformity.
- Researchers have investigated whether the ‘social distance’ and anonymity enforced by interacting through technology as disembodied entities overcome these effects.
- Sumner and Hostetler (2000) compared students using computer conferencing (e-mail) with those holding face-to-face meetings to complete a systems analysis project.
- Those in the computer condition made better decisions: more group members participated, a wider range of opinions were generated, and more rigorous analysis was carried out.
- They also felt at a greater psychological distance from each other and took longer to arrive at a decision.

Group productivity and social loafing

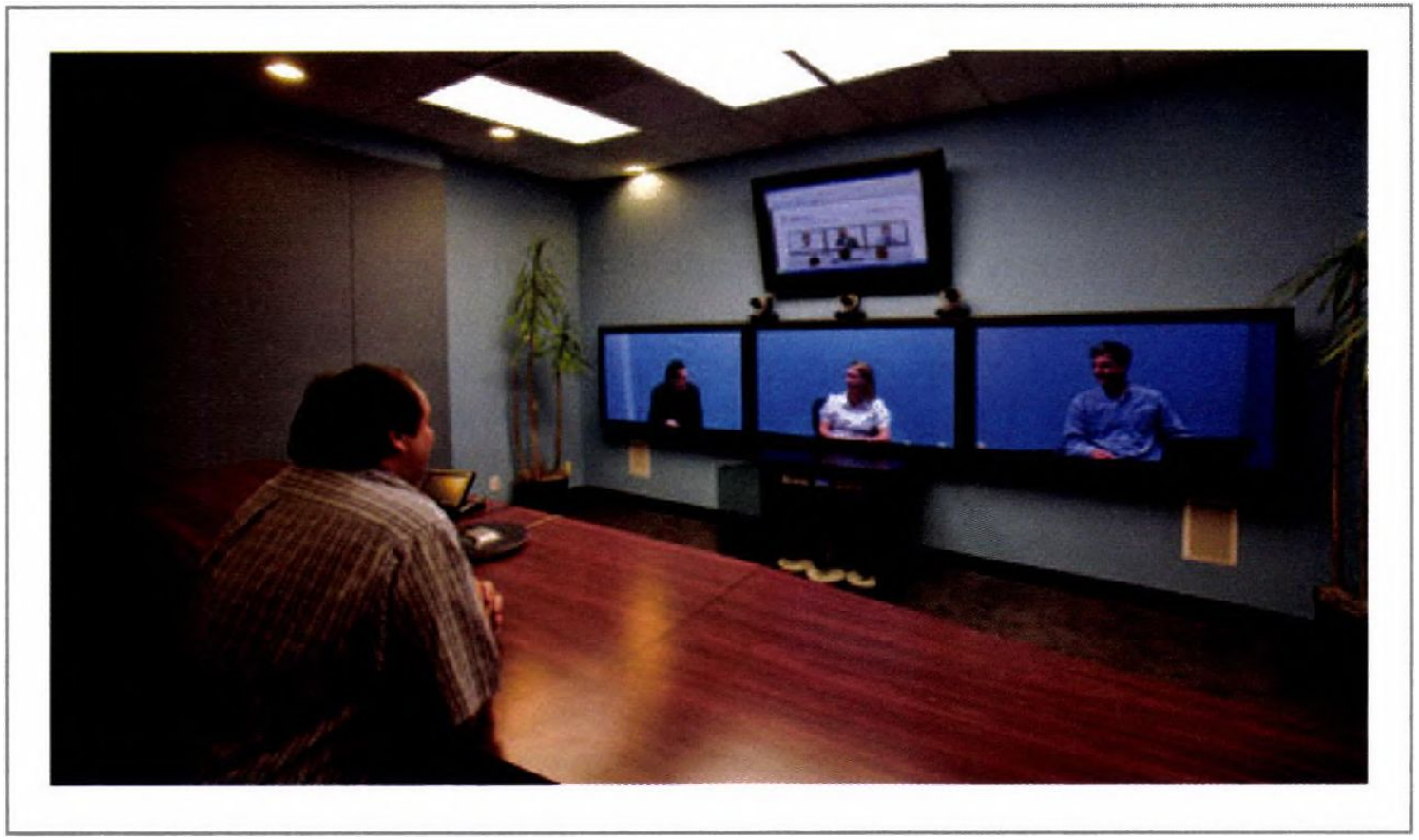
- People tend to under-exert themselves in groups.
- The output of brainstorming groups tends to be less than that of the same number of individuals working in isolation.
- This effect has been named **social loafing** and tends to occur more frequently when it is hard for individual effort to be identified,
- However, some individuals may work harder - **social compensation** - to make up for their lazier colleagues if the group is important to them.
- **production blocking** - where one person's contribution simply gets in the way of another's, principally by causing the second person to forget what they were about to say.

