The Effects of Time-Varying Situations on Behavior in the Meeting Place

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ABSTRACT

The purpose of this paper is to clarify by objective time-based notation how an environment which changes with time influence behavior. More particularly, this research deals with how behavior in the meeting place is affected by both time and the physical environment. At two popular meeting places in downtown Tokyo, a person's motion was recorded by three TV cameras set in different positions. The movement of each person who answered our interview after rendezvous was studied on the video tape. Items of interview included promised time to meet, description used to specify meeting place, and the experiences of using the place, which we call " initial information ". Based on observation of physical arrangements and people's distribution, several contour maps were created to show the level of "local potential" in the meeting place for three basic desires : comfortableness (refuge) , easiness to find (prospect) , easiness to be found (retreat / reveal). The person's movement trace was overlaid on these maps to see the changes of the level of potential before and after each movement. Thus a time-based notation was used to describe a series of position choices which reflect varying mental states, or the priority of three basic desires.

An analysis of behavior using the notation revealed that, (1) such initial information as specified position and expected direction of approach influence behavior while waiting; (2) different spatial arrangement of the meeting place influences position choice for having good visibility; (3) in crowded situations the desire to be found seem to be growing as time passed. Finally, we proposed implications for the design of meeting places considering temporal, spatial and psychological factors.

Keywords: Behavior, Meeting place, Time, Notation

1. INTRODUCTION

While waiting for somebody in a public place, one perceives the environmental situations, not only physical arrangements but also people's distribution, and chooses a suitable place according to one's current mental states, namely desire and/or expectation at the time. However, these environmental situations and mental states are not always constant but change as time passes, particularly on such occasion as waiting for somebody to meet at a certain promised time. If these changes occur one would choose other position. Therefore, a series of position choice are in turn expected to reflect varying environmental situations and/or mental states. This paper intends to clarify by objective time-based notation (Thiel, 1997) how an environment which changes with time influence behavior by a survey at two popular meeting places in downtown Tokyo.

2. METHOD

2.1 A Survey of the Meeting Place

Two popular meeting places in Tokyo, Yuraku-cho Mullion (MULLION), Ikebukuro Metropolitan Prism Garden (METRO), were selected after considering physical arrangement of spaces and number of alternative approaches. The physical arrangement of the places were surveyed and passenger's flow and staying person's distribution were recorded by three TV cameras set in different positions to cover the area. We interviewed persons after rendezvous. Table 1 shows the outline of the survey and the items of the interview, which included promised time to meet, description used to specify meeting place, and the experiences of using the place, which we call " initial information ".

Table 1. The outline of the survey

Survey of the meeting place (date/time)	Yuraku-cho Mullion (MULLION)	Ikebukuro Metropolitan (METRO)
	10/16/96 10/24/96 17 : 00 - 19:00	10/28/96 11/01/96 17 : 00 - 19:00
Items of interview	■Promised time	(:)
	■Experiences of using the place	(unexperienced • 2-3 times • 4 times or more)
	■Knowledge concerning the direction from which the partner came	(known • unknown) ◇If "known", then ask expected direction ( )
	■Description used to specify meeting place	free answer
	■Reasons for place choice	free answer
Items of observation	■Profile of respondent	(sex: M • F) (age: - 20 • 30 - 40 • 50 -)

2.2 Time-Based Notation and Analysis of Behavior

The movement trace of each person who answered the interview (58 in MULLION, 67 in METRO) was input into the personal computer based on the record taken by the TV cameras. In order to describe person's behavior as time passes, each person's movement is notated on the time axis as shown in Figure 1.

