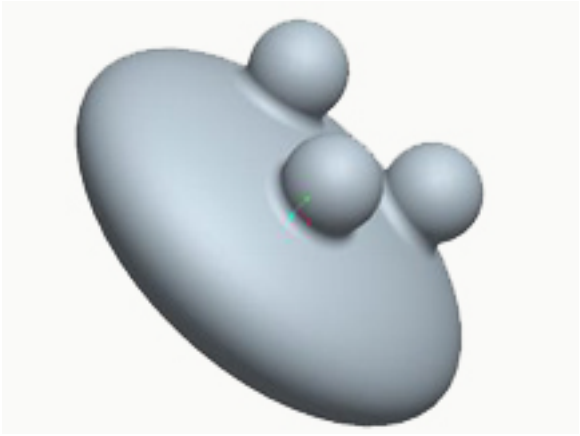
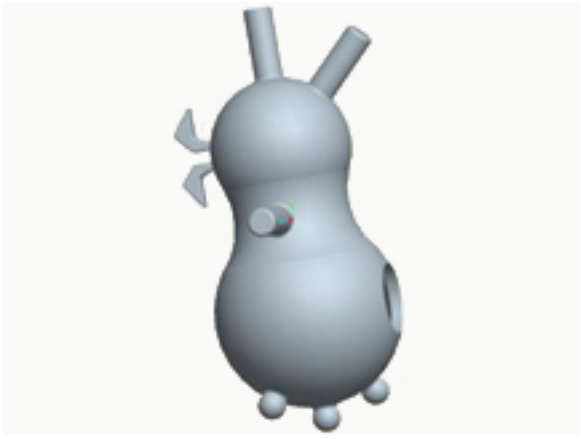
MesoSpace

Spatial language and
cognition in Mesoamerica

(NSF Award #BCS-0723694)





2008 Field Manual

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Acknowledgements

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1. Introduction

The goal of the Spatial language and cognition in Mesoamerica project (MesoSpace) is to engage in a comparative study of the representation of space in 16 indigenous languages of Guatemala and Mexico. It focuses on two typologically unusual traits of spatial language in the Mesoamerican (MA) area: the highly productive use of "meronymic" terminologies for object parts and spatial regions based primarily on object geometry and the striking preference for allocentric over egocentric (observer-based) FoR. The goal is to exploit these unique properties of the MA area as a natural laboratory for the representation of space in language and mind. To this end, an international team of specialists in the target languages will collect primary data at their field sites. Applying methods of semantic typology to a linguistic area – a first in kind - they will provide comparable descriptions of the phenomena in the target languages in order to elucidate their nature, the relations among them, the linguistic and cultural conditions of their occurrence, their diffusion through language contact, and the possible effects they may have on nonlinguistic cognition.

1.1. What space in Mesoamerican languages can teach us about the human mind

The MA linguistic and cultural area stretches from the Valley of Mexico in the North to the northern Honduran border on the Caribbean coast and well into Costa Rica on the Pacific Coast. The MA languages comprise five unrelated families: Otomanguean; Aztecan (a branch of the larger Uto-Aztecan language family); Totonacan; Mixe-Zoquean; and Mayan. A number of MA languages are isolates or of uncertain genealogical grouping; these include Purepecha (or Tarascan), Huave, Oaxaca Chontal (or Tequistlatec), and Xinca. A number of typologically unusual properties of spatial descriptions are shared across genealogical boundaries in MA. Two of these are targeted in the MesoSpace project: the highly productive use of shape-based merological terminologies ("meronymies"), especially body part terms, in reference to object parts and spatial regions and a striking preference for allocentric over egocentric (observer-based) frames of reference (FoRs).

The study of the representation of space in language provides powerful clues about the human mind. Spatial information plays a ubiquitous role in cognition. Perception is inherently "spatialized", and it has often been suggested that the conceptualization of abstract cognitive domains is based on spatial models (Gruber 1965, Lakoff & Johnson 1980, Jackendoff 1983, Boroditsky 2000, Boroditsky 2001). At the same time, because language is a symbolic and, with the exception of signed language, largely non-spatial medium, designated representational systems for the cognitive encoding of spatial properties have been argued to play an intermediate role between language and perception (Kant 1781, Johnson-Laird 1983, Jackendoff 1994, Bierwisch 1994). The properties of spatial descriptions in MA languages have the potential of revealing important insights into the interface between language and cognition. Thus, preliminary evidence suggests that MA languages label objects parts on the basis of their geometrical properties much more productively

than do Indo-European languages. The semantic typology of meronym systems in MA will reveal to what extent languages differ and to what extent they converge in the properties of object structure they express – in particular the identification of object parts in terms of shape vs. function. This in turn speaks to the question of how much – and what kinds of – spatial information is represented in language and internal representations interfacing with language (e.g., Jackendoff 1994, Bierwisch 1994, Landau & Jackendoff 1993). Moreover, the use of body part terms in meronymies varies across MA languages and between MA and Indo-European languages in how the source domain – the structure of the human, animal, or plant body – is mapped into the target domain – the structure of inanimate objects (Brugman 1983, MacLaury 1989, Levinson 1994; cf. §2-2.1). By elucidating the different types of analogical mappings involved in these systems and the conceptual relations between them, a semantic typology of meronym systems in MA languages will inform the theory of domain mappings, which have been argued to play a foundational role in language and cognition (e.g., Gruber 1965, Lakoff & Johnson 1980, Jackendoff 1983, Boroditsky 2000, Boroditsky 2001, Gentner 1983). Many MA languages differ from Indo-European languages in that they show a much more restricted use of observer-based spatial frames of reference. The proposed research will test the hypothesis that the dominance of intrinsic (object-centered) over observer-centered reference frames is a consequence of or at least made possible by the availability of productive shape-based meronym systems. If confirmed, meronym systems would be the first attested linguistic predictor of frame-of-reference selection. The question of determinants of preferences in frames-of-reference usage has attracted particular attention in connection with the demonstration of a close alignment in FoR selection for linguistic encoding, recall memory, and spatial reasoning (Levinson 1996, Levinson 2003, Pederson et al. 1998). These findings have triggered a debate over the relative importance of linguistic and cultural factors in frames-of-reference choice (Li & Gleitman 2002, Levinson et al. 2002). The MesoSpace project will significantly advance this debate, capitalizing on the diversity of the MA area in terms of ecology and potential cultural factors such as modes of production, bilingualism, and education, as well the possibility of a linguistic predictor (namely, meronym systems).

1.2. Goals and methods

In order to explore the cognitive implications of the properties of spatial language in MA, detailed descriptions of the phenomena in a wide variety of languages of the area are needed. These descriptions must afford crosslinguistic comparisons to determine which aspects are variable and which are invariant. The method that can produce such descriptions is the method of semantic typology developed at the Max Plank Institute for Psycholinguistics (Levinson et al. 2003, Pederson et al. 1998, Bohnemeyer et al. in press). Semantic typology is the comparative study of linguistic categorization – research into how linguistic representations structure a given cognitive domain across languages. The starting point is the construction of an "etic grid", a possibility space created by a few independent notional dimensions in which every linguistic categorization in the domain under study can be located as a data point. The cells of the grid are exhaustively encoded in sets of nonverbal stimuli and both preferred descriptions and ranges of possible descriptions of these are collected in a typologically broadly varied sample of unrelated languages with multiple speakers per language according to a standardized protocol.

Etic grids are conceptual spaces projected from the anticipated dimensions of the analysis. These dimensions are selected on the basis of evidence from prior research. While stimulus kits that encode the dimensions of an etic grid are not helpful in making the role of factors external to the grid visible, they do not obscure them, either. For example, (Levinson 2000) demonstrates that not all languages lexicalize color foci identifiable in terms of the two dimensions of the Munsell color

chart – hue and brightness – employed as an etic grid in (Berlin & Kay 1969, Kay et al. 1997). Yet, the demonstration is based primarily on data collected with the Munsell color chips. In the MesoSpace project, the researchers will check the data obtained in grid- based elicitation with nonverbal stimulus kits against non-elicited sources of evidence, such as recorded texts and conversational data they have collected or observed. All researchers are experts in their field languages, and five of them are native speakers (see §1.3). Their knowledge of the language and the comparison to non-elicited data will be employed to guard against filter effects of the grid and to assess the naturalness of descriptions obtained from elicitation with nonverbal stimuli. Furthermore, they will conduct follow up elicitation to go beyond the extensional data elicited with the stimuli and isolate the lexical meanings of the recorded descriptors (in particular, meronyms and expressions of spatial relations) by weeding out pragmatic meaning components (implicatures and presuppositions).

The MesoSpace project breaks new ground by applying the method of semantic typology for the first time to the languages of a linguistic area, conducting what might be called a "micro-typology" of spatial reference in MA languages. Semantic typology will be used in the MesoSpace project to determine the range of variation of the properties of spatial descriptions across the target languages. Most of the languages and language families to be targeted have not been studied at all to date for the phenomena of interest (§1.3). The method of semantic typology will also make it possible to examine the linguistic or nonlinguistic conditions under which the properties of interest occur. It will enable the team of researchers, for instance, to test the hypothesis that the availability of highly productive geometry-based meronymies favors or is a prerequisite of the greater prominence of intrinsic over observer-based (i.e., egocentric) frames of reference. Semantic typology will likewise put us in a position to examine to what extent the preference for a particular type of spatial frame of reference (in language and/or nonlinguistic cognition) in a given community is a function of geographical or ecological conditions or modes of production. Furthermore, a semantic typology of meronymies and spatial frames of reference makes it possible to study the areal diffusion of these systems through language contact. The MA languages have long been recognized as forming a sprachbund or linguistic area (Kaufman 1973, Campbell 1979, Campbell et al. 1986, Smith-Stark 1994). Many millennia of intensive contact have changed the members of the various unrelated language families so as to enhance their compatibility in formal and semantic categories. It has often been suggested that the expression of spatial information constitutes one of the prime domains of areal convergence in MA (England 1978, MacLaury 1989, de León & Levinson 1992, Levinson & Haviland 1994, Brown 2006). Up to now it is difficult to validate such hypotheses, as available descriptions are few and far between. The MesoSpace project will make important progress by mapping the distribution of meronymies and spatial frames of reference in the area. Direct evidence in support of transfer through contact comes from features shared, not in the entire MA area, but in smaller groups of languages that can be shown to at some point in time have been spoken in the same sub-region. Where features co-occur in all MA languages, this provides support for an analysis in terms of typological interdependence rather than areal diffusion; in this case, evidence from adjacent languages may prove conclusive. An example of a possible typological implicational generalization to be validated in the MesoSpace project concerns the relation between shape-based meronym systems and the predominance of the intrinsic over the relative frame of reference. If the former is a necessary condition of the latter, then all languages in which intrinsic frames are preferred over relative frames (in some domain of use) have productive shape/function-based meronymies. The principal theoretical interest in the areal diffusion of properties of spatial reference is to determine which of these properties may be subject to transfer in contact and how, if at all, they are transferred – through borrowing (transfer of lexical material) or through calquing (transfer of patterns in word formation and syntax). Finally, the semantic typology of space in MA will close significant gaps in the description of the individual languages. These records will also be of documentary value. The unique systems of spatial semantics in MA languages face the threat of becoming obsolete under the competition of the socio-economically dominant Spanish. Five of the languages of the sample are considered endangered since they have fewer than 10,000 speakers

and seven are severely under-studied (see §1.3). The recordings made in the course of the MesoSpace project will be archived and made available to the target language communities as well as the scientific community at the Archive of the Indigenous Languages of Latin America at the University of Texas at Austin (AILLA). Those portions of the recordings directly relevant to the analysis will be transcribed; transcriptions will be archived along with the recordings wherever appropriate.

1.3. The language sample and the research team

Semantic typology depends on the collection of primary data from a wide range of genealogically independent and typologically diverse languages. This data collection should, and often has to, be carried out in the field, and it can only be carried out by experts for the languages under investigation. Therefore, semantic typology is a collaborative effort. For the MesoSpace project, an international team of researchers has been assembled that includes specialists on the following languages:

- Languages from four of the eight branches of the Mayan language family
  - Q'anjob'alan (Q'anjob'al, E. Mateo-Toledo)
  - Tzeltalan (Tzeltal, G. Polian)
  - Cholan (Chol, J. J. Vázquez)
  - Yucatecan (Yucatec, J. Bohnemeyer (PI))

- Languages from all three branches of the Mixe-Zoquean family
  - Mixean (Ayutla Mixe, R. Romero)
  - Gulf Zoquean (Sierra Popoluca, S. Gutiérrez)
  - Zoquean Proper (Tecpatán Zoque, R. Zavala)

- Two languages of different branches of the Otomanguean language family
  - Otomí (E. Palancar)
  - Juchiteco or Isthmus Zapotec (G. Pérez Báez).

- A language from the Totonac-Tepehua language family
  - Huehuetla Tepehua (Tepehua; S. Smythe-Kung)

- Purepecha or Tarascan, an isolate (A. Capistrán)

- The Uto-Aztecan language family
  - Pajapan Nawat (V. Peralta), a language of the Aztecan sub-family, which is considered squarely a part of the MA area
  - Cora (V. Vázquez), which is considered MA in Smith-Stark 1994, but not in Campbell et al. 1986

- Control languages
  - A Misumalpan language (Sumu/Mayangna, E. Benedicto)
  - Seri, a language of uncertain affiliation, spoken in Sonora (C. O'Meara). There is no evidence of contact between Seri and MA languages, and yet Seri shows some of the traits of interest, such as dispositional roots and relational nouns in locative descriptions (O'Meara & Bohnemeyer in press). Seri thus seems suitable as another control to isolate possible areal features.

- Mexican Spanish is added as a baseline and because of its ubiquitous status as a socially dominant contact language in the MA area. Monolingual Spanish speakers will be recorded by the Research Assistant in a community in Mexico selected to be as compatible as possible in socio-economic terms and in terms of level of schooling, exposure to mass media, etc., to the other field sites.

Naturally, the selection of the languages included in the sample is largely a function of the composition of the research team. This is inevitable as semantic typology requires seasoned field workers with established field sites and profound knowledge of their field languages. Of course it would have been desirable to add further languages, e.g., representatives of other branches of the Otomanguean language family and controls spoken to the south of the MA area (especially genealogically or typologically related languages, parallel to the case of Seri north of the MA area). This proved impossible at present as no colleagues qualified for and interested in contributing data from such languages could be found. This by no means invalidate the language sample of the projected activity, however. Given the linguists working on MA or adjacent languages that have the requisite profile and an interest in collaborating on the MesoSpace project, the researchers that have agreed to collaborate represent the best team that could have been assembled for this project.

The MesoSpace project will close significant gaps in the description of the MA linguistic area. There are as yet no published accounts of the semantics of the meronym system or the spatial FoR used in most branches of the Mayan language family, the entire Mixe-Zoquean language family, and the Uto-Aztecan languages spoken in or near the MA area and no published records of FoRs use in any Otomanguean language. For some of the languages in the sample, preliminary evidence is already available from previous research (cf. §2 and §3 for details). However, comparability of results across languages according to the semantic typology method strictly requires data collection with the same set of stimuli according to the same protocol. It is therefore a necessary perquisite to answering the research questions of the MesoSpace project that the elicitation tasks described in §§2-3 be carried out with the same number of speakers in each of the 16 languages of the sample including Spanish.