In summary: the social psychology of groups

- People behave differently in groups.
- Social psychology tells us much about the change in behaviour from individuals to groups.
- Technology has the potential to mitigate or enhance some of these effects.
- Predicting social effects in computer-mediated groups requires careful thought to identify the real issues.
- Finally, there are individual differences to take into account. We have not strayed into this area so as to keep this material to a manageable length, but you should be aware that factors such as personality, gender and so forth will also affect how individuals work in groups

Presence

- The sense of presence is a key component of social interaction
- Telepresence is the use of technology to give people the feeling that they are in another place.



Presence

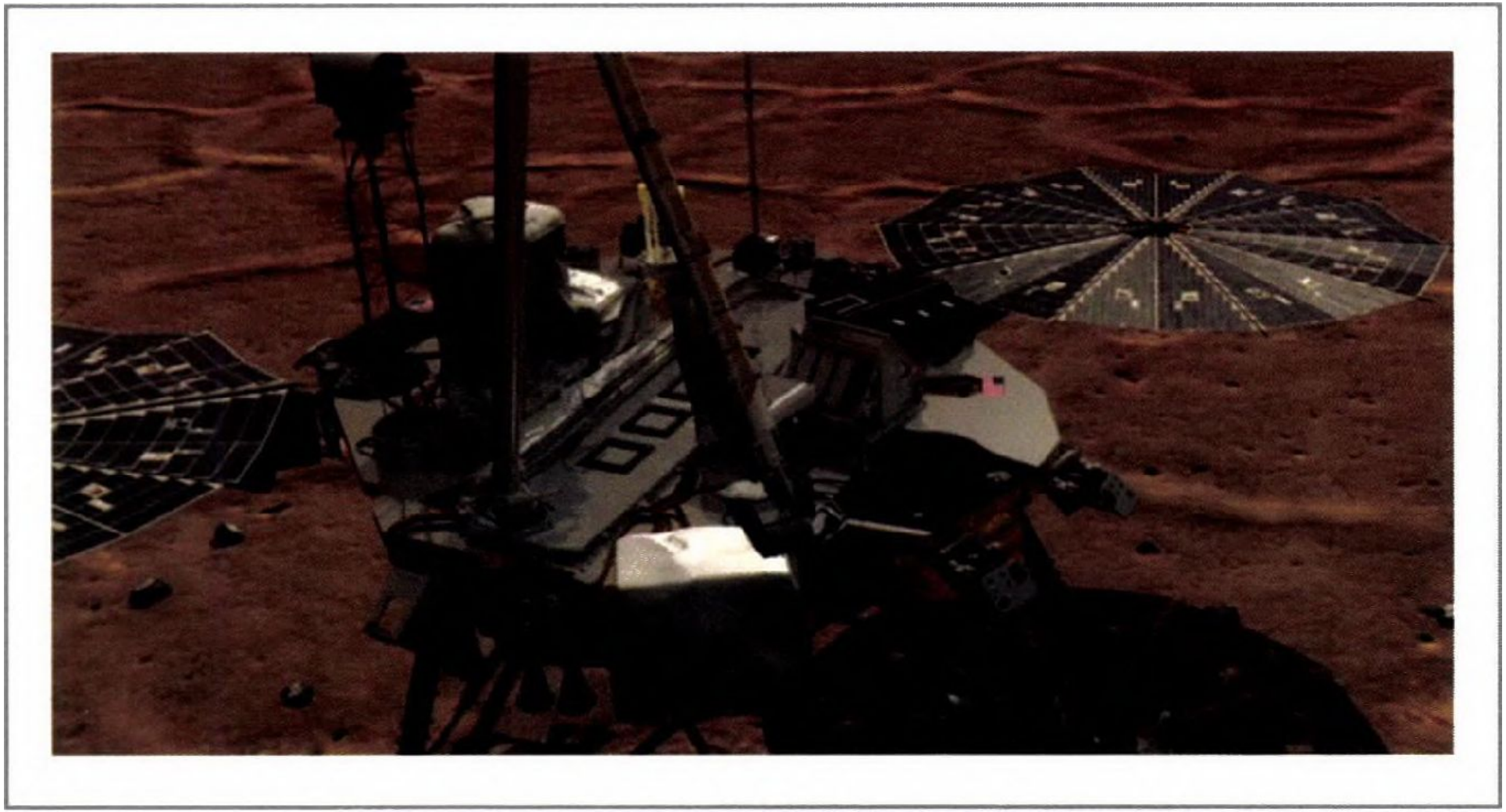
- Presence has been described in various ways, as the sense of ‘being there’
- Although presence is normally thought of with respect to high-fidelity, high- technology communication devices - telepresence - it can apply to any medium.
- For example, a person may achieve a high sense of presence when reading a book. They may feel transported to another land depicted in the book, or may feel close to a character in a book.
- The same is true of radio drama and TV
- Presence can be described as the feeling of being somewhere, and co-presence that of being somewhere with someone else.

