Space in semantic typology: Object-centered geometries

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We present a study in semantic typology probing the relationship between linguistic resources for reference to object parts and spatial frames of reference in discourse and cognition. The background of this study is the still-growing controversy over the use spatial frames of reference (FoRs) in language and cognition. FoRs are cognitive coordinate systems used to identify places and directions. Levinson (1996, 2003) and Pederson et al. 1998 show that speakers' selection of types of FoRs in discourse predicts their use of the same types of FoRs in recall memory and spatial inference. They advance a relativistic interpretation according to which language determines FoR selection in internal cognition. Li and Gleitman (2002) instead argue that the alignment is the result of cultural factors such as literacy, education, and the adaption to topography and ecology.

Our case study was conducted as part of the project *Spatial language and cognition in Mesoamerica* ('MesoSpace' for short; NSF Award # BCS-0723694, PI J. Bohnemeyer), which investigates 15 indigenous languages of the Mesoamerican (MA) linguistic and cultural area. MesoSpace focuses on two unusual traits of spatial reference in MA: i) the widespread absence or paucity of use of relative FoRs and ii) the highly productive use of 'meronymic' terminologies that identify object parts in terms of their shape. Competing accounts for the unusually high productivity of MA meronymies invoke global analogical domain mappings (MacLaury 1989) and local shape-analytical algorithms (Levinson 1994). The overarching hypothesis informing MesoSpace is the idea that the availability of productive geometric meronymies may disfavor the use of relative FoRs in both language and internal cognition. If confirmed, this 'meronymy-allocentrism pattern' would represent evidence for a purely linguistic determinant of reference frame selection.

We collected part descriptions and placement descriptions from five pairs of adult native speakers of Yucatec, a Mayan language of Mexico, with a referential communication task involving objects of unfamiliar shape. These data are complemented by part and location descriptions elicited from seven speakers using line drawings and photographs. The Yucatec meronym system is distinct from those proposed by MacLaury for Ayoquesco Zapotec and Levinson for Tseltal Maya. Yucatec meronymy distinguishes between three semi-autonomous subsystems, which label surfaces, volumes, and curvature extremes (edges and points), respectively. The subsystems for surface and curvature extreme naming are fully productive. In contrast, the use of the volume part terms appears to be conventionalized. Spatial descriptions that are to be interpreted in intrinsic or relative FoRs must be formed with a surface meronym in Yucatec. The meronym may head either the 'ground phrase' itself - the place-denoting co-constituent of the verb - or the complement of a semantically nearly empty 'generic' preposition. If the ground phrase is formed without a meronym, or with a volume or edge/point meronym, it will be interpreted 'topologically', i.e., perspective-free.

A second referential communication task, this one involving picture-to-picture matching, examined preferences for FoRs in reference to indoor-scale spatial configurations. The task involved four sets of 12 pictures each, all featuring a ball and a chair in varying configurations, and was conducted with five pairs of speakers. The results confirm the preference for intrinsic over relative FoRs predicted by the meronymy-allocentrism hypothesis: of the total 240 locative descriptions, 45% were intrinsic, 23% absolute, 22% topological, and just 10% relative. In Yucatec, the use of both intrinsic and relative FoRs presupposes the ability to consistently reference object geometry. But the relative use of meronyms requires speakers to assign these disregarding the geometry of the ground, superimposing it with a projection of the observer's body instead. We hypothesize that Yucatec speakers disprefer this because the frequent use of geometric meronyms habituates them to mentally encoding object geometry.