Language Sciences 33 (2011) 868–891

Contents lists available at ScienceDirect

Language Sciences

journal homepage: www.elsevier.com/locate/langsci

Uniformity and variation in Tseltal reference frame use

Gilles Polian [a,*], Juergen Bohnemeyer [b]

[a] Centro de Investigaciones y Estudios Superiores en Antropología Social – Unidad Sureste, Car. a Chamula Km. 3.5, La Quinta San Martín, San Cristóbal L.C., Chiapas, C.P. 29247, Mexico
[b] Department of Linguistics, University at Buffalo, 609 Baldy Hall, Buffalo, NY 14260, United States

ARTICLE INFO

Article history:
Received 1 March 2011
Accepted 22 June 2011
Available online 28 July 2011

Keywords:
Tseltal (or Tzeltal)
Frames of reference
Space
Semantic typology

ABSTRACT

Tseltal (Mayan) speakers have been described as favoring absolute frames of reference (FoRs) in spatial language and cognition (Levinson, 2003; Brown, 2006). We present the results of a new referential communication task conducted in three Tseltal communities. The data show an overall preference for object-centered and landmark-based descriptions over absolute ones. The use of absolute FoRs varied drastically across the communities in correlation with the salience of topographic features. We argue that this variation is evidence of environmental constraints on FoR use, but not of environmental determinism as suggested by Li and Gleitman (2002).

1. Introduction[1]

Frames of reference (FoRs) are coordinate systems used to specify the location or direction of motion of a **figure** entity with respect to some reference entity or **ground** (Talmy, 2000) or the orientation of the figure. Levinson (2003) distinguishes three types of FoRs: **intrinsic** FoRs exploit inherent asymmetries of the ground object itself to project regions of space, as in *The cat is behind the house* in the observer-independent sense of *behind*. The other two types of FoRs involve a third element besides figure and ground: **relative** FoRs involve the identification of regions around a ground object according to an observer's viewpoint, as in *The cat is behind the house* under the interpretation in which *behind* selects the region at the far side from the observer. Finally, **absolute** FoRs identify regions around the ground entity based on fixed bearings, independently of both the ground and the observer, as in *The cat is north of the house*. More fine-grained distinctions are introduced below, specifically, a landmark-based type of FoR, involving a landmark distinct from both ground and observer, as in *The cat is toward the tree from the house*.

Spatial FoRs have received a renewed interest in recent years through the discovery of two important facts. The first of these is the discovery that members of different cultures show variation in the FoRs they use and in their preferences for particular types of FoRs. For instance, speakers of Dutch or English prefer relative and intrinsic FoRs, whereas speakers of Guugu Yimithirr (Pama Nyungan, Australia) use exclusively absolute FoRs and speakers of Yucatec (Mayan) regularly use all three types (Pederson et al., 1998; Levinson, 2003; Majid et al., 2004; Levinson and Wilkins, 2006; Bohnemeyer and Stolz, 2006; Bohnemeyer, 2011; *inter alia*). In addition, people have been found to display an alignment between their preferred FoR when speaking and when memorizing and reasoning about spatial arrays: for example, Guugu Yimithirr speakers not only habitually speak in terms of absolute cardinal directions but also memorize scenes the same way, whereas English speakers favor a relative viewpoint for both speaking and thinking about space. This alignment between the types of FoRs

* Corresponding author. Tel.: +52 967 674 9100.
E-mail address: gillespolian@yahoo.com (G. Polian).

[1] The following abbreviations are used in this paper: ABS: personal absolutive affix; CL: clitic; DIR: directional particle; PERF: perfect aspect; PL: plural; POS: possessive affix; PREP: generic preposition.

0388-0001/$ - see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.langsci.2011.06.010

used in language and cognition is necessitated by the lack of intertranslatability across FoRs: one cannot report a configuration in a different FoR from that in which one remembers it, unless further contextual information allows one to recode it. But what determines, then, which FoRs a particular population prefers in any given context of use? The members of the Cognitive Anthropology Research (now Language and Cognition) Group at the Max Planck Institute for Psycholinguistics have advanced the case that language, along with other observable behaviors, may be a driving force in preferences for FoR selection (Levinson, 1996, 2003; Pederson et al., 1998; Levinson et al., 2002; Levinson and Wilkins, 2006; Majid et al., 2004). This entails a causal effect of language on thought—a "Whorfian" effect. The rationale of this relativistic hypothesis is this: given that there is more variation in FoR use across populations than within, the question is how do children acquire their community's bias for FoR use? The answer, according to the relativistic view, is that the main source of information governing this development is observable behavior, such as speech, gesture, and any other cultural practices that can be directly observed (as opposed to internal practices of thinking). Each population's pattern of FoR use represents a cultural *habitus* of that community, and language and gesture are the primary vehicles through which this *habitus* is transferred across generations.