Of the 16 languages of the sample, at least five have to be considered endangered, as they each have less than 10,000 speakers: Cora, Ayutla Mixe, Pajapan Nawat, Seri, and Tecpatán Zoque. The Mixe-Zoquean and Otomanguean languages in the sample are severely under-described, as are Pajapan Nawat and Seri. The team of researchers that has come together to collaborate on this project represents a rare opportunity. Without the collaboration of these scholars it would be impossible to carry out the work proposed here on the proposed scale. It is therefore vital to realize the MesoSpace project before the team disbands as the members commit themselves to other projects. Half of the field workers are graduate students, the other half are senior researchers. For the students, the MesoSpace project offers significant training opportunities. The project's field research campaign will be preceded by a week-long training workshop at CIESAS Sureste in San Cristóbal de las Casas, Chiapas, Mexico, during which the PI will familiarize the collaborators with the research questions, stimuli, and elicitation procedures. The students then gain hands-on experience with the methods of semantic typology in the field and afterwards in the processing of the data under guidance of the PI and the RA provided online. A second workshop at CIESAS a year after the first will be dedicated to presentations of the collaborators' individual results and the comparison in preparation of group publications. All collaborators have established field sites and are both seasoned field researchers and experts on their field languages. Four of the graduate students are native speakers of their field languages (S. Gutiérrez, E. Mateo-Toledo, V. Peralta, and J. J. Vázquez). A senior field researcher is among the pioneers of research in spatial semantics in MA (R. Zavala). This team of researchers represents a unique opportunity for major advances in the study of spatial semantics in MA languages.

2. Meronyms, object geometry, and the cognitive foundations of metaphor

Mesoamerican (MA) languages have highly productive terminologies for object parts and spatial regions, expressed by systems of relational spatial nominals or meronyms (Friedrich 1970, Levy 1992, Brugman 1983, Hollenbach 1990, Pérez-Báez in press, de León 1992, Goldap 1992). Meronyms are nouns that denote a part of an object, or a region projected from a part of an object, when possessed by a nominal that refers to the object. Some meronyms have abstract geometrical meanings such as 'edge', 'center', or 'interstice'; but all MA languages also have meronyms derived from body part terms. Semantic transfer from body parts to object parts and spatial regions may well be a universal (Svorou 1994, Heine 1997). What makes the MA case special is the productivity and semantic regularity of meronymic systems based primarily on shape and only somewhat more marginally on function. At least in Mayan and Otomanguean languages – we lack sufficiently detailed studies from other languages – it is possible to readily and predictably label any part defined in terms of shape (and only secondarily in terms of function) of any object with a body part term. In Indo-European languages, this is possible in observer-centered frames of reference (cf. §3), as when distinguishing the (relative) front, back, and left of an object in English. It is even possible intrinsically, but only in terms of function. Function-based assignment occurs predominantly along the 'front'-'back' axis. For example, the foremost part of a vehicle in the direction in which it canonically moves is identified as its 'front', as is the part of a gage or a device of information technology that includes the display or speaker, as is the part of a building through which it is canonically entered or exited (Levinson et al. 2006, Levelt 1996). Speakers of Indo-European languages are hard-pressed to assign meronyms predominantly on the basis of geometrical properties, as speakers of MA languages routinely do, e.g., when identifying the 'back' and 'front' of a leaf or tortilla (the 'back' is the rougher side) or the 'back', 'belly', 'face', 'nose', and 'buttocks' of a knife or machete. In Tzeltal (Levinson 1994), the 'buttocks' of a knife or machete is the less convex end of the dominant axis – i.e., the handle; the 'nose' is the sharply convex end of the dominant axis – the tip; the 'back' is the flatter and less featured end of the secondary axis – the dull edge of the blade; and the 'belly' or 'face' is the part opposite the 'back', i.e., the sharp edge – it is the 'belly' if it is curved (for instance, in the case of a machete) and the 'face' if not (e.g., with a kitchen knife). To quote one more example to illustrate the predominance of function over geometry in defining object parts in Indo-European languages, houses and cars have 'roofs', containers have 'lids', and pens and soda bottles 'caps'; in many MA languages, all of these are readily identifiable as 'heads'.

The Zapotecan languages have a set of seven body part terms that can be metaphorically applied to any animal or inanimate object on the basis of a global analogical mapping (Gentner 1983) of the structure of the human body in its canonical upright orientation onto the animal/object, with only minor adjustments for functionality; cf. Figure 2.1 for Ayoquesco Zapotec, based on MacLaury 1989:122-125. The same terms are used for the spatial regions projected from the object parts; e.g., gīk "head" refers to both the lid of the pot and the space on/above the pot (there are no adpositions in Ayoquesco). A different system is described for Tzeltal in (Levinson 1994). Tzeltal has about 20 body part terms that denote exclusively parts when applied to inanimate objects (there is a separate set for spatial regions; Brown 2006). The use of these is as productive as that of the Zapotec terms,

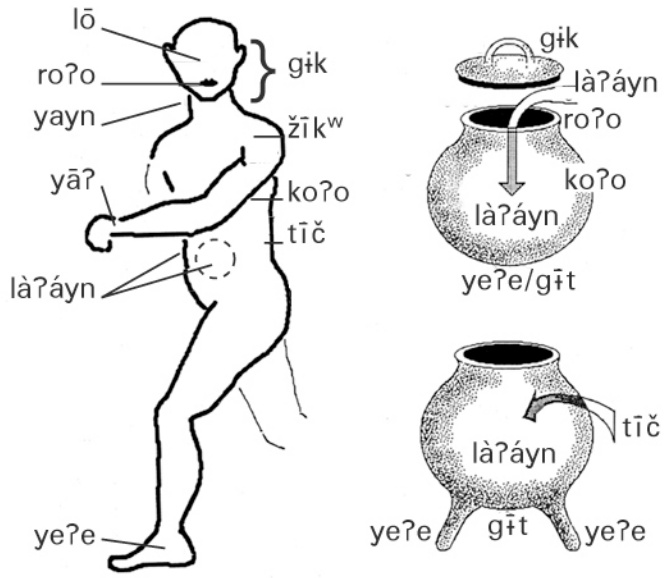

Fig 2.1. Meronyms in Ayoquesco Zapotec (adapted from MacLaury 1989)

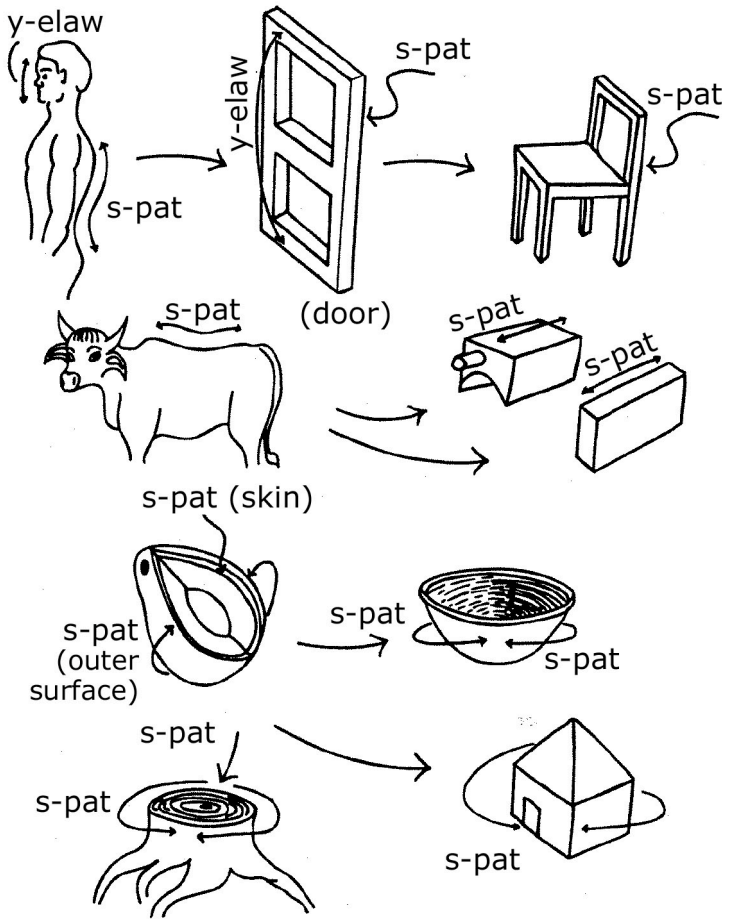

Fig 2.2.Meronyms in Tzeltal (adapted from Levinson 1989)

but it is not based on a global "structure mapping". Analogical mappings would have to be based on three different source domains – human, animal, and plant bodies – with conflicting results; cf. Figure 2.2, based on Levinson 1994:811. Levinson 1994 proposes an algorithm that might govern the assignment of body part terms in Tzeltal, based on theoretical approaches to shape recognition in vision (Marr 1982, Biedermann 1987). This algorithm involves segmentation into parts by contour, assignment of axes based on volumetric analyses, and labeling of the parts at the ends of the axes according to shape (contour) and function. An instructive example of the application of the algorithm is the labeling of the parts of a knife or machete discussed above.

2.1. Hypotheses and research questions

A first goal of the proposed activity is to broaden the database on shape- vs. function-based semantics in meronym systems. The interest here is to determine how much and what kinds of spatial information are encoded in language and in internal cognitive systems supporting language and to what extent languages vary in this respect. Furthermore, the proposed activity aims to discern the distribution of global analogical mappings and shape-based algorithms in the meronym systems of MA languages and determine whether all algorithmic mappings follow the proposal of Levinson 1994 or whether there are different algorithms. A related goal is to understand how holistic analogical mappings and shape-analytical algorithms relate to each other. The Zapotec and Tzeltal systems differ in two respects: parts on different axes are named independently of each other in the Tzeltal system – there is no global analogy governing the mapping; plus, in Zapotec, object parts are labeled on the basis of the vertical orientation of the object, whereas the Tzeltal terms are orientation-free. Levinson 1994 argues that the Tzeltal system has a conceptual basis fundamentally different from that of the Zapotec system. He makes the case for a non-metaphorical analysis of the algorithmic mappings, as the same algorithm also correctly predicts the application of the terms to human, animal, and plant body parts. However, only a minority of the terms used in reference to body parts of animate beings is also used in reference to object parts, and the proposed algorithm does not predict the uses of those terms that are not. An alternative approach might treat algorithmic mappings as a different kind of metaphor: one that relies, not on a global structural-analogical mapping, but on a global structural analysis followed by relatively autonomous local mappings. The proposed activity will explore the theoretical conditions and empirical evidence for a unified analysis and its implications for the theory of metaphor. There is evidence that the two systems converge. PérezBáez in press and Pérez Báez & Bohnemeyer 2007 show that Juchiteco Zapotec has, in addition to counterparts of the general orientation-sensitive terms described by MacLaury 1989, a larger set of orientation-free terms which appear to be used just as productively as those of Tzeltal. Figure 2.3 illustrates this for the parts of a hammer. There is no structural difference between the two sets of meronyms. The coexistence of orientation-free and orientation-bound terms in one and the same structural system casts doubt on the analysis of the orientation-free terms as non-metaphorical, as it seems implausible that Juchiteco speakers would use metaphorical mappings only for the orientation-bound terms. Besides, the two systems often map the same body part terms onto the same object parts. For instance, in both systems, orifices are referred to as "mouths" and edges as "lips". Aside from providing further evidence of the conceptual similarity of the two systems, such shared metaphors are of a wider interest. Spatial metaphors shared across the MA area are considered calques (borrowed semantic patterns) and one of the areal traits of MA (Kaufman 1973, Campbell 1979, Campbell et al. 1986, Smith-Stark 1994). In the context of the semantic typology of meronym systems in MA, this raises the question whether the extent of such calques is limited to individual metaphors or whether it can be said that MA languages have borrowed entire productive systems of labeling object parts from each other. The proposed project will enable us to answer this question. Finally, of central concern for the proposed activity is the question of the relationship, if any, between the availability of productive geometry-based meronymies and the

preference for intrinsic (and, in some instances, also absolute) over observer-based frames of reference. This issue is discussed in §3.

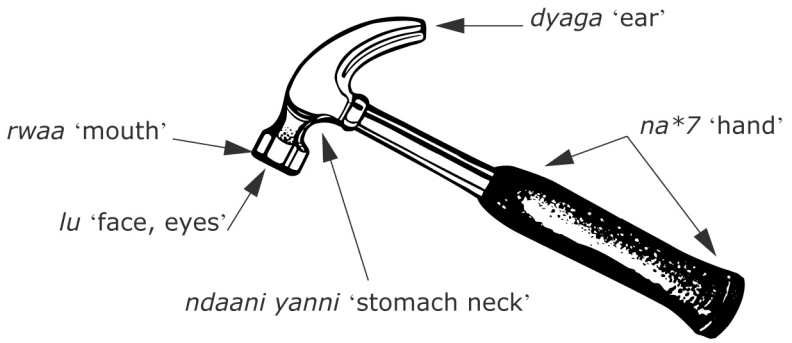

Fig 2.3. Orientation-free terms in Juchitán Zapotec (adapted from Pérez Báez in press)

2.2. Elicitation task: body part terms

2.2.1. Stimuli and task in a nutshell – Elicitation of labels for human, animal, and plant body parts along with their approximate extensions based on picture stimuli.

2.2.2. Goals – Body part terms (BPTs) are the meronyms *par excellence*. In many languages, and quite possibly universally, the richest and most fine-grained meronymy is that of the human body. Again perhaps universally, BPTs are extended to serve as the metaphoric basis of meronymies in other domains. As mentioned above, throughout MA, meronyms used outside the body domain are to a very large extent a proper subset of BPTs. One of the primary goals of MesoSpace is to determine how these extensions work - whether they are metaphorical, as described by MacLaury for Ayoquesco, algorithmic, as argued by Levinson for Tzeltal, or a mixture of both. We begin by collecting an inventory of BPTs for each language. The tasks described in the following sections then probe to what extent BPTs are used outside the body domain.

2.2.3. Materials – There are altogether 19 illustrations in this set. The first 11 show humans. There are pictures each of a man and a woman, front and back, with various degrees of clothing from nude to clothed with shirt and shorts. Choose the images that are appropriate to your community. Next, there are images of a dog, a chicken, a fish, a fly, an avocado, a tree, a corn plant, and a cactus. In preparation of conducting this task, please make, of each picture, at least one copy per participant (except for the fig-leafed or nude varieties you don't intend to use with the particular participant). Furthermore, you'll need a set of color pens or crayons.

2.2.4. Elicitation: issues – The elicitation of BPTs is fraught with a number of well-known problems:

Most languages don't have a word for "part". So it's not a trivial matter to explain to your consultants what you are looking for.