Presence

- When presence is mediated by technologies, the sense of presence experienced through a communication channel is a combined function of the extent to which the person is addressed on the three levels:
- The sensorimotor (does the system respond appropriately - how and on what timescale - to body movements)
- The perceptual (for example, the quality of sound and visual presentations),
- and the conceptual.
- Things such as ‘cyber-sickness’ may cause a break in presence.
- High fidelity is not always associated with high presence, especially the co-presence with others that is our focus.

Presence

- A high degree of presence is necessary to control things at a distance such as with tele-medicine, or controlling the Mars lander



Social presence

- The sense of presence is a key component of social interaction. This sense includes feelings of being in the world, a sense of being in a place and a sense of being with other people.
- Awareness has been important in the field of Computer Supported Cooperative Work (CSCW) for a long time, with novel technological solutions being proposed that allow people to be aware of what others are doing in remote locations
- High level social presence through video-conferencing

Social presence

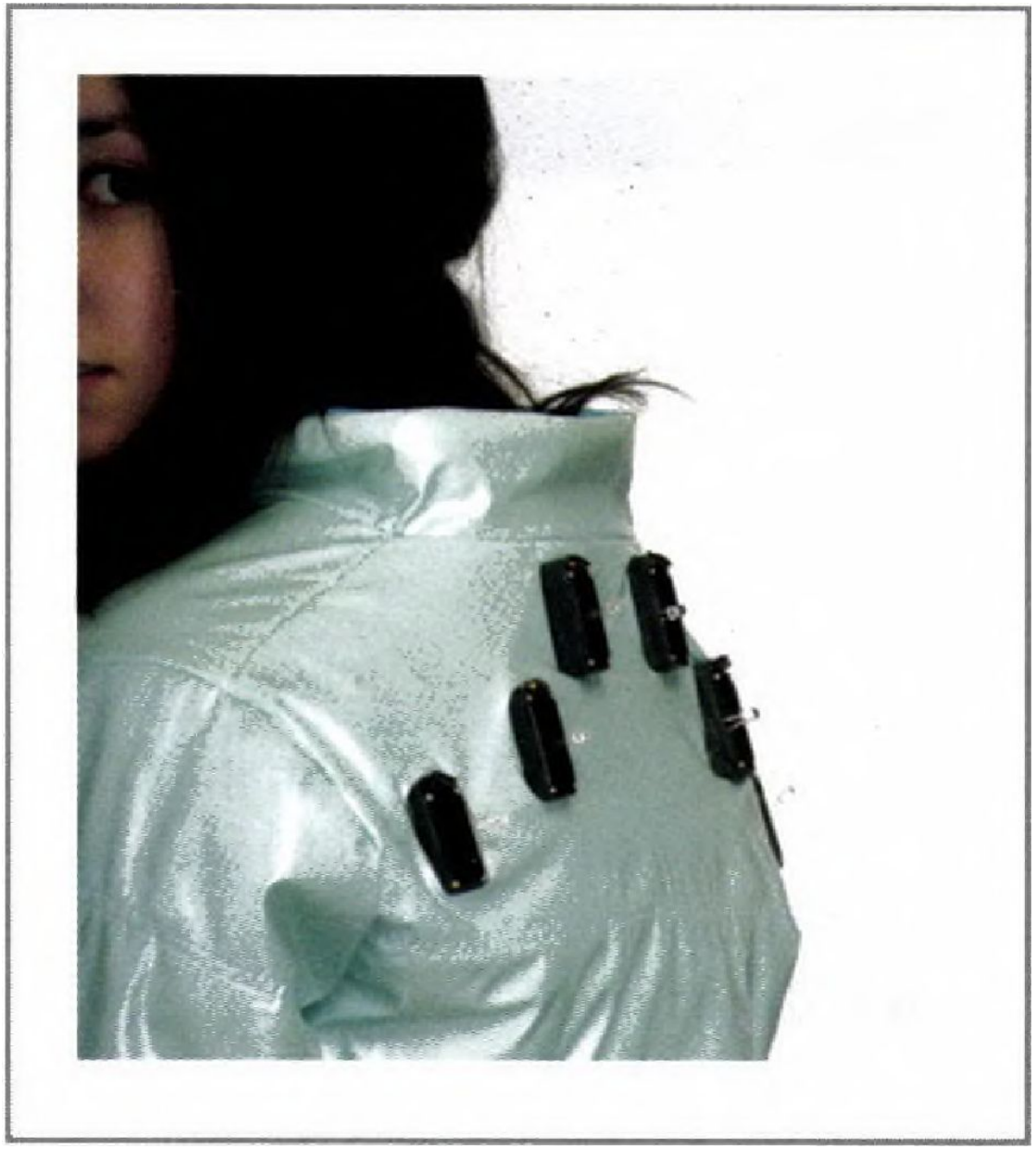


Figure 24.10 A prototype massage module attached to an SOS member's jacket

Culture and identity

- In the globalized world we live in, issues of culture and identity are increasingly important. People are concerned that globalization leads to a world dominated by the attitudes and values of big (usually American) organizations.
- Marcus and Gould (2012) discusses globalization, internationalization (preparing systems so that they can be made available for an international distribution) and localization (the process of adapting systems for particular cultures).
- He gives advice on ensuring that metaphors, icons, language, appearance and other aspects of a system are able to be localized to cultural mores.

