

## Chapter 3

### **Research Methodology**

This chapter deals with the research methodology used in this study. It gives detailed information on subjects of both languages, the experimental tools designed to test them, the research procedures, problems encountered in collecting the data, as well as data processing and data analysis.

#### 3.1 Subjects<sup>1</sup>

The subjects comprised 61 people as follows: 15 Thai males, 15 Thai females, 15 Japanese males and 16 Japanese females. The experimenter first set the number of the Japanese female subjects at 15 as in the other groups, but failed to keep a count. The experimenter subsequently decided not to exclude one subject from the group. The subjects for the experiment were randomly selected from a field of potential subjects with a minimum of 6 years of formal education. This means they must at least completed 6 years of elementary education<sup>2</sup>. This was to make sure that the educational background of the subjects did not affect the validity of the results obtained from the experiment. The subjects' ages ranged between 12 and 65 to avoid any communication problems that might stem from age, such as absent-mindedness and inability to have a full grip of the linguistic information during the experiment due to physical defects such as deafness or short-sightedness

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<sup>1</sup> Details of subjects are in Appendix B.

<sup>2</sup> For some Thai subjects who had had a 4-year compulsory primary education following the traditional national curriculum, it will be regarded equivalent to 6-year primary education of the present day.

and to avoid any problems of insufficient knowledge which may result from having too young people as subjects.

The subjects in both languages were native speakers who were not overly influenced by any foreign languages or cultures. So any potential Thai and Japanese subjects who had spent time abroad to such an extent that the language(s) of that particular country (countries) might influence their mother-tongue ability or ideas were excluded. A pre-experimental interview or talk with each subject was held to find out if they had been abroad for a certain length of time, to find out whether they had been influenced by foreign cultures. Japanese subjects, in particular, were questioned about their knowledge and learning of Thai. If their Thai proficiency was better than the level they had ticked on the Perception Data Sheet <sup>3</sup>, they were excluded after the first experiment. Some subjects ticked “excellent” in the column in relation to their foreign language ability; however, this did not necessarily mean that they must be excluded as long as they stated that they believed they were not culturally influenced by such foreign languages they had mastered. But one definite limitation of this interview was that the researcher could not do a thorough check (apart from a few minutes of pre-experimental interviewing) to determine whether or not the subjects have supplied correct information.

### 3.2 Experimental Tools

The experimental instruments designed for this study is the idea initiated by Grabowski and Weiss (1996). These include the board of experiment, the Perception Data Sheet, and other supplementary tools. The instruments used in the data collection were the following:

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<sup>3</sup> See Appendix A.

### 3.2.1 Board of Experiment of Spatial Frame of Reference

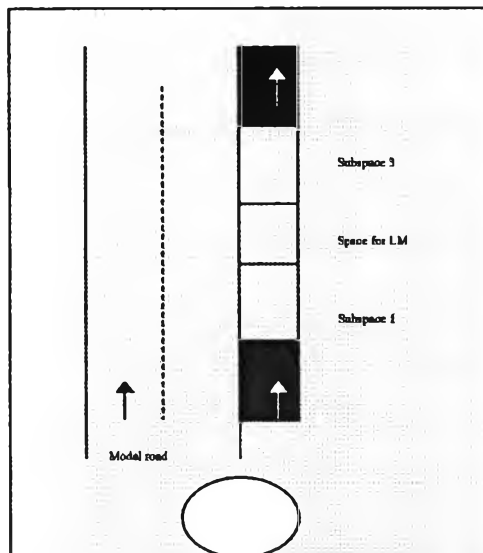


Figure 1 Board of experiment of spatial frames of reference

1. A wooden board was used, which had an area of 250 square inches (15 x 20 inches), an which was painted showing a model road containing 4 parking lots, marked black and white spaces as shown in figure 1<sup>4</sup>, and a space for the LM. The black parking areas were the parking spaces where two cars

had already been put to let the subjects know that they could park the car only in one of two unoccupied free white parking spaces, Subspace 1 and Subspace 3. The white arrows in the black spaces indicated the direction towards which the parts of the cars containing the headlights were pointed. The white box on the setting was where the car which subjects were told to imagine to be driving was placed. The black arrow in the white box indicated the direction the car was instructed to move to. The white box marked with “*space for LM*” is the area for the location of the LMs (the beetle car and the wooden tree) which are going to be placed alternately there in each experiment. The oval circle indicated the place where the subjects were going to sit and listen to the experimenter’s instructions<sup>5</sup>.