This line of research has provoked much controversy. Adopting an opposing view, Li and Gleitman (2002) and others have argued that all spatial FoRs are universally available to human beings independently of their language. According to this position, the population-specific preferences, both in terms of linguistic and non-linguistic behavior, do not represent elements of culture-specific knowledge (cultural *habitus* of referential practice), but instead are determined in terms of literacy, education, topography, and population geography (including the distribution of a population over the area they inhabit and their prevailing settlement types). Accordingly, although correlations may exist between language and cognition, there is no causation from the former to the latter (see also Bloom and Keil, 2001).

Data from Tenejapan Tseltal[2] (Mayan, Mexico) have been at the center of this controversy. Tenejapan Tseltal has been described as a language where absolute FoRs are dominant in spatial descriptions and spatial reasoning (Brown and Levinson, 1992, 1993; Levinson, 1996, 2003; Brown, 2006; *inter alia*). Specifically, Tenejapans rely on an 'up'/'down' system, whose axis is abstracted from the general slope of the terrain. In several publications, Brown and Levinson show that this axis is pervasively used absolutely, meaning independently of the local topography, at all scales, including in manipulable space, although the same terms for 'up' and 'down' also have non-absolute uses in reference to the actual local slope and absolute ones in the vertical FoR, which is **anchored** to the Earth's field of gravity, among others (see Section 3). Under Li and Gleitman's view, the Tenejapan absolute system is an effect of living in the mountains in a relatively small and cohesive speech community. Any such society, under the same circumstances, would thus be predicted to use a similar absolute system (Li and Gleitman, 2002).

A recurrent problem in this controversy has been the lack of agreement about the very terms of the debate: categories of analysis of FoRs, as used on the two sides of the debate, do not match. Li and Gleitman (2002) and other publications following the same line (Li et al., 2005; Abarbanell, 2007) rely on a classification widely used in the psychological literature, which distinguishes among egocentric (or 'viewer-centered'), intrinsic (or 'object-centered'), and geocentric (or 'environment-centered') frames (see also, e.g., Carlson-Radvansky and Irwin, 1993; Wassmann and Dasen, 1998). The basis of this distinction is what Danziger (2010) calls the **anchor** of the frame: some entity or environmental feature which defines the axes of the coordinate system. In egocentric representations, the anchor is the body of an observer. In intrinsic representations, a part of the ground object functions as anchor, and in geocentric ones, some environmental entity or feature does. The members of the former Cognitive Anthropology Research Group at the Max Planck Institute for Psycholinguistics have developed a different classification on the basis of evidence from language typology (henceforth, the 'Nijmegen classification'; Levinson, 1996, 2003; cf. also Pederson, 2003 and Danziger, 2010 for proposed refinements). These two classifications are often misunderstood as terminological variants; they in fact group FoRs quite differently. The relative type of the Nijmegen classification singles out exclusively those egocentric representations in which the ground is distinct from the observer's body. *The ball is left of the chair* is relative following the Nijmegen classification, but *The ball is left of me* is intrinsic. An absolute type in the Nijmegen classification includes only those geocentric frames whose axes are abstracted from some environmental gradient or feature and provide bearings treated as fixed throughout the totality of space (Levinson, 2003, pp. 90–92). So *The ball is uphill of the chair* counts as absolute if 'uphill' is understood to denote an abstract direction vector that remains constant regardless of the actual location of ground or observer *vis-à-vis* the hill, and as intrinsic otherwise. Any frame that is neither relative nor absolute is classified as intrinsic. This classification is justified by crosslinguistic evidence: while all languages have both egocentric and geocentric frames, many languages lack relative frames, absolute frames, or both (Pederson et al., 1998; Levinson, 2003; Levinson and Wilkins, 2006).

The first goal of this paper is to clarify in which sense the absolute and geomorphic use of 'up' and 'down' in Tseltal can be said to be influenced by environmental factors. We show that this system, in the way it is used in different communities, is constrained by the local topography, in the sense that the frequency of use of the 'up'/'down' terms depends on the location and orientation of each community with respect to a salient mountain slope that may serve as the anchor of the system. The 'up'/'down' system is also "calibrated" to the local topography in the sense that the inclination of the slope, where one is present, determines the orientation of the central axis of the 'up'/'down' system. We argue that such environmental constraints on the use of geocentric FoRs are special cases of more general principles that govern the accuracy of any FoR

[2] Following recent agreements on orthography, we use *ts* instead of *tz* for the alveo-dental affricate, so we write *Tseltal* instead of *Tzeltal*. This last spelling has been used in most previous publications in English.