OBSERVATION OF HUMAN BEHAVIOR
AS A FIELD STUDY METHOD

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Among the large variety of human behaviors in daily life situations, sustaining a standing posture occurs the most frequently and recurrently (KATAOKA, 1975). A standing posture is relatively easily sustained because it can involve several antigravity muscles with frequent minor changes. During the past two decades, we have been undertaking a series of studies on changes with the times of standing postures in various real life and experimental situations. These studies applied electromyography, biomechanical methods, and direct observation. The purpose of this study is to examine the role of direct observation in describing and assessing the changes occurring during a sustained standing posture. In our study, we focus on natural changes in habitual physical movements in various daily life situations. This means human movement and the habitual physical movements in these situations. One way to analyze human movement biomechanically is the EMG method.

Figure 1 shows an experiment in which a load is being given to a finger and the muscle fatigue is observed. It is not difficult to observe muscle movement in partial exercise. We need only put electrodes on one or two places that seem to be the main working muscles. But what if this were a dynamic exercise using the entire body? Part of the main muscle moves. For example, when we lift a barbell, the main working muscle’s movement for lifting would change.

If we want to observe the changing process, we would need to put many electrodes as shown and do a tracking record (Fig. 2).

The case of very static condition “sustained long standing”

When the muscle load is great, even in a whole body exercise as in Fig. 2, we would know that the cause of the stopped movement is from radical muscle fatigue. But how will it be in an example like sustained long standing? Fatigue will gradually progress, and it is hard to identify the body part that causes the position to break down. We have done a sustained long-standing experiment on people aged from 3 to 66 (KATAOKA et al., 1981; KATAOKA, 1983; KATAOKA et al., 1984) (Fig. 3).
The time length of the sustained long-standing experiment was as follows: 10 minutes for subjects 3–8 years old, 20 minutes for those 10 years old, and an hour for people older than 11. Some subjects moved frequently, but some rarely moved. Every 5 minutes we had them tell us the degree of pain and the parts by numbers (Fig. 4). Adults who stood still and obeyed the direction complained of pain in the heel (where all the load goes). The younger children moved more. This is an example, a 3 year-old boy. The subject had many movements while standing 10 minutes with the HR kept at a low level (Fig. 5 left). On the other hand, with WF, a 4-year-old boy, frequency of physical movement was less than with the adults, but the HR level was high (Fig. 5 right). We could see that he was physiologically enduring greatly.

From these opposing phenomena, we can see the individual differences in sustaining long standing. However, many experimental reports have a tendency to evaluate the mechanical parameters higher. In an experiment in which monotonous
Experimental Situation

Fig. 3. Figure of subject standing at ease. Various spontaneous movements and some physiological response such as heart rate and respiratory rate were observed for ten minutes.

Fig. 4. The number of persons having pains in different body parts in each 5-minute interval. R: Right; L: Left.
J. KATAOKA, S. OHARA, and H. KIKUCHI

Fig. 5. A subject aged 3 had a moderate heart rate level and small variation of respiration patterns despite very frequent body movements. Another, aged 4, had a quite high heart rate level and a large variation of respiration patterns, and he showed lower frequencies of various movements.

movement or position lasts for a long time or when a child is the subject, we must attach great importance to the movement observation as one piece of data.

The case of field work

In the field of Labor Science, results of movement observations by some researchers (KISHIDA, 1973; KOGI, 1974; SAITO et al., 1972; TANII et al., 1972) were used as a way to determine the fatigue. In 1975, from biological curiosity about how often a person moves, Kataoka did research on free physical movements while standing and sitting at a train station. The subjects were recorded for a period of 3 minutes by commentary with a tape recorder. The 3 minute duration for observation was determined by a preliminary study on the waiting times of 53 males and 72 females. The most impressive part of this research was the results that
Humans have many movements under nonrestricted conditions.

These were the results. Later on we did supplementary examinations with students, but the histogram's peak was always the same (Kataoka et al., 1987) (Fig. 6). The mean frequencies of spontaneous movements were 16.8/min during standing and 14.3/min during sitting. After 1975, mainly in Tokyo, we conducted a series of observation studies on people waiting for others, using automatic vending machines (Kataoka et al., 1993), greeting others (Kataoka et al., 1989), moving in stations (Kataoka et al., 1994a) and in other situations (Kataoka et al., 1992; Kataoka et al., 1994b). The results were especially useful:

1) Subjects were observed without being noticed;
2) Subjects were alone;
3) The results were separately analyzed by age and sex;
4) Data were collected for many subjects (The number of subjects amounted to as many as 7,000 to 10,000 in some of our studies.);
5) Not conducted on Saturdays, Sundays, holidays, and rainy days;
6) Observations were done from 10 a.m.–5 p.m.;
7) Concerning the observer's fatigue, the time length of each observation was not more than 2 hours;
8) Attempts were made for the observer to be as similar as possible in sex, age, and position;
9) The measuring equipment, were tools that are small and that were not prominent, such as stopwatches, tape measures, and counters.
Recommendation of humans observing study in the field

Direct observation is therefore suited to varying field situations. It can demonstrate the natural way of living as people adapt themselves to each situation. The information obtained is often limited when we apply the method to many people. Nevertheless, the obtained results can reveal the large diversity of adaptive behavior and the various effects of environments and social systems. It is important to describe changing human behavior to assess real problems that arise for people in their living environments. Recording changes in human behavior by direct observation is one widely applicable method in particular in field conditions. Our experiences show that the results thus obtained can be a useful source of information for analyzing the relevant factors affecting the behavior.

In conclusion, I wish to list some of the merits of studies done by the direct observation method.

1) Easy to do.
2) Inexpensive.
3) Much information can be collected at once.
4) Because the method is clearly defined, objectivity can be maintained.

REFERENCES