<sup>4</sup> There were no such colors marked on the real board. The black-and-white marks in this thesis are set for explicit explanation. In the actual experiment, the subjects can see the actual coloured toy cars and LM, which are placed on the board.

<sup>5</sup> There is not an oval circle on the real board. The subjects were instructed on which side of the board they are to sit and play with their toy car.

2. Two toy cars were placed in the black spaces in Figure 1 to let the subjects know that these two parking areas were occupied and they must not park the car they would be asked to imagine driving. These two toy cars were randomly picked from a set of 4 toy cars comprising two red sports cars, a red four-door family car, and a school bus. None of these cars was not the LM but were used simply as the parked cars on the street to prevent subjects from parking their toy car in these occupied subspaces because they would be instructed to park their toy car only in Subspace 1 and Subspace 3.

3. A white Volkswagen beetle was used as the LM, representing an intrinsically oriented object. It was put in the space for the LM.

4. A green wooden tree, which was approximately 9 inches in height, was used as a non-oriented object LM. This was a second LM which was placed in the space denoted LM in Figure 1.

5. A car, which different from any of the cars in set No. 3, was used for the subjects to imagine they are driving to give a friend a ride home. This car served as the TR in this experiment.

### 3.2.2 The Perception Data Sheet and a Walkman

The Perception Data Sheet <sup>6</sup>, or the recording sheet of the experiment, was designed for the subjects to fill in information about themselves. The information obtained was the subjects' names, their contact addresses, their educational background, ages and sex. The information was required for possible future reference and as criteria for

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<sup>6</sup> Example of the Perception Data Sheet is shown in the Appendix

excluding some subjects who fell outside the scope of the study mentioned in Chapter 1. The address was needed for further contact in the follow-up experiment. However, some subjects who did not feel comfortable giving their addresses were asked only for telephone numbers or email addresses, or a appointments were made right away for the second experiment if they insisted on keeping their addresses secret for some security reason. Some subjects were worried their information might be used for other purposes such as sale to commercial networks, political purposes, or an intelligence quality test (IQ).

The second part of the Perception Data Sheet was used for recording the subspaces in which the subjects parked their car. The information required in this part of the sheet was the number of the experiment, and the subspace in which each parked his or her toy car. The experimenters had to see where the subjects parked the car after receiving the instruction and were regarded to tick the appropriate box in accordance with the column: that is, showing either Subspace 1 or Subspace 3. The third part of the Perception Data Sheet was a space for recording the information obtained from the interview with the subjects after each experiment. The subjects would give their reasons why they choose particular subspaces in response to each concept (FRONT and BACK) contained in the instruction of the experimenter.

A Sony Walkman stereo cassette recorder with an external stereo microphone and cassette tapes for recording. The recorder and the cassette tapes were used to record the voices of Japanese native assistant experimenters. A pre-recorded cassette tape was played to Japanese subjects when the Japanese assistant experimenters were not present. One of the Japanese assistant experimenters (one male and one female) gave their instructions in person to the subjects.

### 3.3 Procedures

The following procedures of data collection and data analysis were implemented in connection with both groups of subjects.

1. The experimenter made an appointment with potential subjects. Most Japanese subjects were introduced by other Japanese subjects with whom I had already carried out the experiment. With Thai subjects, the researcher acted as the experimenter. But a Japanese assistant experimenter worked with the Japanese subjects and the researcher became an observer, who recorded the required information on the Perception Data Sheet. In the absence of the assistant experimenter, the tape containing instructions on what to do was played by the researcher to the subjects.

2. Before the experiment began, the experimenter set/prepared the tools, as follows: The board was placed on the table with the two cars placed in the occupied parking lots. The non-oriented object, or the tree, was placed in the LM area. A car which was used for the subjects to imagine driving to give a friend a ride home was placed at the point. If we used the tree as the LM before the beetle in each experiment, the internal orientedness of the car could influence the decision in parking the toy car of the subjects in the sub-experiment. All subjects were expected to park the car in the subspace that corresponded to the intrinsic orientedness of the intrinsically oriented LM. If this LM had firstly been used in the same experiment, it would have been possible for the subjects to park the toy car at the opposite subspace to what they had done because they found that the LM was different.