Like all meronyms, BPTs are semantically relational.[1] Therefore, they will be inalienable in languages whose grammar distinguishes between alienable and inalienable possession. This may mean - depending on the language - that their base form is possessed and a non-possessed form requires special morphology or does not occur at all.

Animal and plant body parts may be referred to differently depending on whether they are parts of a living body or prepared/traded as food, material, etc.

People's ideas of how body parts are spatially delimited tend to be rather vague.[2] This might have something to do with the fact that body parts typically have a complex internal structure involving different substances - bones, soft tissue, sinews, blood, etc. - and this structure is covered up by skin. Consequently, saying how a certain part is called tends to be easier than saying up to where exactly the part so labeled extends. On a related note, it may be hard to establish the precise denotata of BPTs for internal organs.

As in any mereology, the body may not be exhaustively segmentable into parts all of which are lexicalized (in everyday colloquial registers). For example, torso is certainly a perfectly good anatomical term - but it seems to belong to a more technical register than arm, leg, and head (and to a more formal and technical register than trunk, which is evidently a metaphor).

As in any mereology, some parts may only be talked about as parts of other parts, not as parts of the full body. One reason for this happening may be that the BPT in question is semi-compositional. For instance, in English, it would be misleading to talk about the top of your foot as "your top". Similarly, in Yucatec, my fingers are referred to as "the offspring of my hand" and you would likely be misunderstood if you were trying to refer to them as "my offspring".

Finally, cultural norms may prevent speakers from talking (to the field worker) about the sexual organs and other body parts or indeed even from (them and/or the field worker) knowing terms for these parts.

2.2.5. Elicitation procedure – BPT elicitation: procedure - Start by handing the speaker the color pens or crayons and writing an identifier for the speaker (whatever code you use, or the name if the speaker prefers it) down at the top of the sheet with the picture. (Be sure to put the identifier of the speaker on every picture you work with.) You may want to start with those BPTs you already know - probably including the terms for "arm", "leg", "head", "back", and so on. Ask the speaker:

> "Show me (where) his/her arm/leg/head/... (is)! Please color them for me!"

Repeat with all the basic terms you already know. However don't extend this procedure to BPTs that name subparts or to terms of which you are not entirely sure as to whether they really are general-currency BPTs! Where possible use different colors for adjacent parts. Label the parts the speaker has identified with their BPT in pencil. Use the possessed form ("his/her arm/leg/head") without the expression of the possessor. Establish on the side whether it is possible to say:

> "This is called 'arm/leg/head/...'" instead of "This is called 'his/her arm/leg/head/..."

You don't need to test this for every term. (But see section 2.6 for general guidelines for the analysis of meronyms!)

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[1] A brick may be a part of a house, but *brick* is nevertheless not a meronym.
[2] Unless, perhaps, they are surgeons or butchers, etc.

Now comes the crucial generalization from individual body parts to the concept of body parts in general. You may want to use the Spanish term *partes del cuerpo* for this purpose:

> "You have just taught me how his/her arm, leg, and head (etc.) are called. These are examples of what is called in Spanish *partes del cuerpo*. But there are many more such partes. For example, there's this [wag your index finger]. And this [draw with your index finger a circle around the palm of the other hand]. And this [point to the tip of your elbow]. And this [point to your nose]."

Continue until you are sure the speaker gets the general idea. Now:

> "In Spanish, all these parts have names, too. For example, this is called my *índice*; this is called the *palma* of my hand; and this is called my *nariz*. I want you to teach me all the words for *partes del cuerpo* in your language. Please show me on the picture what each word means as you did before, by coloring the *parte*."

You want to be sure here not to actually elicit translations of the Spanish terms. The Spanish terms only serve as examples to illustrate the concept of body parts and BPTs!

When the speaker runs out of parts to name, probe unlabeled parts, including subparts of already labeled ones. Investigate whether the language makes a distinction between left and right, and whether there are any restrictions in the use of these distinctions. Use pointing gestures to your own body and/or that of the speaker for clarification whenever needed to clarify the reference of a term; annotate the label accordingly. Ignore internal parts unless you happen to know that the terms for certain internal parts are extended to inanimate objects. If not, they are irrelevant for MesoSpace purposes. If you get multiple terms for the same part, try to determine whether they are synonyms (except, perhaps, for register and connotation) or stand in a meronymic relation to one another (i.e., one names a subpart of the part described by the other). Finally, check for inconsistencies between the current speaker's responses and those you collected from others.

When you are done with one picture, move on to the next. Continue from humans to animals and on to plants.

2.2.6. Recording, archiving, analysis – The primary output of this task consists of the colored and labeled copies of the pictures. There is no need to audio- or videotape. Be sure to make photocopies of the labeled pictures or, better yet, scan them to PDF, at the earliest possibility! The most practicable archiving solution may be to archive the PDFs; we will look into this. Your processed output for the project will be a copy of each picture you worked with, with labels consolidated from the speakers' responses and with the denotata of the labels indicated through approximate boundaries drawn on the figures and, where necessary, coloring. In comments, add any observations regarding the form and semantics of the BPTs that think are potentially relevant to MesoSpace.

2.2.7. Time constraints – It will take you approximately an hour to complete the set of pictures with a relatively fast participant.

2.2.8. Participants – This task should ideally be conducted with 10 speakers per language. Run five and see how much variation you get. If variation is low and what little variation you get is readily explicable, leave it at five speakers. Otherwise try for 10.

2.2.9. Stimulus – The 14 illustrations needed for this elicitation task are included in Appendix A. For improved quality, it is recommended that you produce the necessary printouts directly from the electronic version of the manual rather than using photocopies.

2.3. Elicitation task: artifact meronyms

2.3.1. Task in a nutshell – Elicitation of labels for parts of Mesoamerican (MA) and Western artifacts based on picture stimuli.

2.3.2. Goals – Participants are shown a set of pictures of artifacts of everyday use in MA culture. To the extent that the identification of artifact parts is partly influenced by functional properties, it is expected to deviate from purely shape-based principles. Artifacts of Western culture with parts commonly identified functionally in Spanish are included as well, especially where the Spanish labels for these deviate from the labels predicted by geometry. For example, what speakers of English or Spanish would identify as the rear part of a bus or truck based on the direction in which the vehicle canonically moves would be identified as the "buttocks", not the "back", in Tzeltal according to Levinson 1994; the "back" may in fact be the roof of the vehicle (depending on the exact shape). Clashes such as this make it possible to investigate whether Spanish usage has an influence on meronymic terminology, especially in bilingual speakers.

2.3.3. Materials – There are altogether 7 photographs in this set to use as guide and coding sheets. These are a machete, a hoe, a basket, an *olla*, a comal, a car and a television. Use the photographs as a guide to collecting real objects that are culturally appropriate to your community of study, as you will need actual objects for the elicitation task. It is suggested that you make photographs of the artifacts you collected to create coding sheets. You'll again need a set of color pens or crayons.

2.3.4. Elicitation procedure – It is recommended that you precede this task with the body part elicitation task described above. The procedure is basically the same. First, however, you need to introduce the concept of object parts:

> "Up to now, we have been talking about the partes del cuerpo. Now, things such as a machete or a car have partes too. For example, the machete on this picture can be said to have a *mango*, an *hoja*, a *filo*, and a *punta*. How do you call the parts of the machete in your language? Can you teach me the names as you did before, by coloring the *partes* they refer to?"

As before, the Spanish terms serve only to get the idea of object parts and their labels across; we do not want to elicit translations. In you elicitation, you should also investigate whether the parts of the artifacts change in name or not when the object is rotated.

2.3.5. Recording, archiving, analysis – As in the case of the body part elicitation task, the primary output are the colored and labeled copies of the pictures. Again you want to make copies of them or scan them as soon as possible. Your contribution to the group analysis will again be a copy of each picture with consolidated labels.

2.3.6. Time constraints – This task should take you no more than about 20 minutes per speaker.

2.3.7. Participants – This task should ideally be conducted with 10 speakers per language. Run five and see how much variation you get. If variation is low and what little variation you get is readily explicable, leave it at five speakers. Otherwise try for 10.

2.3.8. Stimulus – The 7 photographs needed for this elicitation task are included in Appendix B. For improved quality, it is recommended that you produce the necessary printouts directly from the electronic version of the manual rather than using photocopies.

2.4. Elicitation task: location with regards to parts – meronyms as ground-denoting nominals

2.4.1. Task in a nutshell – Elicitation of locative descriptions with respect to body and object parts as referential grounds based on picture stimuli.

2.4.2. Goals – The goal of this task is to investigate the syntactic and morphological properties of locative constructions. In particular, we seek to identify syntactic differences and/or commonalities in the expression of topological relations and the expression of relations based on projected space.

Of special interest is the use of BPTs and meronyms in general as ground-denoting nominals in locative and motion descriptions. Many Otomanguean languages lack adpositions altogether and canonically employ meronyms as heads of the "ground phrase" (the expression that denotes the place at which the "figure" is located; e.g., MacLaury 1989; Brugman 1983; Hollenbach 1990; Pérez Báez in press); some Mayan languages use a generic preposition augmented by a meronym (Brown 2006), while others have mixed systems in which some meronyms head the ground phrase and others combine with a "generic" preposition whose main function seems to be to mark the conversion from object to place function (Bohnemeyer & Stolz 2006; Bohnemeyer in press; Pérez Báez & Bohnemeyer ms.). As MacLaury 1989 observes, meronyms used in reference to spatial regions are not always identical to those used to identify the parts from which the regions are projected. In both Ayoquesco Zapotec and Yucatec Maya, the 'front' part of a table is the top, whereas the 'front' region is the region closest to the observer provided none of the sides is intrinsically designated as 'front'. The shape and function of the parts appear to be less important in the identification of the regions projected from them. To study the use of meronyms in locative descriptions, a placement task complement the elicitation of BPTs.

2.4.3. Materials – Use the same pictures of human, animal, and plant bodies and artifacts you used for the meronym elicitation tasks described above. However instead of recording responses on paper, you will want to audio-tape and/or directly transcribe them on your computer.

2.4.4. Elicitation procedure – You do not need to run the following procedure for all the meronyms you previously elicited. The configurations required for this task are below, and you may decide within these parameters, which configurations to elicit according to what is interesting in your language of study:

- There are 5 elicitation domains: human body, animal body, plants, cultural objects (*olla, comal, machete,* basket, etc.) and "western" objects (car, television).
- For each domain, elicit:
  - 2 configurations in which figure and ground are in a topological relation: 1 of contact, 1 of inclusion.
  - 2 configurations in which figure and ground are in a projective relationship.

For each "holonym"[3] - i.e., for the human body, for each animal and plant body, and for each artifact - try one or two highest-order meronyms (meronyms that only accept the holonym as a hypernym) and one or two second-order meronyms (meronyms that do accept hypernyms that may in their turn be possessed by the holonym). Use one of the following elicitation frames (these differ by spatial relation: topological - surface contact vs. containment - vs. projective; if possible, try examples of all three types):4

"There is a fly on your/his/her/its arm/leg/shoulder/elbow/tail/root/..."
"There is an ant in your/his/her/its nose/armpit/ear/hair/..."
"There is a spider behind your leg/under the dog's tail/in front of the tip of the machete"

Pick a "figure" - object to be located - that is suitable given the ground. What matters is that the ground is in each case expressed by a meronym. In other words, the ground isn't the addressee themselves, but the foot of the addressee; isn't the machete, but the tip of the machete, and so on.

2.4.5. Recording, transcription, analysis – Recording, transcription, analysis - Audio-taping is recommended; but feel free to transcribe on your computer or on the annotated pictures used as coding sheets in the meronym elicitation tasks instead or in addition. The critical part of the responses is mostly the ground phrase, i.e., the oblique or adjunct that encodes the place at which the figure is located. We are interested in the form of the locative predicate only to the extent that it affects the form of the ground phrase. The primary output of this study you would contribute to the group analysis is an answer to the following question:

When the head of the ground-denoting nominal is a meronym, does the ground-denoting nominal combine with an adposition or a second meronym that expresses the spatial relation - the "place function" that maps the ground into a place defined with respect to it - or is the ground-denoting nominal identical to the ground phrase?

For illustration, compare the following two examples from Juchiteco Zapotec (1) and Yucatec (2):

(1) Nuu* sumbre*ru i^ke=be*
EXIST hat head=3
'The hat is on his head' (Pérez-Báez p.c.)

[3] A term I just made up, denoting a maximal hypernym of which a given meronym can be a hyponym. The holonym describes a kind of object that has parts, but is not itself a part of a larger object *in the same sense*. For example, your nose is a part of you (or your body, and your body is a part of you) and you are a part of (the faculty or student body of) your department, but your nose is not typically thought of as a part of your department. So *body* is a holonym for *nose*, while *department* is not.

[4] Topological relations are orientation-free. They involve proximity, contact, attachment, or inclusion/containment. In contrast, projective relations require a frame of reference for their interpretation.

(2) Ti'=yàan le=p'óok t-u=pòol le=máak=o'
PREP=EXIST(B3SG) DET=hat PREP-A3=head DET=person=D2
'The hat is on the man's head'

These are descriptions of the same picture of a man wearing a hat. The speaker is trying to answer the question "Where is the hat?" In both cases, the man's head is selected as the primary ground. In (1), the meronym "head" is the head - no pun intended - of the ground phrase, and the ground phrase is identical to the possessed nominal that denotes the ground. There is no morphological expression of the mapping from ground object into place. In contrast, in (2) - as in English or Spanish - this mapping is expressed by a preposition, albeit a semantically nearly empty "generic" preposition t(i')-. What we want to know is whether your field language patterns with Juchiteco or with Yucatec, or whether both strategies occur, the selection depending on the particular meronym and/or spatial relation. Add a few examples of locative descriptions that illustrate your analysis. You do not need to transcribe your data beyond whatever you need to answer the question and provide supporting examples.

2.4.6. Time constraints – This task should not take you more than 20 minutes *tops* per speaker.

2.4.7. Participants – As above: this task should ideally be conducted with 10 speakers per language. Run five and see how much variation you get. If variation is low and what little variation you get is readily explicable, leave it at five speakers. Otherwise try for 10.

2.4.8. Stimulus – The 13 illustrations and 6 photographs needed for this elicitation task are included in Appendix A and B. For improved quality, it is recommended that you produce the necessary printouts directly from the electronic version of the manual rather than using photocopies. Remember to use actual artifacts rather than the photographs for this task as well.

2.5. Elicitation tasks: productivity and mapping – meronyms for novel objects

2.5.1. Stimuli, tasks, and goal in a nutshell – Two object-to-object matching tasks, employing a set of objects of novel shape, in the sense that they (or at least the more complex among them) do not resemble any objects or animals recognized in either Mesoamerican or Euro-American culture. The first task targets the labeling of the parts of the objects, to test certain ideas about Mesoamerican meronym systems. The second looks at reference to locations defined with respect to the novel objects, exploring the relation between meronymies and spatial frames of reference.

