

## Describing locations in English and Japanese after real-world navigation

Steven Tripp

**Abstract** Previous research on descriptions of scenes (e.g., Mainwaring et al. 2003) relied on drawings that were interpreted as maps. The present research involved two variations on previous studies. First, students navigated in the real world. Second they discovered, rather being shown, the locations that were the object of the experiment. Four locations and an example were programmed into a GPS device. Students were shown how to use the device to navigate to the example location. Using the GPS device for navigation, students discovered the locations of three waypoints. After freely navigating on campus to the locations, students identified the locations by drawing them on a map, and then again by pointing to the locations from various assumed positions. Response time and direction of pointing were recorded. Finally, students were asked to describe in writing the discovered locations from other assumed locations, using either English or Japanese. Results showed that, although students found pointing to different locations from assumed locations approximately equally difficult; they showed a preference for using absolute terms of reference when writing English directions. When writing in Japanese, intrinsic and relative terms of reference were more frequent than when writing in English.

**Keywords** Language · Navigation · Description culture

### Introduction

Since at least 1978 (O'Keefe and Nadel 1978) the relationship between spatial cognition and language has attracted attention. Cognitive semantics (Talmy 2003) has recently emphasized the importance of cognitive representations of spatial relations that may underlie

many aspect of linguistic expression. However, others (e.g., Bowerman 1999; Levinson 2003) have noted the differing ways that speakers of different languages choose to express spatial relations. Mainwaring et al. (2003) compared descriptions of simple spatial scenes by English and Japanese speakers. Using a research model based on Schober (1993), Mainwaring et al. (2003) had subjects describe, from differing perspectives, scenes presented on paper. No differences were observed for culture, however the content of descriptions differed according to amount spatial information presented, with compass and landmark descriptions increasing when available.

In this research, subjects were asked to describe scenes but under slightly different circumstances. First, subjects navigated in the real world (a familiar location) to three "hidden" locations using a GPS receiver and upon returning to the "home" location were asked to describe, in English or Japanese, the location of target locations from various perspectives.

### Methods

This research took place at a small Japanese university and all the subjects were native speakers of Japanese. In preparation for the experiment a "home" location and three locations not visible from the home location were entered in a small handheld GPS unit (a Garmin Geko). In addition, a practice location was also entered. Forty subjects were recruited from the author's classes. The data collection was administered by two graduate students who briefed the subjects on the objectives of the experiment, explained the use of the GPS, and walked the subjects through finding the example location. The subjects then returned to the home location and were allowed to navigate freely to three target locations. The

---

S. Tripp (✉)

University of Aizu, Japan  
e-mail: tripp@u-aizu.ac.jp

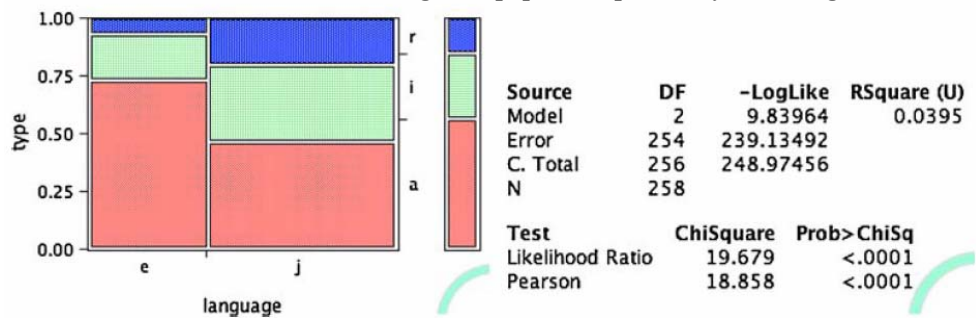


target locations were not marked physically in any way. No time limit was set for this search but most subjects finished in 10–15 min. Upon returning to the home location the subjects were given a piece of paper with a 3-D perspective map of the campus on which they indicated the location of the targets. The paper was then taken from the subject and the subject was asked to point to the location of the three targets from the home location. The reaction time was recorded with a stopwatch and the angle of pointing was estimated with a compass upon which the subjects were standing. A graduate student recorded these data and then asked the subjects to imagine they were standing at target “A” and point to the other locations, one at a time. Again reaction times and angles were recorded. Finally, subjects were given another piece of paper and asked to explain where two of the targets were from the home location and from one other target location. Half the subjects were instructed to write in Japanese and half in English, but due to confusion or stubbornness some wrote in both languages. The resulting data was collated and analyzed.

