

current activity, or a participant chose to work at the far side of the wheelchair which was obscured from the camera.

Data analysis

It was observed in each of the 24 videotapes that participants' communications concerning the work at hand frequently contained talking in association with actions. Sometimes participants made actions without talking. Seven of the videotapes with extensive segments of talking and actions were selected for detailed analysis. The total length of the segments in the seven videotapes was 2 hours 45 minutes. Data was extracted from the videotapes chronologically by transcribing the participants' talk,² describing the actions³ and noting the artefacts used, and timing the length of the talking and acting. Table 6.1 is an example of the action description style adopted to accompany the transcribing of talk.

Categorizing action

In the videotape analyzed, many artefacts were used and many actions were applied to them across a wide range of talk-type. None the less, common and recurrent actions were easily recognizable. Categories to code participants'

Table 6.1. Description of action adopted in transcribing videotapes

Time	Speaker	Transcription
1:00:40	Engineer (Engr)	He has been going into that sort of posture [ART Engr moves pelvis into sideways-sitting posture]* all the time which you know encourages that sort of curve [ART traces out curved line in the air with the spanner he is holding]. (The action description was written into the transcript, encased in square brackets [ART] with the start of action synchronized with the talk accompanying it.)
1:00:52	Occupational Therapist (Occ. Th.)	I'll put his arm up on the armrest [Occ. Th. walks over and grabs hold of Stephen's left arm at wrist and elbow and lifts it up off the left side seat and places it on the left armrest, straightening Stephen's trunk in the process.]
1:01:00	Engineer	That is something too he has got no where to he can't keep that arm on anything to help {Occ. Th.: the arm allows him to sit back}.* The armrests don't go back enough [ART Engr moves right arm in a sweep from front of the wheelchair towards the back]. {Occ. Th.: Does that feel more comfortable now, Stephen?} They are not padded big enough. You know, if he had something over that side [ART Engr has outstretched hand pointing over the side of the wheelchair] to support his arm in this sort of position [ART Engr extends same arm and points in general direction of Stephen's supported left arm which is now resting on the left armrest], then that would help. {Orthotist: Uhm.}

*[. . .] Square brackets indicate a description of artefacting that accompanied the person's talking. The person performing the artefacting is labelled, e.g., Engr – Engineer.

*{. . .} Curly brackets indicate that the labelled person, e.g., Occ. Th. – Occupational Therapist – interjected during or briefly interrupted the main speaker's talk.

actions used while communicating seating design information were developed based on evidence, visible or audible in observation of the video tapes, as proposed by Tartar (1989). Harrison and Minneman (1996) studied the use of objects by a team of three designers during a videotaped design activity and devised a five-category system for the use of objects in design. This system was expanded to six categories and modified to cover activities observed in the rehabilitation engineering videotapes that Harrison and Minneman did not consider. The six action categories and their indicative types of action shown in Table 6.2 offered an objective classification scheme that could be applied by observing the participants' actions accompanying their talk, or occurring in silence. The types of action listed in the right-hand column of Table 6.2 were developed by generalizing into simple, unambiguous movements and actions all the actions observed across the tapes. Photographs showing some examples of the Action category appear in Figure 6.2.

Categorizing talk

A system to categorize talking arose from evaluating videotape transcripts and reviewing the videotapes to find obvious groupings. The development of both the action categorization and the talk categorization schemas was assisted by members of an engineering research practice group to refine the groups and the application of coding rules. Table 6.3 shows the final schema that was developed to code participants' talk.

The consistency of the categories that were chosen for coding the talk and action data was tested by comparing the coding that was applied by three test coders and the coding that the authors had applied. One test coder was familiar with the work at the Seating Clinic; the other test coders had had no exposure to the Clinic. Each coder was: (1) given an introduction to the task they were to perform; (2) provided with notes on how to code videotape, event⁴ by event; (3) supplied a videotape of two clips of the Seating Clinic video lasting 20 seconds and 2 minutes, and (4) given rating sheets with the transcript of each event on the videotape segments and space to mark his or her choice

Table 6.2. Categories developed to classify actions that participants use associated with designing

Action category	Types of action observed
Constructing	Mock-up using artefacts, hand shapes, animations.
Locating/Indicating	Touch, tap, trace around, scribe marks on an object.
Measuring	Application of conventional measuring instrument, plus approximations using hand-to-hand span, hand-to-object distance, thumb-finger distance, etc.
Demonstrating function	Using an artefact (object) by applying force, (push, pull, rotation) to demonstrate some feature or a desired effect.
Examining	A participant investigates an object by himself.
Gesturing	Look at, glance towards an object, person. Pointing to an object but not touching it. Waving an arm at an object or person.