2.5.2. Materials – You'll need two copies of each of the nine objects, made of plastic. There will be two participants per trial, who you will have to seat next to one another at a table, facing in the same direction, separated by a screen (see Figure 2.4). Use for the screen whatever works for you; one solution frequently used in the field is the fieldworker's suitcase. As always in referential communication tasks, the screen should ideally block attention sharing between the participants entirely, but should minimally occlude the stimuli and the participants' hands when manipulating them. For the part identification task, a generous supply of bright yellow paper stickers is required. You will use these stickers to mark the parts to be matched on the "director's" copy of each object as per the instructions given below, and the director will then instruct the "matcher" to place a

sticker on the corresponding part of their copy of the same object. For the placement task, you need two sets of dime-sized color chips or coins. Use these to mark the locations to be matched for the director, as per the instructions below, and the matcher will place a second set of chips/coins according to the director's descriptions. For the part identification task, you'll need one or more canvas bags. Each object is handed to either participant in such a bag so as to avoid stipulating a particular orientation. The "landing sites" where the stickers/chips are supposed to be placed are shown in pictures at the end of this manual entry. Both tasks should be video-taped.

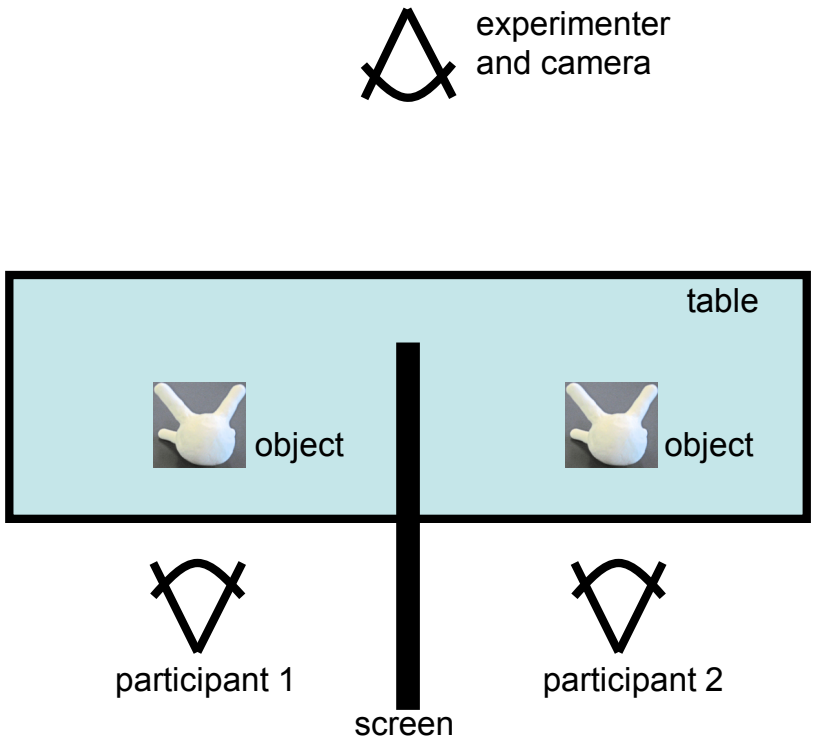

Figure 2.4. B&C matching game layout

2.5.3. Layout – see Figure 4. The screen should ideally inhibit attention sharing between the participants entirely, but at a minimum must occlude the pix.

2.5.4. Recording – The central data are the verbal descriptions produced by the participants and the referents of these descriptions. Audio-recording alone is sufficient to capture the former, but may not do as a record of the latter. The stickers in the part identification task really only mark a point on a part of the object; the boundaries of this part are determined by the participants. Something similar holds for the placement task. It will therefore be useful to video-tape both tasks and try to pan on the participants' hands as they gesture in reference to the objects while talking about them.

2.5.5. Time constraints – Each of the two tasks takes 15-25 minutes.

2.5.6. Participants - Each task should be run with a minimum of five pairs of speakers per language. It is not necessary to complete both tasks with the same participants. Participants doing both can do them in either order.

2.5.7. Background – Our goal is to survey the semantics of the meronym system of each language and to compare the results toward a semantic typology. The novel-objects stimuli are deployed in two referential communication tasks, one targeting labeling of parts, the other targeting reference to parts in placement (i.e., locative descriptions). These are accompanied by tasks and stimuli for the elicitation of meronyms for human, animal, and plant bodies and conventional objects (cf. §§ 2.2-2.3). Here are some of the research questions driving these studies:

How productive are meronymies across the languages of the sample?
Productivity is assessed in terms of the ability to label parts of objects that are not conventional in either MA or Western culture. To what extent is meronym assignment in MA based on shape/geometry and to what on function? Available accounts (Brugman 1983, de León 1992, MacLaury 1989, Levinson 1994, etc.) suggest that function matters much less in MA meronymies compared to European languages, and conversely, that the importance of shape is much greater in MA. Function-dependence is assessed by comparing labels for novel-object parts to labels for parts of conventional artifacts. To what extent is meronym assignment dependent on observer perspective? All available accounts of MA meronymies appear to converge on the finding that observer-dependent assignment of "front" and "back" is restricted to geometrically non-unique parts/axes; inherent (orientation-independent) shape-defined "backs" and "fronts" cannot be "overridden"; relative or intrinsic "left"-"right" assignment to non-humans appears to be severely restricted or absent across MA. Orientation-dependence is assessed by using the same objects in different trials in different orientation. To what extent is meronym assignment dependent on orientation in the vertical? According to MacLaury 1989, in Ayoquesco meronym assignment in the vertical depends strictly on the orientation of the object, which trumps shape; in contrast, Levinson 1994 has the role of vertical orientation in Tenejapa Tzeltal reduced to the distinction of protrusions/appendages into "arms" and "legs". Orientation-dependence is assessed the way described above.

What is the role of global analogical domain mappings in MA meronymies?
Brugman 1983, MacLaury 1989 and others describe meronym assignment as a global analogical domain mapping (in the sense of Gentner's 1983 "structure mapping") from the structure of the human body into that of animal bodies and object geometries. In contrast, Levinson 1994 proposes a labeling algorithm for Tenejapa Tzeltal that visually parses the body or object into parts, assigns axes to these on the basis of shape, and then labels the parts on the ends of these axes in such a way that the axes form systems which are in first approximation treated independently of one another. Protrusions, projections, and secondary parts are likewise labeled with a certain degree of freedom in terms of where in the overall structure of the body/object they appear. Pérez Báez & Bohnemeyer (ms.) argue on the basis of data from Juchiteco Zapotec that analogical mapping and algorithmic labeling may not be mutually exclusive, but co-exist in a language. The evidence for calquing of body part metaphors across MA (esp. Smith-Stark 1994) and the fact that algorithmic labeling and analogical mapping have to converge on the same solutions at least for human and animal bodies further support the hypothesis that the two approaches are two different realizations of a single larger domain mapping process. Assessment of the distribution of shape-analytical algorithms and global mappings will be based on objects for which the two make divergent predictions.

To what extent is there variation in the global analogical mappings and shape-analytical labeling algorithms found in different languages?
The difficulty here is that we lack predictions for where languages might vary. Thus, the novel objects were designed with properties that may provoke a clash between some of the principles the algorithm proposed by Levinson 1994 operates on. The design criteria are summarized below:

Object 1 – Adapted from Leyton 1989 (p. 9, Level III Q3 shape), this object responds to Levinson's (1994) lack of prediction for objects that have a void opposite the "back" on the orienting axis. In a global analogical mapping, it is likely that object 1 can be assigned a core set of meronyms based

on orientation and FoRs as MacLaury describes it. It is also possible that the ends at the void will be identified as "hands" in analogy to human hands.

Object 2 – The algorithm in Levinson 1994 does not offer a clear prediction of the meronym assignment in an object like this one, since neither of the pointy parts is more convex or concave than the other.

Object 3 – There are three protrusions opposite the least featured surface on the orienting axis (as per Levinson 1994) of this object. Assuming these are large enough, a potential conflict for Levinson's generalizations arises: is it possible to have three "arms" or "legs" which are equidistant from the "head" and "butt"? Furthermore, the assignment of the same meronym - e.g., "nose" or "nipple" - to the three protrusions indicates a deviation from strict analogical mapping; thus, object 3 will allow us to test to what extent the languages in the sample adhere to such a mapping. And both for this reason and because "nose" and "nipple" are not part of the seven general "armature" terms described in MacLaury 1989, this object also allows us to probe the extent to which shape plays a role in global analogy meronymies.

Object 4 – Object 4 is a squashed cylinder with a salient texture on one side. There are three distinct ways the "scales" might be dealt with: according to Levinson 1994, if the scales are interpreted as texture, the scaled side should be the "back", but if they are interpreted as a "feature" of the scaled side, then the scaled side should be the "face". Finally, if salient enough, the "scales" may also be interpreted as "teeth", which would be consistent with MacLaury 1989

Object 5 – Object 5 instantiates a "complex object" with secondary parts (parts of parts). The question is whether labeling is recursive in this case (i.e., whether the protrusions branching off of the cylinder are identified as parts of the cylinder, etc.), and if so, whether recursive labeling is compatible with a global analogical mapping.

Object 6 – Object 6 is intended to test whether meronym assignment can be function-dependent. The protrusions are intended to give speakers the possibility of thinking of this object as if it were a table or stool, and thus assign meronyms according to the function of the object and its parts. The sphere is intended to avoid leading speakers, at least in Tzeltal, to assign axes and their orientation and the resulting meronyms on the basis of present features such as a "squashed" face or an open face.

Object 7 – The design of this object responds to "holes" identified in Levinson's (1994) algorithm and test a number of claims as well. Features in Object 7 include:

- a protrusion straight up the main axis, a position that is not covered in the algorithm
- a similar protrusion at about 45 degrees, that should be named hand according to the algorithm
- two similar non-unique protrusions exactly at the orthogonal axis of the shape, that is also not covered in the algorithm.
- Two spheres of different sizes intended to lead the participant to naming the smaller one as the head.
- Protrusions in the shape of feet at…well, the head. They are intended to test whether they would both be called hands in Tzeltal, and feet in Zapotec in analogy to human feet.
- There are small protrusions at the bottom that should be called noses according to Levinson 1994. I wonder if, in Zapotec, these will be called feet. The prediction is that they will, which would be consistent with MacLaury 1989.
- There's an opening which should be named *mouth* no matter what, in both Tzeltal and Zapotec according to the proposed theories.

Object 8 and 9 – These two objects are intended to probe into the clash between MacLaury's (1989) account of assignment of meronyms to objects without identifiable features, and Levinson's (1994) claim that part naming in objects such as 9 has to be done arbitrarily and not in analogy to the human body.

2.5.8. Elicitation task: part identification task – Prepare before the beginning of the study by putting the stickers on the director's copies of the objects according to the diagrams at the end of this manual entry. Put the copies of the first object in the bags. Hand the paper bags to the two participants and ask them to take out the object and examine it. Address the director as follows:

> "Both of you have copies of the same object in front of you. But on your copy, I've put a few stickers. I'm going to give [matcher's name] a bunch of unattached stickers now and I want her/him to put them in the same places where the stickers on your object are. But [matcher's name] won't be able to look at your object; so I want you to tell her/him where these stickers go. I want you to use only speech; please try not to gesture and don't look at [matcher's name's] object. "

Now hand the matcher the bag of stickers.

> "I want you to put these exactly where [director's name] tells you to. If you are not quite sure about something [director's name] is saying, feel free to explain the problem and ask him/her for clarification. Do not look at [director's name's] copy of the object or at [director's name's] gestures."

When the matcher has placed their sticker, pause briefly to see where the sticker was placed. Be careful not to interfere in the participants' handling of the objects. If the matcher is wildly off the mark, tell the participants and ask them to try again. If they still cannot solve the problem, let the matcher pass their copy with their best shot at placing the sticker to the director, and let the director examine it and return it to the matcher before trying to explain what went wrong.

Having the participants swap the roles of director and matcher back and forth a few times may make the task more fun for them and prevent boredom and mechanization of responses.

2.5.9 Elicitation task: placement task – At the beginning of each trial, place the two copies of the object to be matched in front of the participants in the orientation represented in the appendix. The predetermined placement and orientation of the object allows for the use of absolute FoRs to surface. Place the chips around the director's copy and instruct her as follows (simplify if these participants have already done the part identification task):

> "Both of you have copies of the same object in front of you. But around your copy, I've put a few [chips/coins]. I'm going to give [matcher's name] another bunch of [chips/coins] now and I want her/him to put them in the same places where the [chips/coins] around your object are. But [matcher's name] won't be able to look at your object; so I want you to tell her/him where these [chips/coins] go. I want you to use only speech; please try not to gesture and don't look at [matcher's name's] object."

Now hand the matcher the chips.

> "I want you to put these exactly where [director's name] tells you to. If you are not quite sure about something [director's name] is saying, feel free to explain the problem and ask for clarification. Do not look at [director's name's] copy of the object or his/her gestures."

When the matcher has placed their chips, try to get a close-up of the result on camera. If the matcher is wildly off the mark, tell the participants and ask them to try again. If they still cannot solve the problem, let the director take a look at the matcher's work and try to verbally - and only verbally - correct it.

It is possible that the first or second objects will serve as practice runs for the participants. This does not invalidate the data from those exchanges. You may want to consider having the participants swap the roles of director and matcher back and forth a few times to make the task more fun for them and prevent boredom and mechanization of responses.

2.5.10. Transcription, coding, analysis –

Part Identification Task – We are above all interested in the strategies the participants use to identify and refer to the parts of the objects. They may or may not use meronyms for this purpose, which may or may not include body part terms ("Put a sticker on its nose") as well as abstract geometrical terms ("Put a sticker in its orifice") and, for example, specialized terms for (metaphorical) artifacts ("Put a sticker on its antenna"). They may or may not explicitly negotiate an interpretation of the object as a whole ("It's (like) a four-legged animal whose head and trunk are the same") and/or interpretations of individual parts ("It has the feet of a duck"). They may also elect to describe parts in terms of their shape ("There's a smaller sphere on one end and a larger sphere on the other with three tiny spheres attached to it"). It may be possible to identify part in terms of locative relations - especially if an orientation of the object on the table has been established ("It's standing on its legs. Now put a sticker on top/the highest point").

We would like you to transcribe all expressions that refer to any of the parts in any of the ways suggested above, or indeed in any other manner. Likewise, descriptions that attempt an interpretation of an object as a whole and/or assign it an orientation should be transcribed in full. For coding purposes, we will send out a spreadsheet that asks for each trial and each part of each object whether that part was referred to at all during the trial and if so, which strategy was used, where strategies include "body part term", "abstract geometrical meronym", "artifact meronym", "shape description", "locative relation", and "other". If a meronym ("body part term", "abstract geometrical meronym", or "artifact meronym") was used, please provide a gloss ("nose", "orifice", "antenna"). Device an inventory of glosses such that each gloss uniquely identifies a meronym of the language; there will be a separate part of the spreadsheet in which you can identify the meronym corresponding to each gloss. If there are descriptions of the object as a whole, or its orientation, we would like you to transcribe and gloss these as well. We will provide an example along with the spreadsheet.