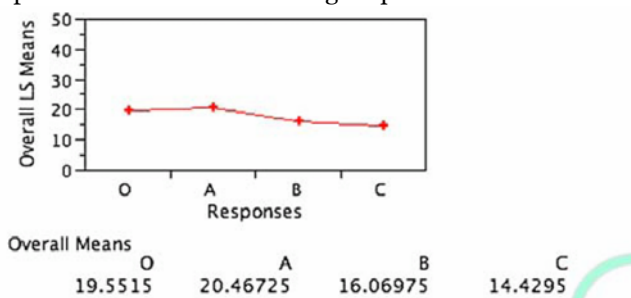
**Results**

The most interesting data involved the written descriptions. The descriptions were classified into relative, intrinsic and absolute according to Levinson’s (1999) system. The results indicated a difference according to the Chi-square test. Students seemed to use more absolute (North–South–East–West descriptions, when writing in English; Fig. 1).

**Fig. 1** Distribution of responses by language



The data for reaction times is shown in Fig. 2. The reaction times for three acts of pointing were combined into one number for each location. Contrary to what I expected the reaction times got quicker with the later



**Fig. 2** Response times for pointing from real and imagined locations

imagined locations. Location O is the home location. The reaction times went up with the first imagined location and then dropped with the second and third imagined location. These differences were significant by a repeated measures MANOVA.

Unfortunately, the data for pointing could not be analyzed because I lacked the proper software. Circular data presents a peculiar problem for data analysis because 360° and 0° are the same so the mean of 2° and 358° should not be 180°, but 0°. My statistical software cannot handle circular data.

**Discussion**

Surprisingly, Japanese students preferred absolute terms of reference when writing in English. Perhaps this can be attributed to the fact that such descriptions may be easier to express for students who are by no means fluent in English. The university campus happens to be oriented on a near North–South–East–West grid so that may facilitate using cardinal directions. However, no buildings on campus are identified by cardinal labels and it is not normal for people to use cardinal directions in describing locations on campus. The author is the only person who does such, and it unusually accompanied by a confused look from the addressees, so it cannot be asserted that the cardinal directions are familiar terms for the students. The 3D map of campus had north marked on it but that cannot explain the difference frequencies between Japanese and English expressions. Similarly, the pointing exercise, which took place standing on a paper compass, may have heightened their

awareness of the cardinal directions, but that would have been equally true for both language conditions. Also, one might imagine that the task increased in difficulty as it progressed from the home position to the imagined position, and the students might have reverted to cardinals in English because of the increased cognitive load, but the lowered reaction times indicate that cognitive load probably was not increasing. Also, an informal analysis of the length of the written answers didn’t seem to indicate that the English answers were noticeably shorter than the Japanese ones. It is difficult to compare the languages directly, because of the problem of defining word boundaries in Japanese and



also because it may be that one language is more compact in its expression than the other. A few students answered in both languages (contrary to instructions) and their answers in both languages are generally equally lengthy (or short). If any conclusions can be drawn from this research it is probably that Japanese students are lacking in the ability to use intrinsic reference frames when describing location in English. It would be interesting to know whether this hold true for students in other countries too.

### References

Bowerman M (1999) Learning how to structure space for language: a crosslinguistic perspective. In: Bloom P, Peterson M, Nadel L,

- Garret M (eds) Language and space. MIT, Cambridge, pp 385–436
- Levinson S (1999) Frames of reference and Molyneux's question: cross-linguistic evidence. In: Bloom P, Peterson M, Nadel L, Garret M (eds) Language and space. MIT, Cambridge, pp 109–169
- Levinson SC (2003) Space in language and cognition. Cambridge University Press, Cambridge
- Mainwaring SD, Tversky B, Ogishi M, Schiano DJ (2003) Descriptions of simple spatial scenes in English and Japanese. *J Spat Cogn Comput* 3(1):3–42
- O'Keefe J, Nadel L (1978) The hippocampus as a cognitive map. Clarendon Press, Oxford
- Schober MF (1993) Spatial perspective taking in conversation. *Cognition* 47:1–24
- Talmy L (2003) Toward a cognitive semantics, vol I & II. MIT, Cambridge