3. It was explained to the subjects what they would be asked to do. Each location on the board was explained and the subjects were free to ask

questions to make sure that everything was clearly understood before the experiment was carried out. In the absence of the Japanese assistant, the explanations were given in English before the experiment began. Then the instructions were given to each subjects that s/he was going to drive and park a car in one of the areas indicated.

4. The experimenter asked each subject to fill up the information only the first part of the Perception Data Sheet. This took approximately 2-5 minutes. The subject could then ask questions if they did not understand what to write.

5. The experimenter/the assistant Japanese experimenter(s) or the tape cassette directed the subjects in their native language instructions equivalent to the following instructions in English: “Now suppose you are driving this car (the experimenter pointed to the car parked in the circle. In case the assistant was absent the researcher remembered the appropriate part from the tape cassette, which was uttered in Japanese, so the researcher could point to the car parking while the tape was playing at the relevant time) and now that you are giving a friend a ride home (from a party). You don’t know exactly where his/her home is. So s/he is like a back-seat driver giving you directions. When you turn into this road s/he tells you to stop the car as his/her house is somewhere nearby by saying ‘stop your car *in front of / behind* (to be replaced by the locative expressions tested in Thai and in Japanese) the tree (the white beetle in the subsequent experiment). Could you please show me where to park your car?”

In each experiment, only one of the following spatial terms (naa and lan in Thai and mae and ufiro in Japanese) was used in the directions. Thus the following order might be encountered during the experiment. 1) In Experiment I, if naa or mae (in front of) was tested both with non-oriented

and intrinsically oriented objects, then lan or ufiro (behind) would be tested in Experiment II using both kinds of LM, and vice versa. 2) In Experiment I, if the term mae or naa (in front of) was tested with the non-oriented LM, then lan or ufiro (behind) would be tested with intrinsically oriented LM, in experiment II, and vice versa. 3) In Experiment I, if lan or ufiro was tested with the non-oriented LM, then naa or mae (in front of) would be tested using intrinsically oriented LM, in experiment II, and vice versa.

6. The subjects moved the toy car as they thought appropriate, on the basis of the directions given, and parked in Subspaces 1 or 3. This took less than a minute. However, for some subjects, they spent a few minutes thinking, especially when the LM placed was the tree. The experimenter did not rush the subjects into parking the car.

7. The experimenter ticked the Perception Data Sheet (part II) with either 'FRONT' or 'BACK' on the basis of the subjects' decision to park the car. These concepts were written in the language being tested. (FRONT here is naa in Thai and mae in Japanese while BACK means lan in Thai and ufiro in Japanese.)

8. The experimenter interviewed the subjects asking them for their reason for choosing certain the subspace selected for each concept tested. The experimenter then recorded the information in part III of the Perception Data Sheet.

9. The experimenter made an appointment with each subject for the second experiment to be held at least one or two weeks later to avoid the influence of the response in the first experiment. It would have been possible for the subjects to still remember the result he or she had arrived at in the first experiment with the non-oriented LM. The researcher



assumed that they had forgotten what they had done a week or more later and could begin to do the second experiment without any thought of the first experiment.

10. In the second experiment, the experimenter followed the procedures from 1-8 again (except No. 4 because subjects did not have to write their personal data again. The Perception Data Sheet was the same as that used in the first experiment except that this time the experimenter ticked the table to indicate each subject's decision on where to park the toy car in the table relating to the second experiment). In the second experiment, the experimenter tested the concept that had not been previously tested, using both LMs.

### 3.4 Problems Relating to Data Collection

Many subjects, even after hearing the instructions, parked the car right on the road near the tree when they were instructed to stop the car using an instruction containing a FRONT concept in relation to the tree. This problem was always encountered during the experiment, especially in the experiments we did with the first groups of subjects. The researcher recorded this outcome in Part III of the Perception Data Sheet, but explained to the subjects that in this situation they must obey the law by parking only in the parking areas (Subspace 1 or Subspace 3). It was very interesting that more than half the subjects parked the car on the road. This problem might have arisen from the fact that the board designed for the experiment did not convey clearly enough the pictures of the road and the tree LM. Moreover, it is relevant that the tree was placed beside the road, not in the middle of the road. In later experiments, the researcher

attempted to add the instruction that there were only two spaces where the subjects could park the toy car.