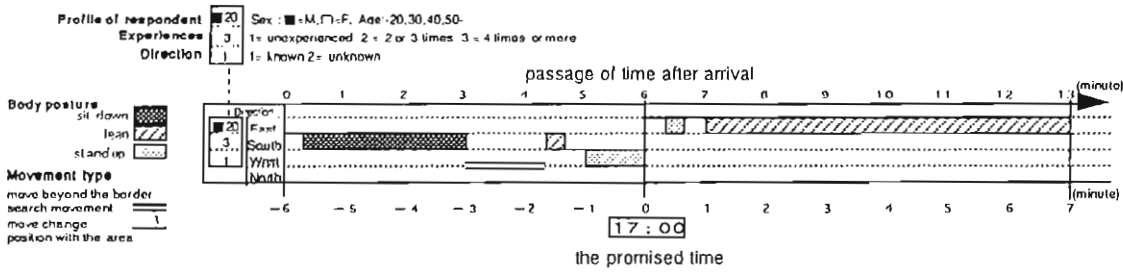

Figure 1. An example of time-based notation of a person's behavior

2.3 Description of Changes in Mental State Estimated by Position Choice

A set of charts was created to show the potential of the position for satisfying the basic desires, namely comfortableness, prospect (Appleton, 1975) and reveal which were farther classified into eight items.

For each items, a contour map like chart was created to visualize the estimated level of quality or fitness of a given position within the site. Figure 2 is an example of the chart, which shows estimated visibility to the point where a partner is expected to appear. The level of visibility in this chart was calculated using a computer program (Ohno, 1991) from the map showing density distribution of staying persons (Figure 3). The person's movement trace (Figure 4), was overlaid on the chart to see the changes in the level of visibility before and after each movement. For each of other categories, a similar chart was also created to estimate changes in the level of quality relevant to a certain desire.