Of special importance for the project is the question whether the labels for any of the parts depend in any way on the orientation of the object - be it on the orientation of the vertical or be it on the orientation with respect to the director, matcher, or some other observer. The spreadsheet will include a column where you can indicate the orientation of the object during the trial. It is recommended that you try to obtain during the task a sense of which terms, if any, depend on the orientation of the object and test those observations in additional elicitation sessions with one or two individual speakers by simply asking whether or not the same term can be applied under varying orientation.

Part identification task - The placement task is designed to elicit locative descriptions with respect to the parts of the Novel Objects as grounds. There are three questions here: how are the parts of the objects identified, what frames of reference (FoRs) are used, and how are meronyms used in the ground phrase. Strategies for reference to parts can in principle be coded in the same manner as in

the part identification task. However, it may be sufficient to merely point out any differences between the strategies used in identifying parts in the two conditions. Please create an inventory of the spatial relators (including meronyms if the language uses meronyms as heads of the ground phrase; cf. §2.4.5) that are used in the task. In the identification of spatial relators, follow the instructions in §3.4.2.

2.5.10. Stimulus – The set of 9 novel objects is provided by the MesoSpace project. The sets will need to rotate around the 15 members of the MesoSpace project. Once you have completed your field research, contact Carolyn O'Meara (ckomeara@buffalo.edu) to coordinate returning the novel objects to the MesoSpace project or passing them to another team member. The novel objects part identification and placement landing sites coding sheets are included in Appendix C and D. For improved quality, it is recommended that you produce the necessary printouts directly from the electronic version of the manual rather than using photocopies.

2.6. Studying meronymies

This section contains some suggestions for how to analyze the data on meronymy collected with the tasks and stimuli described above and from other sources. At the end of this section, you will find some questions that we would like every member of the team to answer.

2.6.1. Distinguishing meronyms from adpositions – The ground phrase of a locative description is the expression of the place at which the figure is located. The ground-denoting nominal is the nominal that denotes the ground object if there is one. Meronyms in the ground phrase must be possessed by the ground-denoting nominal. However, the ground-denoting nominal need not be overtly realized. In the following Yucatec examples, it is (3a), but not in (3b):

(3) a. Le=lùuch=o' ti'=yàan y=óok'ol le=mesa=o'
DEF=cup=D2 PREP=EXIST(B3SG) A3=top DET=table=D2
'The cup, it's there on the table'

b. Le=lùuch=o' ti'=yàan y=óok'ol=i'
DEF=cup=D2 PREP=EXIST(B3SG) A3=top=D4
'The cup, it's there on it' (constructed)

Depending on the language, the possessor (in this case, the ground nominal) may or may not be (obligatorily) cross-referenced on the meronym. In Mayan languages, it tends to be cross-referenced. But in Juchiteco Zapotec, for instance, the possessor is expressed on the relational noun by a pronominal clitic only if is not realized by a nominal:

(4) a. Ike(=be*)
head=3
'his/her head' / 'on him/her' (Pérez-Báez in press: 4)
b. Nuu* sumbre*ru i^ke=be*
EXIST hat head=3
'The hat is on his head' (Pérez-Báez p.c.)
c. Dxi!'ba za ikeyoo
raised.over cloud head house
'The cloud is over the house' (Pérez-Báez in press:11)

Adpositions are not possessed; but they may still cross-reference their complement. Except for Mixe-Zoquean, there are either no adpositions (e.g., Mixtec, Zapotec), only one generic one (Totonac; Mayan), plus (Yucatec) or minus one specific spatial preposition. The examples in (5) illustrate both the generic preposition ti' and the only spatial preposition of Yucatec, ich 'in':

(5) a. Le=kàaro=o' ti' yàan ich / ti' le=kàaha=o'
DET=cart=D2 there EXIST(B3SG) in / PREP DET=box=D2
'The cart, it is in the box'
b. Le=kàaro=o' h-òok ich / ti' le=kàaha=o'
DET=cart=D2 PRV-enter(B3SG) in / PREP DET=box=D2
'The cart, it entered (lit. in) the box'
c. Le=kàaro=o' h-hóok' ich / ti' le=kàaha=o'
DET=cart=D2 PRV-exit(B3SG) in / PREP DET=box=D2
'The cart, it exited [lit. in] the box'

Ich derives from a meronym meaning 'fruit', 'eye', 'face'; but it has grammaticalized into a preposition and in this use is no longer possessed by the complement.

Meronyms may combine with adpositions – that is a relatively surefire way of telling that they're not adpositions themselves. In Yucatec, some meronyms obligatorily combine with the generic preposition ti' (e.g., *ts'u'* 'core' in (6)); others never do (e.g., *óok'ol* 'on'/ 'above' in (7)). Example (8) illustrates an alternative construction for those meronyms that do require *ti'*: the meronym is adverbialized by the relational suffix *–il* and forms a co-constituent, rather than a constituent, of the prepositional phrase

(6) H-òok le=chan xóot'+che' tu=ts'u' le=chìina=o'
PRV-enter(B3SG) DET=DIM cut+wood PREP:A3=core DET=orange=D2
'The little cut piece of wood entered in the interior of the orange'
(7) …h-tàal u=balak' y=óok'ol le=pak'=o'
PRV-come(B3SG) A3=roll A.3=on DET=brickwork=D2
'…it came rolling on the wall'
(8) …yan u=máan pàach-il te=chan láaguna …
OBL A3=pass back-REL PREP:DET=DIM lagoon
'…it will pass behind the little lake…'

So there are three criteria:

(a) If the relator is a meronym, the construction integrating relator and complement should have the structural properties of adnominal possession, including cross-referencing of the complement on the relator and whatever other properties apply.
(b) The inverse does not necessarily hold: there is no a-priori reason why adpositions should not agree with their complements. The most famous case in point would seem to be that of prepositional agreement in the Celtic languages. Of course, this raises the question of whether what has traditionally been considered prepositions in Celtic are actually relational

nouns. How would we go about trying to determine this? The first question would be whether some of the relators have other uses which are clearly nominal - are they ever used as heads of argument nominals? (I do not know the answer as far as Celtic goes; much to my regret, I've never had the opportunity to study a Celtic language.) If the answer is no, it could be because the relators are adpositions or because they are inherently place-denoting meronyms such as Yucatec *óok'ol* in (3) which cannot head an argument NP since it does not denote an entity.

(c) Finally, does the relator combine with (an) adposition(s)? Such a combination could take two forms: the phrase headed by the mystery relator appears as the complement of an adposition, or the mystery relator and the adposition form something that behaves like a complex adposition. In the first case, the phrase headed by the mystery relator is clearly a nominal projection and the relator can therefore only be a meronym. In the second case, we're stuck without further information about the adverb(i)al syntax of the language (are there satellites? Multi-verb constructions? Directionals? It may be only through elimination of all these options that we can establish that the relator is a meronym).

2.6.2. Questions about meronyms in your field language

2.6.2.1. Space: The Final Frontier – Please provide a few examples of locative or motion descriptions with respect to entities as referential grounds (i.e., not using place names or deictic adverbs or the like). Now describe to the best of your abilities the structure of the ground phrase in these descriptions. Using the criteria laid out above, can you tell whether the head is an adposition or a meronym? Is this so obligatorily? If the head is (obligatorily?) an adposition, can a meronym appear elsewhere in the ground phrase? If so, please exemplify. To make sure that you/we don't overlook anything, please include the paradigm of agreement/cross-reference markers used in adnominal possessive constructions. If there are adpositions that may head the ground phrase, can you give us an inventory? The same goes for meronyms, whether they are actually used as heads of the ground phrase or whether they merely occur somewhere further down in the ground phrase.

2.6.2.2. (In)Alien(ability) – An alienable-inalienable distinction is a morphosyntactic distinction of classes of nouns with respect to the function of possessum in terms of any of the following options: (i) the selection among the marking strategies in adnominal possession, including agreement/cross-reference on the possessum, "genitive" case marking on the possessor, and "proprietive" case marking on the possessum; (ii) the order of the possessor and possessed; (iii) the occurrence of a particular class of nouns in/outside of adnominal possession; (iv) any kind of morphological process required for the members of a particular class to occur in/outside of adnominal possession (including "absolute" derivation (turning inalienable nouns into non-possessible ones), "relational" derivation (turning alienable or non-possessible nouns into inalienable ones), and possessive classification (which may have a function similar to that of relational derivation, but only in case it is restricted to particular classes of nouns)). Does such a morphosyntactic classification of nouns exist in your field language? If so, can you tell us in a few sentences what you know about this system, illustrating with a few examples? If there is such a system in your field language, how do meronyms fit in it? For illustration, Table 1 shows the classification of nouns according to their privileges of occurring as heads of adnominal possessive constructions in Yucatec. Meronyms are "inabsoluble" in this system - they do occur unpossessed at all.

Table 1. Classes of nouns vis-a-vis their priviledges of occurring as heads of adnominal possessive constructions (Lehmann 2003:49)

Grammatical Class	**Subclass**	**Absolute Use**	**Possessed Use**	**Semantic Classes**
Neutral		N	N	Diverse
Inalienable	Inabsoluble	–	N	Parts of wholes
	Absoluble	N-*tsil*		Kin
Alienable	Impossessible	N		Persons, configurations of nature
	Possessible convertible		N-*ill-el*	Most
	Possessible classifiable		POSS.CLASS N	Objects of cultural sphere

2.6.2.3. Beyond space – Does your field language have any adpositions at all? If so, in which domains are these used? Please exemplify! Do these really look like adpositions in the sense of the discussion above, or might they be relational nouns? Do you have any comments re. the use of relational nouns as opposed to adpositions in the expression of adverbial/oblique roles such as comitative, instrumental, cause, and purpose?

3. Spatial Frames of Reference

Spatial frames of reference (FoRs) are coordinate systems used to "project" (Piaget & Imhälder 1956) a place function (typically a spatial region) from a referential ground. Three types of FoRs are distinguished in language use and internal cognition (Levelt 1984, Levelt 1996, Carlson-Radvansky & Irwin 1993, Levinson 1996, Levinson 2003): "intrinsic" or object-centered systems, where the geometrical or functional structure of the ground itself is projected onto space (as when a tree closest to the intrinsic front of a house is referred to as being in front of the house); "relative" or observer-centered systems, where the geometrical/functional structure of the viewer's body is projected onto the ground (as when a tree in the line of vision between speaker and house is referred to as being in front of the house while the speaker is in fact facing the side or back of the house); and "absolute" systems, which are projected onto the ground without a unique vantage point from which they are projected (e.g., if a tree is north of the house, it is so regardless of where the observer is positioned or how the house is oriented). Intrinsic and absolute FoRs may be grouped as "allocentric" against "egocentric", i.e., observer-based/relative FoRs.

All known cases of relative and absolute FoRs can be assumed to have developed from intrinsic systems via semantic transfer. The conceptual relations underlying this transfer have given rise to a considerable amount of confusion in the literature concerning the classification of particular FoR systems. Thus, reference to the observer's front, back, left, and right is by itself intrinsic and does not constitute a relative FoR unless it is projected onto some external referential ground replacing the observer as the origo of the FoR. Failure to recognize this distinction accounts for the mistaken interpretation of experimental findings in Li et al. 2005; the supposed "egocentric" condition in these experiments is, in fact, an intrinsic one (cf. §3.3.2 for details). For the same reason, the traditional equation of egocentric with deictic reference is unfortunate. When you say, e.g., 'The ball is on my left', you refer to your intrinsic left despite the fact that the ground – you – is denoted deictically by the first-person pronoun. 'The ball is on my left' and 'The ball is on Peter's left' are equally intrinsic descriptions; in contrast, 'Peter is left of the ball' must employ an egocentric FoR projected from the observer's body, since the designated ground of the description, the ball, has no intrinsic left in this case. Similarly, absolute FoRs should be distinguished from "geomorphic" FoRs. Absolute systems are frequently abstracted from natural gradients such as mountain slopes ('uphill'/'downhill'), drainage systems ('upriver'/'downriver'), sea shores ('landwards'/'seawards'), currents or prevailing winds, as well as the virtual position of celestial bodies at particular times of the day/year. But true geomorphic systems based on such natural landmarks are merely giant intrinsic FoRs. For example, the absolute FoR of Tenejapan Tzeltal (Brown 2006, Brown & Levinson. 1993, Levinson 2003) is abstracted from an 'uphill'/'downhill' mountain slope system; but in actual fact, the direction referred to as 'uphill' is approximately 165 degrees south, and the expressions that denote this direction are applicable to it even on the other side of the mountain, where their geomorphic interpretation reverses (the absolute 'uphill' now corresponding to the geomorphic 'downhill' and vice versa). Failure to distinguish between absolute and landmark-based systems accounts for the incorrect analysis in (Li & Gleitman. 2002); as demonstrated in (Levinson et al. 2002), the artificial landmark introduced in these experiments induces not absolute, but intrinsic reference (cf. also §3.4). A clear set of criteria for the distinction among the three types of FoRs is proposed in (Levinson 1996): reference to a figure with respect to a ground is intrinsic if and only if

the figure-ground relation changes with the orientation of the ground while all other factors are kept constant; it is relative if and only if the relation changes with the orientation of the observer while all other factors are kept constant; and it is absolute if and only if the relation changes with the relative position of figure and ground (or in other words the orientation of the figure-ground array) while all other factors are kept constant. This presupposes that every FoR necessarily involves a referential ground that functions as origo; if a figure is located directly with respect to an observer, the observer's body serves as ground.

In Western languages and cultures, selection among the three FoRs is strongly biased by domain: absolute FoRs are largely restricted to geographic-scale space; every smaller domain favors intrinsic and in particular relative FoRs. The only known exception is the vertical, where the Earth's gravitational field constitutes a special kind of absolute FoR that is exploited in language with (near-)universality. Canonically, intrinsic, relative, and absolute perspectives align in the vertical (e.g., the part recognized as the intrinsic top tends to also be the highest in the gravitational field and in the observer's field of vision), but in case of a mismatch, absolute assignment of place functions is preferred (Levelt 1984, Levelt 1996, Carlson-Radvansky & Irwin. 1993; Levinson 2003:75-76). It used to be widely assumed that the distribution of FoRs over domains of use is more or less universal (Kant 1991 [1768], Miller & Johnson-Laird 1976, Klein 1994, Pederson et al. 1998. But in the 1990s, evidence against this conjecture began to emerge. Research in the Mesoamerican (MA) area in particular indicates that relative FoRs are either not used at all (MacLaury 1989, de León 1994, Brown & Levinson. 1993, Levinson & Brown. 1994, Danziger 1996; Becerril et al. 2006, unpublished data collected by R. Zavala on Olutec Mixe) or used along with intrinsic and absolute FoRs, with intrinsic frames dominating in table top space (Levinson 2003, Pederson et al. 1998 (based on data collected by P. Levy) and Levy 2006 on Papantla Totonac; Bohnemeyer & Stolz 2006 on Yucatec Maya). Consider, for instance, the reports on FoR usage in Dutch (van Staden et al. 2006; cf. also Levinson & Wilkins 2006, Pederson et al. 1998), Japanese (Kita 2006), Tzeltal (Brown 2006; cf. also Levinson & Wilkins 2006, Pederson et al. 1998), and Yucatec (Bohnemeyer & Stolz 2006) in the contributions to Levinson & Wilkins 2006 based on data collected with the Men and Tree referential communication task (see §3.3 for details of the procedure). The authors analyzed responses by three pairs of native speakers (four in the case of Yucatec) to the same six pictures out of the Men and Tree set. These pictures feature a toy man whose location and orientation was to be identified vis-à-vis a toy tree in the viewer's virtual horizontal plane. Dutch and Japanese favor the use of egocentric over intrinsic FoRs and use absolute FoRs only in the vertical and in reference to maps or map-scale space. All Dutch and Japanese participants used exclusively relative FoRs to locate the toy man ('left/right of the tree') and almost exclusively intrinsic FoRs to describe his orientation ('facing towards/away from the tree'); no absolute reference occurred at all in this task in either population. This contrasts dramatically with the performance of the two MA populations. The Tzeltal speakers referred exclusively absolutely to both the location and the orientation of the toy man ('standing uphillwards of the tree, facing downhillwards'; as mentioned above, the geomorphic English glosses are misleading). The Yucatec participants strongly preferred intrinsic reference to both the location and the orientation of the toy man; absolute and relative reference each occurred only in two out of 24 trials.