### 3.5 Data Analysis

#### 3.5.1 Subspaces in Relation to FRONT-BACK

The locations of Subspace 1 and Subspace 3 assigned on the experiment board were very significant. They were arranged so that the researcher could see how many people choose each particular subspace in response to an instruction containing one of the concepts FRONT and BACK. If FRONT was included in the instructions and the LM was an intrinsically oriented object, then it was expected that the car would have been parked in Subspace 3. Subspace 1 is thus the back of an intrinsically oriented LM. Such an interpretation implies the intrinsic frame of reference. In contrast, the conceptualization of Subspace 1 as FRONT and Subspace 3 as BACK would imply the use of the extrinsic frame of reference, which was neither expected nor investigated in this study.

Non-oriented LM produced results contrary to the results relating to an intrinsically oriented LM. In this situation, FRONT can be interpreted as either Subspace 1 or Subspace 3. If the subjects parked the car in Subspace 1 in response to an instruction containing the concept FRONT or Subspace 3 for BACK, they would be depending on the relative frame of reference using the non-oriented LM as the reference point. If, on the contrary, the subject conceptualized Subspace 3 for FRONT or Subspace 1 for BACK, they would be using the relative frame of reference, using the car TR they were imagine driving as the reference point in space.

### 3.5.2 Consistency and Inconsistency

The data was presented in tables showing the number of the subjects showing consistency and inconsistency, respectively, in perceiving the concepts of FRONT and BACK. By definition, the concepts of FRONT and BACK are opposite concepts, which must be viewed from different places in relation to the LM. That is, in both situations involving both an intrinsically oriented and non-oriented LM, if a subject conceptualizes Subspace 1 as FRONT, then s/he would be logically be expected to view Subspace 3 to signify BACK. If s/he chooses different subspaces in relation to given LM to represent different concepts he is being consistent in his/her answers. However, if a subject perceives a similar subspace as a manifestation of both concepts tested s/he is not being consistent with his/her answer.

### 3.5.3 Frequency of Parking

The frequency of parking in both experiments for each subject was counted. This was, firstly, presented from a cross language standpoint, to see if there were any observable differences between the Thai and Japanese subjects. From such a cross language standpoint, we will look into two main aspects: a comparison of the subjects in a situation with an intrinsically oriented LM and a comparison of the subjects in a situation with a non-oriented LM. In each situation we will use the consistency and inconsistency of the subjects to determine whether the consistent and the inconsistent numbers of subjects support the overall findings. The Test of Difference of Proportion of Two Populations is now applied test if the frequency given by the various subjects is consistent statically or not. Similarly, the data will be analysed comparing the two groups of subjects,

male and female. This is to see whether there is any difference in Thai male subjects from Thai female subjects, and between Japanese male subjects and Japanese female subjects.

The researcher will then discuss the frames of reference used from the standpoint of the responses of the various subjects to each of the two LMs (beetle and tree). When the LM was the beetle car the intrinsic frame of reference was expected, with FRONT implying Subspace 3 and BACK implying Subspace 1 because the part of the beetle LM containing the headlights was turned in a direction to where Subspace 3 was. Further, when the LM was the tree the relative frame of reference was expected. The relative frame of reference using the LM as the reference point would imply the treatment of Subspace 1 as the space at the front of the tree and Subspace 3 the back of it. In contrast, it was expected that the opposite subspaces would be chosen, using the relative frame, when the car TR was taken as the reference point.

The inconsistent responses were also analyzed to determine the frames of reference they implied in locating the FRONT and BACK concepts in relation to each LM. When there were inconsistencies in the data collected, the researcher analyzed the frames of reference chosen by subjects in the case of the tree as the LM because it was certain that the beetle Volkswagen would not produce any problematic or inconsistent results in the data collected. This is due to the fact that both Thai and Japanese people are very particular in using the internal properties of intrinsically oriented objects as factors controlling their selections of the intrinsic frames of reference. Inconsistencies in the subjects' responses in the case of the tree LM were used to determine whether the frame of reference observed in consistent responses is the frame of reference really used by the subjects of the languages being tested.

The last stage of data analysis was to present the system of locative expressions in Thai and in Japanese to analyze whether the system of the locative words, especially those representing the concepts of FRONT and BACK, which normally share the same spatial and temporal senses, have something to do with the use of reference frames by people of both cultures. The researcher also provided examples of the locative expressions that represent the concepts of FRONT and BACK, both spatial and temporal, as well as examples of application for Thai and Japanese locative expressions and a discussion on their role in helping speakers of Thai and Japanese decide to adopt which frames of reference in locating objects in space.