Figure 2. Visibility to the point where a partner appears

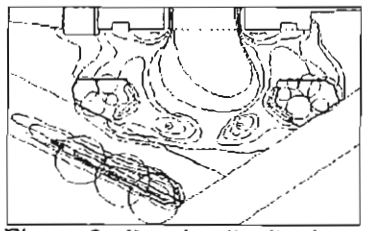

Figure 3. Density distribution of staying persons

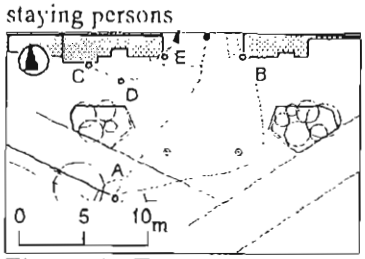

Figure 4. Trace of a person's movement on the map

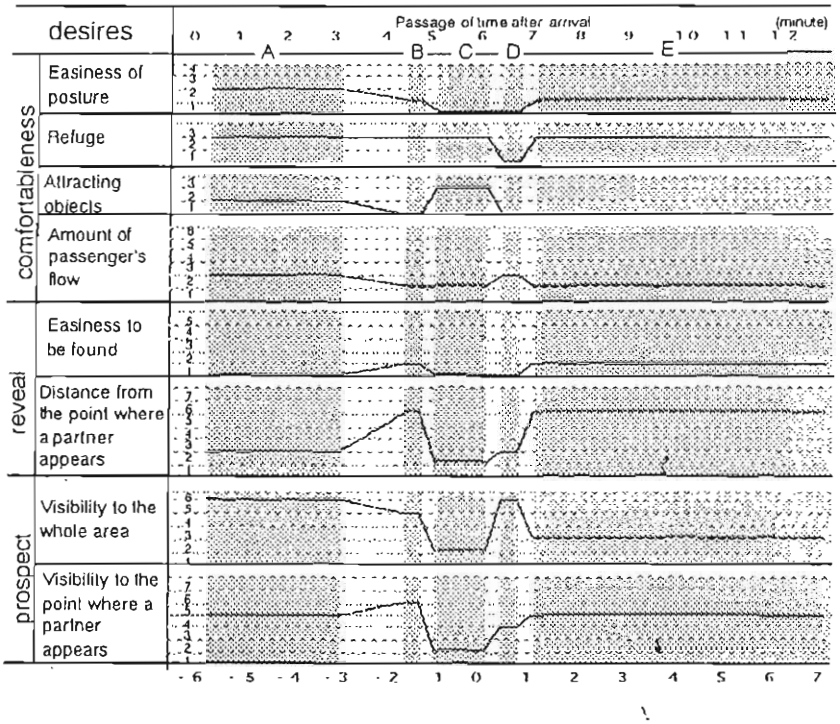

Figure 5. An example of the notation for changes in each item of desire

Figure 5 is an example of the notation which describes the changes caused by the movement from position A to position E (see Figure 4). When the person moved from A to B, level of the items related to "comfortableness" descended, while level of the items related to "reveal" ascend. As for "prospect", level of one item descended and the other ascended. These changes suggested that the movement from A to B was made to reveal oneself at the sacrifice of comfortableness. The subsequent movement from B to C can be interpreted as seeking comfortableness at the sacrifice of a chance to be found and visibility. In order to compare and analyze all the movements recorded in the survey, a simplified notation was developed. As shown in Figure 6, it simply shows the change (ascend, descend or unchang) in the level of quality related to three basic desires.

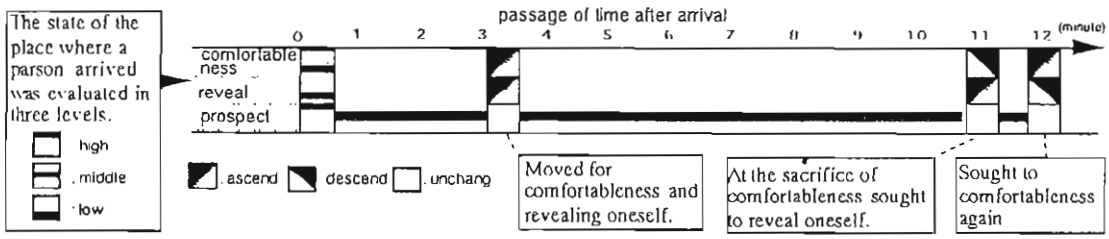

Figure 6. An example of simplified notation of changing priority of desire

3. RESULTS

3.1 Relation Between Initial Information and Behavior

Figure 7 shows the relation between time spent for moving around and the description used to specify a meeting place. It was noted that the narrower the meeting place was specified, the shorter the time spent for

moving around became. Persons with limited experience, who have not yet formed a clear image of the "domain of the meeting place" (Yoshitomi & Nakamura, 1996), show a different tendency from experienced persons: unexperienced persons often move to search even beyond the border of the domain.

Difference in behavior between experienced and unexperienced persons was also noted when the meeting place became crowded. As shown in Figure 8, experienced persons changed their positions to reveal themselves in most crowded situation, while unexperienced persons often changed their positions even in less crowded situations.

Moreover, the knowledge of the direction from which the partner was expected to come influenced on the choice of position and the body direction. These results suggested that the initial information significantly influences on the behavior while waiting.

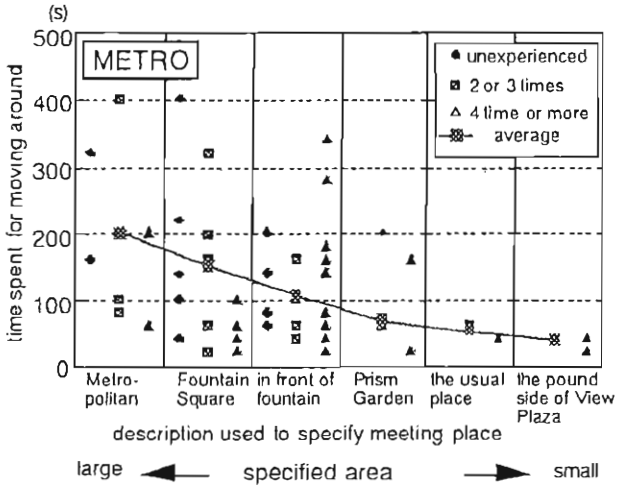

Figure 7. Relation between the description used to specify meeting place and amount of movement

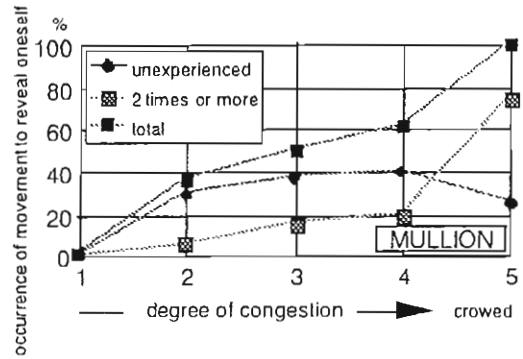

Figure 8. Change of position to reveal oneself and the degree of congestion

3.2 Influence of Spatial Arrangement of the Meeting Place

In Figure 9, reasons for position choice obtained by the interview in the two survey sites was compared. The most popular reason of position choice in METRO was easiness to find, while comfortableness was popular in MULLION.