3.1. Hypotheses and Research Questions

One of the primary goals of MesoSpace is to obtain a better picture of the distribution of FoR preferences. Nothing is known about FoRs in the Mayan family outside the Tzeltalan and Yucatecan branches. FoRs have not been studied in the Zoquean branch of Mixe-Zoquean and not at all in the vast Otomanguean and Uto-Aztecan language families. MesoSpace aims to close these descriptive gaps. An important question about FoR preferences across languages is to what extent they are

influenced by ecological and cultural factors. It has been suggested that for the language community to be located on a mountain slope or a small island might favor the use of an absolute FoR, and so does the foraging mode of production, whereas literacy in any script that distinguishes characters by lateral orientation (such as "b" and "d" in the Latin script) has been hypothesized to favor the use of relative FoRs. (Levinson 2003:170-215), summarizing the available evidence, points out counterexamples to all of these generalizations except for the correlation between hunter-gatherers and use of absolute FoRs. Recent support from the MA area for the last-mentioned correlation comes from (Becerril et al. 2006), who report the pervasive use of absolute FoRs in the isolate Huave of the Isthmus of Tehuantepec. However, the database is at present far too small to assess possible statistical tendencies and interactions between factors. MesoSpace is likely to make significant progress in this regard. The language communities in the sample cover a wide range of topographies, from the high mountains of northern Guatemala, Chiapas, Oaxaca, and the Sierra Madre via the lower mountainous regions of northern Chiapas and Veracruz and the Mesas of Nayarit to the low-lying coastal areas of the Gulf of Mexico, the Yucatan peninsula, the Isthmus of Tehuantepec, and Sonora. They include an equally wide range of ecosystems, from the deserts and mangroves of Sonora to the tropical rainforests of Veracruz, the Yucatán, and the Sierra Lacandona to sub-alpine pine forests in the highland areas and to the high desert plane of the Northwestern Otomí area. While most populations practice horticulture and subsistence-scale agriculture, the Nawat speakers of Pajapan and the Seri of the shore of the Sea of Cortez are intriguing exceptions, in that the former are agriculturalists in their mountain area, but also practice fishing on the coast, and the latter were hunter-gatherers well into the 20th century. Literacy varies dramatically both across and within populations.

So far, no purely linguistic determinants of FoR preferences in language have been considered. This issue is particularly important in connection with the controversy around the proposal that linguistic FoR selection determines FoR selection for recall memory and inferences. Several hypotheses will be investigated. First, is the existence of productive terminologies for labeling object parts on the basis of shape correlated with an increased use of the intrinsic FoR compared to Spanish? It seems plausible that the existence of a productive meronymic system greatly facilitates reference to regions defined in terms of object geometry. Moreover, the preference for egocentric over intrinsic frames of reference among speakers of Dutch, English, or Japanese (§3) may be related to the fact that the systems for intrinsic reference in these languages are primarily based on function rather than geometry. As discussed in §2.1, in Western European languages (and, e.g., in Japanese), the intrinsic 'front' and 'back' of objects is primarily assigned on the basis of functional properties; no clear geometrical criteria are available in these languages. Once 'front' and 'back' are assigned by function, the intrinsic 'left' and 'right' may then be identified by analogy to the human body. But the conventional intrinsic 'front'/'back'-assignment is in most cases easily overridden when an egocentric FoR is projected onto the object (as when a figure is referred to as being 'in front of' a car even though it is closest to the trunk of the car, but between the car and the observer). Characteristically, the only case in which the intrinsic 'front'/'back'-assignment is hard to override in Western languages is when the ground is the body of a person – the only case in which the assignment is not function-based. In stark contrast, in MA languages, it is not possible to identify the 'front'/'back'-axis in relative terms if the ground has intrinsically identifiable parts according to geometric properties (MacLaury 1989; Bohnemeyer & Stolz 2006, Goldap 1992; Brown 2006; Levinson 1994; Pérez Báez In press; Levy 2006). A shape-defined intrinsic axial structure cannot be overridden. Consequently, relative FoRs are used to the extent that the ground object lacks the geometric properties necessary to identify parts. That is, in all FoR systems studied so far in MA languages, egocentric frames are applied exclusively to objects that lack unique axes or that have symmetrical parts. This set of facts is in line with the hypothesis that it is the specifically geometrical semantics of meronyms in MA languages that excludes their use in relative FoRs unless the ground lacks the relevant geometrical specifications, and conversely, that it is the absence of clear geometrical properties in the semantics of spatial relators in Western languages (and, e.g., in Japanese) that favors their use in egocentric FoRs. MesoSpace will test this idea.

Furthermore, FoR preferences make for a particularly interesting test case for the question of areal diffusion. This is because intertranslatability across FoRs is limited by the availability of contextual information (Levinson 1996 & 2003; Levinson et al. 2002). If one memorizes the location of an object exclusively in a relative (/absolute) FoR, one cannot communicate this information in a language that prescribes the use of an absolute (/relative) FoR for the relevant domain. Therefore, a high degree of pressure towards homogenization of FoR usage in language contact situations involving long-term stable multilingualism seems expectable (Gumperz & Wilson 1971). If it is confirmed that relative FoRs are a somewhat marked option throughout the MA area, this might be hypothesized to be evidence of areal diffusion of FoR preferences. The question then arises whether bilingualism in Spanish affects the use of relative FoRs. On the (in)translatability hypothesis, it might be expected, for instance, that bilingual speakers in predominantly monolingual communities imitate the intrinsic and/or absolute systems of their native languages in Spanish, whereas bilingual speakers in predominantly Spanish-speaking communities imitate the relative usage of Spanish in their native languages.

A growing controversy has arisen around the demonstration in Levinson 1996 and 2003 and Levinson et al. 1998 of a robust crosslinguistic alignment of FoR use in language, recall memory, and spatial inferences. Pederson et al. 1998 show that speakers of a language that prefers relative FoRs in a given domain will also rely on relative FoRs in memory and inferences in the same domain, whereas speakers of a language that employs an absolute FoR in the same domain will encode states of affairs in this domain in absolute terms in memory and derive placement inferences based on an absolute FoR. These findings are consistent with a relativistic interpretation according to which FoR selection in language determines FoR selection in internal cognition. On the basis of experiments with American college students, Li & Gleitman 2002 have sought to invalidate the interpretation of possible effects from language onto internal cognition, arguing that FoR preferences in recall memory are easily mutable. The authors replicated one of the designs used in Pederson et al. 1998, in which participants memorize an array of toy animals and then reproduce it after undergoing 180-degree rotation (cf. §3.2-3.3). Li & Gleitman 2002 introduced a new condition employing an ad-hoc landmark (a toy duck pond). This induced a shift in the participants' recall memory strategy that the authors interpret as evidence for employment of an absolute FoR. The authors reason that if American college students can be induced to perform like the Tenejapan Tzeltal speakers described in (Levinson 1996 & 2003, Pederson et al. 1998), then the crosslinguistic differences found in these studies may be no more than shallow artifacts of environmental conditions and cultural factors. However, Levinson et al. 2002 and Levinson 2003 demonstrate that the experimental results of Li & Gleitman 2002 do not in fact straightforwardly support the authors' conclusions. Replication of the duck-pond condition under 90-degree, rather than 180-degree, rotation shows clearly that the landmark-based frame projected from the toy duck pond is an intrinsic, not an absolute, FoR. Li & Gleitman 2002 failed to properly distinguish between landmark-based (geomorphic) and absolute FoRs. Consequently, they did not, in fact, demonstrate that Westerners can be easily induced to perform like Tenejapans. Similarly, Li et al. 2005 report what they argue to be evidence of egocentric FoRs in recall memory used by Tenejapan participants in their experiments. In these experiments, participants had to reproduce the orientation of a playing card after having rotated 180 degrees. The original card was concealed in a box which was given to the participants prior to rotation. In a "geocentric" condition, the box with the card would not change orientation while the participants rotated, whereas in the "egocentric" condition, it would rotate with the participants. It was found that the difference between the conditions had no significant effect, which the authors present as evidence that the use of egocentric and allocentric FoRs in recall memory is equally natural to Tenejapans. However, as discussed in §3.4, a FoR projected from the observer's own body is, in fact, an intrinsic, not a relative, FoR. Thus, just as Li & Gleitman 2002 did not actually demonstrate that Euroamericans are easily induced to perform like Tenejapans, so Li et al. 2005 did not actually demonstrate the Tenjapans are easily induced to perform like Westerners.

The MA area provides a unique opportunity to improve our understanding of language and culture as factors in determining the use of FoRs in internal cognition. It puts us in a position to study populations that are closely matched in terms of their environment, modes of production, and literacy, with language being the potential major differentiating factor – the position of Li & Gleitman 2002 would seem to predict that language should not be able to make a fundamental difference in cognitive performance here. We have, moreover, for the first time possible linguistic predictors of FoR preferences in language, and may thus be able to pit these against other cultural factors to see just how autonomous FoR choices in language use really are. Lastly, we have the ability to study, in some communities, monolingual and bilingual speakers of the same language. On the interpretation of Pederson et al. 1998 and Levinson 2003, bilingualism is expected to critically affect FoR selection (in both language and cognition); on the position of Li & Gleitman 2002, it is not.

3.2. Elicitation task: frames of reference in discourse – the Ball & Chair pictures

3.2.1. Stimuli and task in a nutshell – Picture-to-picture matching task employing four sets of photos featuring a ball and a chair. The goal is to assess for each language which types of frames of reference (FoRs) are used in discourse about spaces of no more than a few feet in diameter and which FoRs are preferred in this domain.

3.2.2. Materials – You'll need two copies of each of the four sets of pictures. Each set consists of 12 pix, so there is a total of 2 x 4 x 12 = 96 pix. Furthermore, you'll need 2 x 11 color chips, to be placed on those photos that have been successfully matched, to mark the fact without taking the pix off the table (thereby reducing the contrast set - this was a significant flaw of Men & Tree (see background)). You'll need table space to seat two participants per trial next to one another (see Figure 3.1) and a screen to separate them.

Two sets of photo prints are provided to you by the MesoSpace project. As a backup, photoprint quality jpgs of the photographs are included in the MesoSpace CDRom. Should you need to reproduce the sets, try to print in true digital print size to avoid cropping problems.

3.2.3. Layout – see Figure 3.1. In contrast to Men & Tree (see background), the orientation of the pix (and the table and the participants) shouldn't matter, since the pictures feature contrasts not just laterally, but along four different axes (the ball may occur in eight different absolute locations vis-a-vis the chair distributed evenly in term of cardinal directions). The screen should ideally inhibit attention sharing between the participants entirely, but at a minimum must occlude the pix.

3.2.4. Recording – The central data are the verbal descriptions produced by the participants. Audio-recording - ideally with two mics feeding into separate channels for easy transcription - is sufficient to capture these. However video-recording - alternatively or in addition - is recommended to capture gestures and gaze patterns, which may come to play an important part in the analysis. Once a pic has been matched, the experimenter announces the number (printed on the back) for the record. For further information regarding the processing of the data, see section 3.2.10.

3.2.5. Time constraints – One pass through the four sets should take you 25-40 minutes. If you need to split a pass through the series of four games among two or more pairs of participants, remember to always start with the first game, as this is specifically meant for training, and be sure to always conduct the games in the order in which they are enumerated (1-2-3-4).

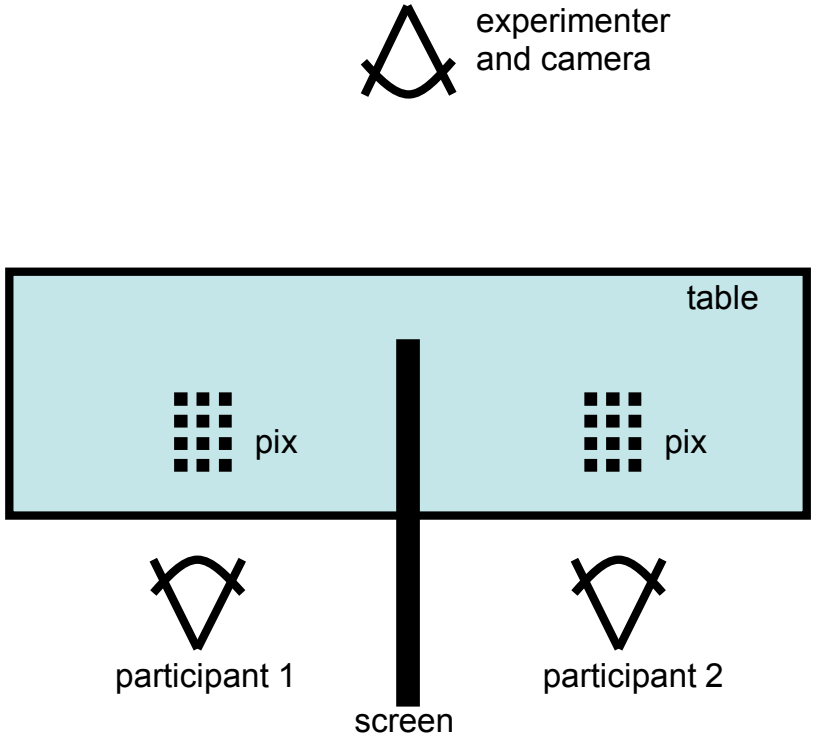

Figure 3.1. B&C matching game layout

3.2.6. Participants – Should be run with a minimum of five pairs of speakers per language.

3.2.7. Background – Ball & Chair (B&C) evolved out of the Men & Tree (M&T) matching games, designed by Eve Danziger and Eric Pederson and released with the very first field manual of what was then the Cognitive Anthropology Research Group at the Max Planck Institute for Psycholinguistics in November 1992. B&C improves on M&T in a number of respects. M&T effectively suppresses intrinsic choices; B&C is designed for the study of the selection among all types of spatial FoRs. People and trees are not particularly good as figures and grounds. Trees often lack a canonical "orienting" (i.e., front-back) axis - the tree of M&T certainly did. And the toy men were more featured than the tree. B&C has many more pictures that show canonical figure-ground asymmetry and simultaneously force FoR selection for disambiguation. Another complication that B&C avoids is the use of pictures of toys - representations of representations, which makes it hard for the participants to consistently operate within the same scale.