Cultural difference

- Designers of interactive systems should be sensitive to the values of different cultures and subcultures.
- Hofstede's theories arose out of a detailed analysis of interviews with IBM employees across 53 countries. He described the patterns of thinking, feeling and acting of these cultures in terms of five dimensions.
- Power distance, individualism, masculine versus feminine, uncertainty avoidance and longterm verses short term perspective

Cultural difference

- **Power distance** concerns the extent to which a country centralizes power through strong hierarchical structures or distributes it across people in a more equitable, heterarchical way.
- **Individualism versus collectivism** divides cultures around issues of individual challenge, honesty, truth and privacy against society support for training and collective harmony.
- **Masculine versus feminine** differentiates cultures that are at the assertive, competitive and tough end of the scale from those that are at the family, tender and people-oriented end
- **uncertainty avoidance** concerns the extent to which a culture embraces an expressive, active and emotional stance against one that focuses on clarity, simplicity and reducing errors
- **longterm versus short term** perspective concerns the extent to which a culture embraces an expressive, active and emotional stance against one that focuses on clarity, simplicity and reducing errors.

Identity

- As individuals we are shaped by the cultures that we live in and the values that we hold. In the globalized world of the ‘information age’ these values are shaped, not just by our immediate surroundings and our basic needs to work, eat and play, but also by global trends and influences.
- We are a world of individuals with our profiles on Facebook or MySpace and with our own set of preferred websites.
- On the other hand we join on-line communities and feel identified with different groups and collections of individuals. The Internet makes this much easier to do.