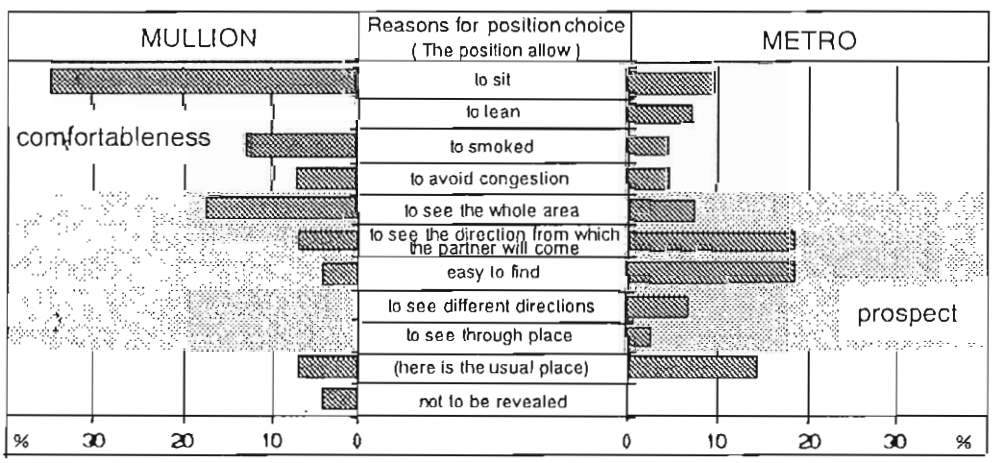

Figure 9. Reasons for position choice

In METRO, person's movement increased as time passed after the promised time, while in MULLION, person tends to stay at the same position until 15 minutes after the promised time. The quantity of movement in METRO as a whole was larger than in MULLION.

These may be caused by the different spatial arrangement: MULLION has a plaza-type space which allows people to have good visibility from most position, while METRO allows only limited visibility because there is a fountain in the center which separates into small spaces as showing in Figure 10.