3.2.8. Structure of the stimulus – As in any referential communication task, the stimuli used together in a trial have to be identified contrastively. Hence, the constituency of each subset of items is not random, but carefully designed with a view towards the kinds of contrasts meant to be elicited - and towards those meant to be avoided.

As with M&T, the first set is for training. All pictures in this set should be identifiable with reference to the disposition of the chair, the topological relation between ball and chair, and, in a few cases, the intrinsic location of the ball vis-à-vis the chair.[1] Put differently, there should be no need to use a relative or absolute FoR to refer to these (which of course doesn't mean participants won't make use of those types of reference).

The second set is composed of pairs of items that can be differentiated in both intrinsic and extrinsic (relative or absolute) terms. The third set focuses on pairs of configurations that require intrinsic reference for disambiguation. No extrinsic reference should be necessary to identify any of these pix (as far as the location of the ball relative to the chair is concerned; however, in some cases, absolute or relative reference to the orientation of the chair may be used; plus there is the issue of the vertical, predicted to elicit absolute reference in all languages). However there is room for intrinsic-relative ambiguity of descriptors across pairs in those languages that permit relative use of otherwise intrinsic terms even in reference to (regions projected from) geometrically unique parts.

The fourth and final set consists of pairs of items that can be distinguished in relative or absolute, but not intrinsic, terms. Participants used to employing predominantly or exclusively intrinsic FoRs in table-top to room-sized space may find this set puzzling and challenging to deal with.

The four games should always be played in this order, to avoid (a) pushing participants towards extrinsic FoRs who otherwise might not use them under the same circumstances and (b) frustrating intrinsic-only coders at a point where it may affect their performance even in those games that do not require extrinsic reference.

3.2.9. Protocol – The following is adapted from the M&T instructions. There are two differences: the order in which the four games are played is fixed with B&C (see above); and instead of the participants putting matched pictures on piles and comparing them at the end of each game, the experimenter acts as arbiter for when a match has been successful and the participants place markers on the matched items instead of taking them off the board (thereby reducing the remaining number of contrasts).

Record the instructions that the players receive. Players should be told, in their own language, the following:

> This is a game with photographs. You each have the same set of pictures, and the game is for one person to choose pictures one by one and to tell the other person which picture s/he has chosen, WITHOUT LOOKING (just with language, try not to point or gesture), so that the other person can pick out the one that matches from their own set. You can talk back and forth as much as you want, for as long as it takes you to make sure you have picked the matching photo. I'll show you how to do it while you play the first game with this set.

When playing Game 1, keep in mind that the idea is to show them exactly how you want them to play the later games. Use the same procedure you will use for the other three games. Language data from game 1 may turn out to be interesting by itself, but the main point is to make sure that people know how to play.

For each game, shuffle the photos beforehand and lay them out right way up in front of each player in a 3 x 4 grid (3 across, 4 down). The players are then free to choose the order in which to pick and describe the photos. When the "matcher" has chosen the picture they think fits the "director's"

[1] It would have been nice if we could have had exclusively dispositional and topological contrasts; but alas, we didn't produce enough variants of this kind.

description, make both participants hold out the pictures to you. In case of a mismatch, announce the numbers of the two pictures for the record on tape (in case you are video-taping, get the pictures on camera, too). Return the pictures, tell the participants that the match was unsuccessful, and ask them to find the source of the problem and/or try again. If the match was successful, announce the number for the record on tape and return the pictures. Ask the participants to place color chips on the matched pictures and then carry on until all pix have markers on them (so do make them describe even the final picture!).

It seems to make it easier to play a series of games if you allow the players to switch roles as they go (e.g., "director" in game 1 becomes "matcher" in game 2). In addition, you get more language for the effort if you have players double up roles, and play each game once in each role (i.e., once as "director" and once as "matcher"). This may, however, be boring or slow for the players. Make your own decision. If you do this, keep in mind that the second time through a set of photos for a given player has a different status from the first, and keep records accordingly. Doubling up is interesting if you want to investigate reductions and special accommodations that develop as people become expert at the game. If you do double up, you still count only one pair (the first run-through for each player) for the comparative project, where the same people are playing.

As well as playing the games, have an assistant explain the differences among the photos to you in elicitation fashion, on some other occasion. If you use your elicitation assistant as a player of the games, don't do the elicitation until after he or she has played the games for you!

The suggested strategies for the game are the following:

- The director has coins to mark the photos he has already explained.
- The matcher doesn't have coins and does not mark the photos s/he has identified.
- The matcher shows the director the photo s/he thinks is the correct one; director makes a judgement as to whether it is the photo s/he described. If the director decides it is not the correct photo, s/he proceeds to explain the photo in question once again. The "incorrect" photo is put back on the table for consideration later in the game.
- At every time a photo is selected by either the director or the matcher, they will need to show the photo number to the researcher for note taking. Researcher notes down, matches, mismatches and corrections according to those numbers

3.2.10. Transcription, coding, analysis – The descriptions of the pictures contain two kinds of predications we are interested in: (a) predications of the location of the ball ("The ball is left/in front of the chair") and (b) predications about the orientation of the chair ("The chair is facing left"/"You are looking at the chair's back"). We need you to transcribe all of these predications, sorted by picture and speaker. Next, each of these predications expresses a figure-ground relation. We need you to code the predications for these expressions. In the examples above: "left of"; "in front of"; "(facing) left"; "(looking at) its back". The expressions may include meronyms, adpositions, adverbs, verbal affixes, "satellites", or a combination of some of the above. Create an inventory of the relators and list for each relator which pictures elicited it, separated according to whether the relator was used to express locative or orientation information. Now try to answer the question which FoRs each relator occurs with. You can tell by comparing the pictures that elicited each relator. For example, if a relator that translates into English "left of" occurs both with pictures in which the ball is at the intrinsic left of the chair and with pictures in which the ball is at the relative left that suggests that the relator is compatible with both relative and intrinsic interpretations. Your input to the group analysis will be a table or spread sheet that states for each relator which FoRs it occurred with in the task. A model is Table 3 in section 3.4.2.3. However, we would like you to list in each cell the ID numbers of the pictures in response to which the particular relator occured with the particular FoR.

3.3. Elicitation task: frames of reference in recall memory – New Animals

3.3.1. Stimulus, task, and goal in a nutshell – Participants commit arrays of toy animals to memory and reproduce them having turned 180 degrees to another table. The question is which spatial frame of reference (FoR) they rely on when encoding the array in memory. This can be deduced from the location and orientation of the reproduced array (provided the task is administered properly and the participant recalled the array correctly). The goal of this study is the profiling of participants and populations in terms of FoR use in recall memory, to test the hypothesis that preferences for particular FoRs in discourse and recall memory align within, but not across, populations defined in terms of language use.

3.3.2. Materials – One set of Cuckoo Alex Rub a Dub Farm Animals Squirters for the Tub bath toys :-), consisting of a pig, cow, sheep, chicken, horse, and a transparent plastic case to hold them. To keep results comparable with those obtained by Pederson et al. 1998, Li & Gleitman 2002, and Levinson et al. 2002, we only use the pig, cow, sheep, and horse - hold the chicken :-). Two tables, as similar to one another as possible, or at any rate two horizontal surfaces (including, e.g., two blankets spread on the ground). The surfaces should be of roughly the same size and shape and without marks of any kind.[2] They need to be positioned exactly parallel and at a little distance from one another (see Figure 3.1). You will need one copy of the coding sheet for each participant. The coding sheet is available in Appendix E at the end of this manual.

Several issues regarding the placement of the tables have been raised. First, evidence from Tzeltal collected with a different recall memory task (Levinson 1996: 115-117) suggests that accuracy of memory for the orientation and location of a stimulus may vary with the actual orientation and location of the stimulus in absolute space. In Tenejapan Tzeltal, (roughly) north and south are lexically distinguished as "downhill" (or rather "downmountain") and "uphill" ("upmountain"), respectively, whereas east and west are lexically conflated as "across". And Tenejapans appear to recall spatial information memorized vis-à-vis the uphill-downhill axis more accurately than information memorized wrt. the across axis. Thus the placement of the array of animals on the stimulus table could potentially affect the accuracy of the participants' performance. If you know or suspect that the people you study routinely use an absolute FoR, try to align the main axes of the tables with the main axes of that FoR (e.g., N-S and E-W rather than NNE-SSW; in the case of Tenejapan Tzeltal, uphill-downhill rather than across). Use the schematic compass rose on the coding sheets to capture the orientation of the tables (or rather, the orientation of the array of animals on the stimulus table - but the animals are always placed along the participant's transversal, parallel to the table's main axis (see Figure 3.1)) with respect to the axes that are primarily lexicalized (i.e., that have the simplest expressions).

In addition, Li & Gleitman 2002 found an effect on the performance of American college students depending on whether the task was conducted indoors or outdoors. However, Levinson et al. 2002 were unable to replicate this effect with Dutch college students.

3.3.3. Layout – see Figure 3.1. Concerning the distance between the tables, Levinson & Schmitt (1993: 65) comment as follows: "Two tables or places at some remove (as for all rotation experiments); you need to engineer up to a minute (not less than 30 sec) delay without distraction of subject, so distance helps."

[2] If you use tables with some sort of markings on the surface, consider getting two identical pieces of cloth to drape over them.

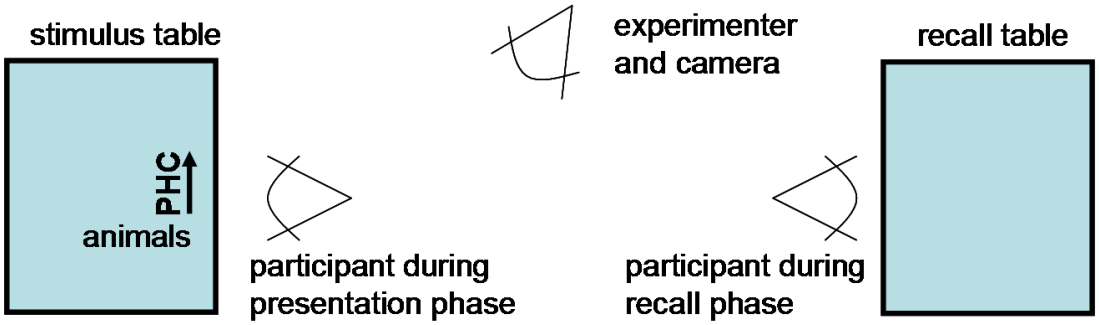

Figure 3.1. New Animals recall memory task layout (this example shows a trial in which the array Pig-Horse-Cow faces in the direction of the arrow, from the participant's perspective).

3.3.4. Recording – The central data are the orientations of the reproduced arrays of animals, recorded on the coding sheet (which you find at the end of this manual entry). This is not a linguistic task, so audio-recording is pointless. However video-recording is recommended to capture any information that may help in the analysis of the responses (e.g., signs of hesitation or confusion; self-corrections; verbal and/or gestural representations produced in reasoning or as mnemonics). Your contribution to group analyses will be PDF copies of the coding sheets.

3.3.5. Time constraints – The task takes a total of 10-20 minutes per participant.

3.3.6. Participants – Should be run with a minimum of 16 participants per language community. The orientation of the animals in the training and the trials needs to be randomized among the participants. You will therefore need to run training runs and trials according to Table 1:

Table 1. Randomization in New Animals task

# of participants	Animal orientation in training	Sequence of trials as per coding sheet
4	Left to right	Start with trial 1, end with trial 6
4	Left to right	Start with trial 6, end with trial 1
4	Right to left	Start with trial 1, end with trial 6
4	Right to left	Start with trial 6, end with trial 1

In other words, you need to ensure that there work with the same number of speakers for every logical possibility in the combinations between switching animal orientation in training runs and switching the order of the trials. Note the labels "Training" and "Trial Order" at the top of the coding sheet. It is intended for you to plan ahead and record which combination you are to conduct with a given speaker. Circle the combination of training and trial arrays ahead of time to ensure you always know which combination you are due to conduct.

3.3.7. Background – New Animals is a near-identical replication of the Animals In A Row (AIAR) task originally released as part of the July 1993 "Cognition and Space Kit" of what was then the Cognitive Anthropology Research Group at the Max Planck Institute for Psycholinguistics.[3] The

[3] New Animals differs from AIAR in three respects: (a) it uses a different set of toy animals; (b) it prescribes the arrays to be used in the trials (AIAR merely requires no array to be used more than once with the same participant and for the orientation

design was developed by Steve Levinson and Bernadette Schmitt (Levinson & Schmitt 1993), based on pilots conducted by Levinson with Guugu Yimithirr speakers and Levinson and Penny Brown with Tenejapa Tzeltal speakers. AIAR was designed to distinguish relative and absolute coders in terms of their responses. Since the participants turn 180 degrees between stimulus and recall tables, relative and absolute reproductions of the same array were readily identifiable as mirror images of one another. Data collected with AIAR formed the basis of Pederson et al. 1998.

The most important limitation of the AIAR design is the lack of a predictable discernible intrinsic response pattern. Intrinsic coders' responses are either masked as relative or absolute responses or, in case they conform to neither pattern, produce noise (in Levinson 1996 and Pederson et al. 1998, they were treated as errors). For MesoSpace, we piloted various versions of a design aimed at fixing this problem through the use of a cue on the stimulus and recall tables intended to allow intrinsic coders to project their preferred FoR. Unfortunately, in all variants we tried, this intrinsic cue had the effect of pushing most of the participating UB undergrads towards intrinsic solutions.

As a result, New Animals, like AIAR, lacks the capability of detecting intrinsic coders in any straightforward manner. Given the goals of MesoSpace, this situation is clearly suboptimal. Our central hypothesis is that productive meronymies may favor the use of allocentric FoRs in language and cognition - meaning of absolute or intrinsic FoRs! And it may well turn out that overall, intrinsic FoRs play a more important role across MA than absolute FoRs. Unfortunately, the only prediction for intrinsic FoRs we will be able to test is the prediction that predominantly intrinsic populations have no single statistically dominant response pattern.4 However, even if this prediction is confirmed, the finding would be at best weak, since there is no principled way of distinguishing random responses caused by intrinsic coding from random responses caused by error.