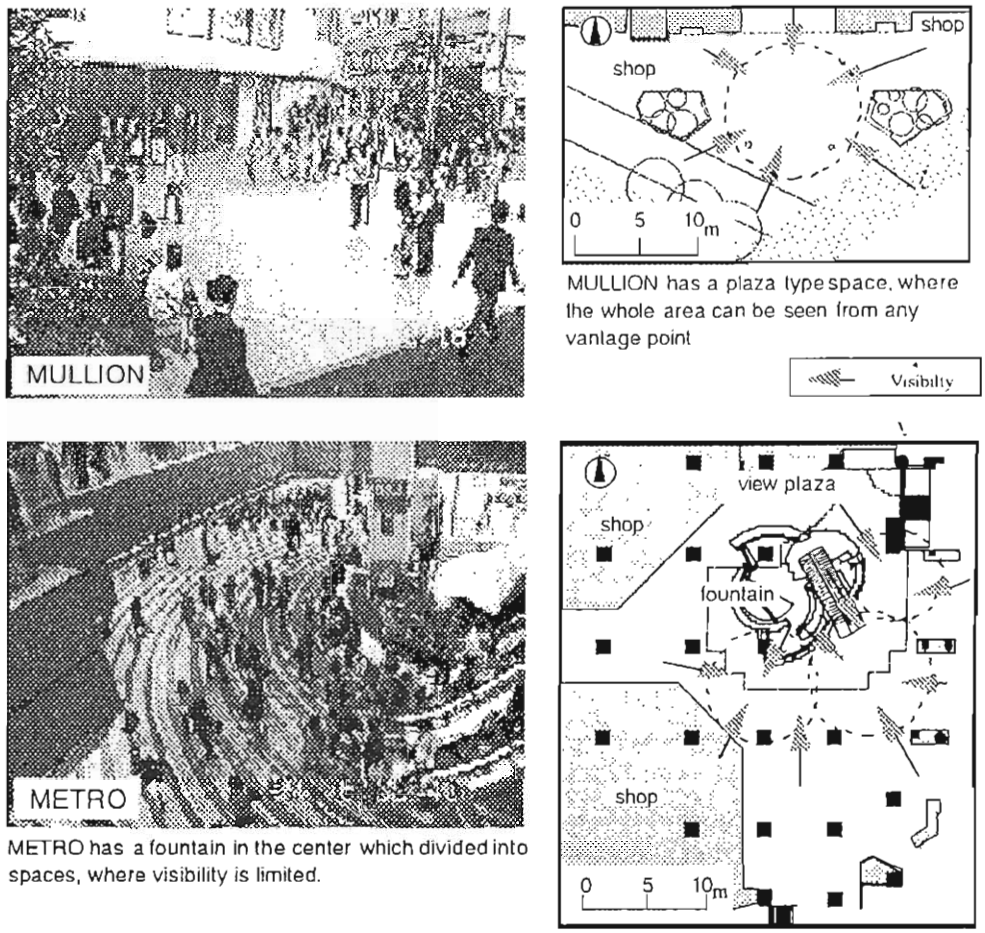

Figure 10. Physical arrangement of spaces in the survey sites

3.3 Some Common Behaviors

Using the simplified notation, a hypothesis that a certain behavior commonly occur at a certain time period before or after the promised time was examined. Since the number of analyzed cases were limited, no concrete result could be obtained. However, some common tendencies were observed in limited cases. As shown in Figure 11, person's movement to reveal oneself tended to occur around the promised time, and the movement to seek prospect (good visibility) tended to occur about 10 minutes before the promised time.

For more general discussions on the impact of time factors on human behavior, we need more data to be analyzed. At present, this study emphasize on developing methodology rather than of obtaining concrete results.

4. CONCLUSION

An analysis of behavior using the time-based notation revealed that: (1) such initial information as specified position and expected direction of approach influence behavior while waiting, (2) different spatial arrangement of the meeting place influences position choice for having good visibility, (3) in crowded situations the desire to be found seem to be growing as time passed.

Based on the present study, following implications for the design of the meeting places are proposed. (1) In order to meet varying needs and desires, meeting place should have various spaces which allow people to retreat or reveal themselves. (2) In order to use initial information effectively, each approach to from a certain transportation should be separate and clearly marked by signs. (3) To avoid congestion in the center, some spaces and objects which are recognized as local landmark and can be used to specify the position should be scatteringly placed. The objects are preferably attract person's interest. (4) To avoid unnecessary movement to search, there should be easily accessible places overlook the whole area of the meeting place.

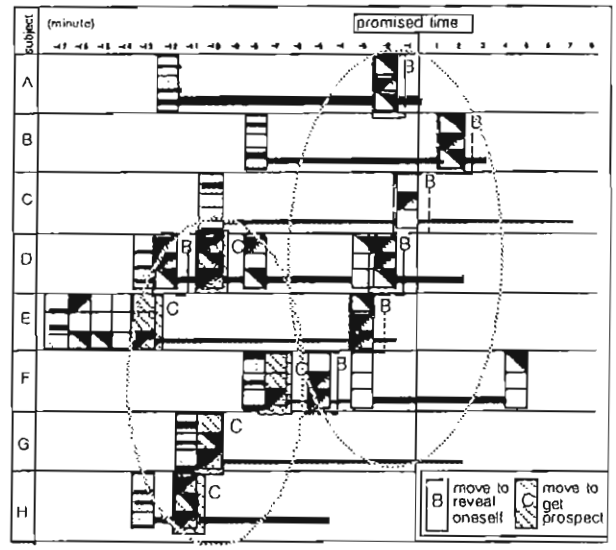

Figure 11. Some common behaviors

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