3.3.8. Procedure – The following is adapted from the AIAR instructions (Levinson & Schmitt 1993) and the protocol in Levinson 1996 and Pederson et al. 1998. Use as test trial the PHC trial of Figure 3.1. Coding conventions: all animals face in the direction of the arrow. The letters stand for the animals - Cow, Horse, Pig, Sheep. The order of the letters, read from right to left, codes the order of the animals from the tail to the head of the arrow: if you look at the letters so that they appear right side up, the rear of the right-most animal is the tail end of the array and the front of the left-most animal is the front or head of the array in the direction in which the animals face.

Explain the toys as animals and answer any questions. Introduce all four animals. Then build the PHC array of Figure 3.1, taking the sheep off the table (it is best to keep it in your hand). Now instruct the participant as follows:

Look carefully. Remember just how it is! I am going to take it away and ask you to make it again. OK, have you remembered it/are you ready?

Remove the array. You should now have all four animals in your hands. Ask the participant to wait a moment. Between 30 and 60 seconds need to pass between removing the stimulus array and reproducing it, without undue distraction of the participant. If need be, just look at your watch and wait. You can use the time to turn the camera from the stimulus to the recall table. After 30-60 seconds, ask the participant to walk over to the recall table. Hand them all four animals! The

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of the stimulus array to alternate regularly); (c) it involves six test trials rather than five, to make counter-balancing for the orientation of the stimulus array easier.

4 Individual intrinsic coders may respond consistently pseudo-absolutely or pseudo-relatively simply by way of a response strategy (meaning they choose a pattern arbitrarily). However, in an exclusively intrinsic *population*, one would expect the number of participants picking pseudo-absolute and pseudo-relative responses to approach 50% given a large enough sample.

purpose of making the participants choose the correct three animals from the total set of four is to mask the real purpose of the experiment. Tell the participant:

"Now make it again!"

If the participant asks whether the order of the animals matters, answer affirmatively. If the participant asks whether the location and/or orientation of the array matter, answer evasively:

"I want you to show me on this table exactly what you saw on the other table."

If the participant makes a mistake during the practice trial, explain the problem and run another practice trial. You can run as many practice trials as seems useful to you - just make sure that you do not accidentally use one of the test trials! The following count as errors: no array or more than one; wrong number of animals; wrong animals; inconsistent orientation (not all animals facing in the same direction). Do not, however, correct the orientation of the array - not even during practice trials.

When you have convinced yourself that the participant has understood the task, proceed to the first test trial (i.e., the first trial of the experiment, as opposed the practice trials). Record the reproduced array on the coding sheet. If the response fits any of the patterns on the sheet, encircle it. If not, draw your own diagram in the "other solution" box. In this case, it is particularly important to use the little compass rose in the lower left corner to mark the directions labeled linguistically in an absolute or geomorphic FoR in the community, so that it becomes apparent how the response is oriented with respect to this system. Do not point out or correct any errors during test trials - just note down the problem on the coding sheet and move on.

3.3.9. Stimulus – Two sets of 4 toy animals will be provided by the MesoSpace project. In addition, a coding sheet is provided in Appendix E

3.4. Analyzing spatial Frames of Reference

The following notes provide some guidelines for the analysis of data on spatial frames of reference in language collected with Ball & Chair and from other sources.

3.4.1. Introduction – Since FoRs are presupposed in the interpretation of spatial relators rather than to be encoded by the latter, it is difficult to read FoR preferences off examples. What expressions are potentially interpreted in spatial FoRs? Above all, any expression of a place function (i.e., an expression that logically takes an entity-denoting expression as an argument and denotes a place projected from the entity) - including adpositions (e.g., in front of; behind), meronyms (front, back, left), directionals and satellites (up), path verbs (ascend; 'go mountainwards'), and adverbs (left, east). Meronyms may be interpreted wrt. FoRs not just in expressions of place functions, but also in arguments. Googling the front of the tree yielded this example:

(9) The front of the tree's trunk sits at ten feet from the curb and extends towards the persons yard.

It seems doubtful whether trees can conventionally be said to have intrinsic fronts in English, and in any case, that's not what (9) is about. The front is evidently whatever part is closest to the curb; the speaker is presumably placing an imaginary observer at the curb. What this (admittedly slightly

funky) example is meant to illustrate is that meronyms can be interpreted relatively or absolutely (West Wing ;-)) even when they head argument NPs. Terms for absolute bearings often (generally? always?) lead a double life as meronyms (10) and adverbs or the like (11):

(10) T-in=xàaman kah-a'n h-Pedro.
PREP-A1SG=north live-RES(B3SG) M-Pedro
'North of me (is where) Pedro lives' (Bricker et al. 1998: 254)

(11) Tóoh nohol h-bin-o'b.
straight south PRV-go-B3PL
'Straight south (is where) they went.'

This pattern has fueled a debate as to whether these terms primarily denote direction vectors or places. Our focus here will be primarily on meronyms and anything that may head a ground phrase. A special comment is in order regarding the role of the vertical: expressions of vertical relations appear to have a universal preference towards interpretation with respect to the Earth' gravitational field. This acts as a special kind of absolute FoR in apparently all languages - which because of this uniformity has largely been ignored in typological work. We will follow suit in this respect. Meaning, for example, that if the gravitational vertical - as opposed to the "geomorphic" (mountain-based, or rather, mountain-derived) vertical in languages such as Tzeltal and Ayutla Mixe - is the only FoR that plays a role in the interpretation of "your" path verbs and/or satellites/directionals/etc., then you can safely ignore the latter.

3.4.2. Questions about frames of reference in your field language

3.4.2.1. Spatial FoRs and meronyms – Classify the most frequent meronyms occurring in spatial descriptions in terms of whether they are used topologically and/or projectively, and if the latter, which types of FoRs they occur with. Let's stipulate that uses that aren't orientation-dependent - i.e., dependent on the orientation of the ground, the observer, or the figure-ground configuration - are treated as topological whether or not they involve contact. If an expression can be interpreted in more than one FoR, comment on any restrictions or preferences that may influence the selection. Please provide examples to illustrate the FoR-bound interpretations.

The Yucatec meronyms in Table 2 have been sorted in terms of whether they can head the ground phrase or require combination with the generic preposition ti' as discussed in section 2.4. Àanal 'under' and óok'ol 'on', 'above', 'over' are exclusively interpreted wrt. the gravitational vertical. So àanal is not used to locate a figure at the butt of somebody or something (it' 'butt' is used for that), and óok'ol does not have the non-vertical contact uses of English on and its cognates in other Germanic languages. Iknal 'at' (in the sense of French chez), chúumuk 'center', ts'u' 'core', and nak' 'belly' are all used exclusively topologically. Conceptually, iknal involves proximity or inclusion in the figure's "domain" or "sphere of control" and the other expressions inclusion or containment; none of these notions is orientation-dependent. Páach 'back', 'outside', táan 'front', tséel 'side', xno'h 'right', and xts'i'k 'left' can be interpreted topologically, intrinsically, and relatively. The following examples illustrate these possibilities for táan 'front'. Example (12) shows the topological use, under which táan refers to the most salient planar part of the ground regardless of orientation. This tends to require contact.

Table 2. Yucatec meronyms commonly used in spatial descriptions and their interpretations

meronym	gloss	type	topological use	projective use	FoRs
àanal	under	head of ground phrase	no	yes	abs (gravity)
óok'ol	on/over				
iknal	at		yes	no	N/A
chúumuk	center	head of ground-denoting nominal or adverbial derivation in -il			
ts'u'	core				
nak'	belly				
(ba')pàach	back/outside			yes	int/rel
(ak)táan	front				
tséel	side				
xno'h	right				
xts'i'k	left				
háal	edge			?	?
xùul	end				
yáam	interstice				
xaman	north		no	yes	abs
nohol	south				
chik'in	west				
lak'in	east				

(12) T-u=táan le=bèeh=o' yàan hun-p'éel tunich=i'
PREP-A3=front DET=way=D2 EXIS(B3SG) one-CL.IN stone=D4
'On top of the road (lit. on the road's "front", i.e., the pavement), there's rock'

In the next example, táan refers to the region projected from the ground's intrinsic front:

(13) Le=mehen x-ch'úupal-al-o'b=o'
DET=DIM F-female:child-PL-PL=D2
ti' k-u=bàaxal-o'b t-u=táan le=máak-o'b=o'
PREP IMPF-A3=play-3PL PREP-A3=front DET=person-PL=D2
'The little girls, there they play in front of the people'

The same interpretation with the adverbial construction of táan:

(14) Táan-il tèen=e' yàan hun-p'éel mèesa=i'
front-REL me=TOP EXIST(B3SG) one-CL.IN table=D4
'In front of me, there's a table'

Finally, (15) is a likely example of a relative use of táan:[5]

(15) Le=x-ya'x+che'=o' yàan hun-túul máak
DET=F-green+tree=D2 EXIST(B3SG) one-CL.AN person
wa'l-akbal táan-il ti'
stand-DIS(B3SG) front-REL PREP(B3SG)
'The ceiba, there's a person standing in front of it'

[5] I'm not actually entirely sure that a *ceiba* cannot be said to have an intrinsic front. In any case, *táan* and *pàach* 'back', 'outside' can indeed be used relatively - provided the ground does not have an intrinsic front/back! - contrary to Bohnemeyer and Stolz 2006: 306.

Perhaps not entirely surprisingly, the adverbial construction in (14) and (15) is preferred with projective and especially with relative interpretations, whereas the possessive construction in (12)-(13) is preferred with topological interpretations.
All types of interpretations appear to be possible in principle with both constructions - but more research is needed on this question.

Critically, intrinsic interpretations always preempt relative interpretations; relative uses are generally possible only where intrinsic ones aren't available.
Thus, the terms for 'left' and 'right' at the very least strongly prefer intrinsic interpretations when used with human or animal grounds. The following two descriptions of Men and Tree pictures illustrate this. In (16), the toy man is the ground, and 'left' and 'right' are interpreted intrinsically. In contrast, in (17), where the ground is the tree, the interpretation is relative:

(16) Pero t-u=ts'íik=e' ti'=yàan, estée, le=k'àax-o'.
but PREP-A3=left-TOP PREP=EXIST(B3SG) HESIT DET=bush=D2
U=x-no'h=e' ti=u=mach-mah le=che'=o'.
A=3=F-right-TOP PREP=A3=grab-PERF(B3SG) DET=wood=D2
'But that bush is to [the toy man's] left. In his right hand, there he has that stick.'
(M&T 2.7)

(17) No'h-a'n yan-ik te=k'àax=o'?
right-RES(B3SG) EXIST-EXTRAFOC(B3SG) PREP:DET=bush=D2
Wáah ts'íik-a'n?
ALT left-RES(B3SG)
'Is [the toy man] to the right of the bush? Or (is it) to the left?' (M&T 2.5)

The possibility of an intrinsic interpretation appears to always preempt a relative one. Levy 2006 proposes a more sophisticated version of this generalization for Papantla Totonac. Determining whether some version of this generalization holds for all MA languages, and in what ways they differ from one another in this respect, is one of the goals of the MesoSpace project.

Cardinal directions are predominantly employed in Yucatec for geographical localization (i.e. localization in large-scale, geographical space) as in (3)-(4) above. Some but not all speakers also use cardinal terms in table-top space. The following example illustrates xaman 'north' in reference to the gaze of the toy man and nohol 'south' in reference to the location of the three wrt. him:

(18) U=ts'o'k hun-p'éel túun=a', he'l=a'
A3=end one-CL.IN then=D1 PRSV=D1
hun-túul pàal túun pàakat toh xaman,
one-CL.AN child PROG:A3 look straight north
nohol k-u=p'áat-al le=k'àax ti'=o'.
south IMPF-A3=leave\ACAUS-INC DET=bush PREP(B3SG)=D2
'The last one, then, here it is, a child, he is looking straight north, the bush remains south of him.' (M&T 2.4)

3.4.2.2. Spatial FoRs and adpositions – Now repeat the same description for spatial adpositions! The only genuine spatial preposition of Yucatec, ich 'in', expresses inclusion and containment and thus is always interpreted topologically. The generic preposition ti' does not lexically encode a place function, but merely turns a noun phrase into an adverbial or oblique. It is only in combination with locative or location change predications that this adverbial or oblique is interpreted as denoting a place function. As the above examples illustrate, this place function can be

topological (12), intrinsic ((13)-(14); (16)), relative ((15), (17)), or absolute (18) - the presence of ti' does not constrain this choice.

3.4.2.3. Spatial FoRs and path verbs, directionals and satellites – Path verbs, directionals, and satellites may likewise tap into FoRs for their interpretation. Yucatec lacks directionals and satellites. Among the path verbs, only lúub 'fall', na'k 'ascend', em 'descend', and líik' 'rise' involve a FoR - and Yucatecans being chronic flatlanders, this is always the gravitational vertical. The other path verbs involve exclusively topological place functions.

However, languages spoken by mountain dwellers often lexicalize 'uphill'-'downhill' distinctions in their path verbs (e.g., Brown 2006 for Tenejapan Tzeltal) and languages spoken by islanders may have verbs meaning 'go landward' and 'go seaward' (e.g., van Staden 2000 for Tidore).[6]

Table 3. The basic change-of-location verbs of Yucatec

Path root	**Causative Stem**	**Place function of Ground**	**Locative description characterizes**	**Ground encoding**
tàal 'come'; u'l 'return'	tàas 'bring'; u's 'return'	AT	target state ('TO')	inherently deictic
k'uch 'arrive'	k'uhs 'cause to arrive'			lexical
bin 'go'	bis 'take'		source state ('FROM')	inherently indexical
luk' 'leave'	lu's 'remove'			lexical
lúub 'fall'	lu's 'fell', 'drop'	ON/ABOVE	target state ('TO')	
na'k 'ascend'	na'ks 'lift'			
em 'descend'	èens 'pluck', 'lower'		source state ('FROM')	
líik' 'rise'	li's 'lift'			
òok 'enter'	òoks 'insert'	IN	target state ('TO')	
hóok' 'exit'	ho's 'extract'		source state ('FROM')	
máan 'pass'	máans 'pass'	under-specified	N.A.	

3.4.2.4. Properties and distribution of the FoRs – We would like to know about anything unusual, quirky, or otherwise noteworthy regarding the FoRs themselves, as opposed to the spatial relators, in your field language that you might be aware of. Any information regarding who prefers what type of FoR under what circumstances where the facts of lexicon and syntax discussed above permit multiple choices is particularly relevant.

In experimental contexts, Yucatec-speaking consultants readily make use of intrinsic FoRs anchored in local or ad-hoc landmarks. These may be topographical landmarks ('towards the square', 'towards the country road'), stable objects in the immediate vicinity of the situation ('towards the door', 'towards the window'), but also moveable objects which hold their position just for the time being ('towards the camera', 'towards where Christel is standing').

[6] In contrast, there appears to be no attested case of a 'go left'/'go right' distinction in path verbs. The reason for this typologically asymmetry is not obvious at present.

(19) Kax-t u=láak' ka'-túul máak.
search-APP(B3SG) A3=other two-CL.AN person
Hun-túul=e' Jaime k-u=pakt-ik,
one-CL.AN=TOP Jaime IMPF-A3=look-INC(B3SG)
hun-túul=e' te=kàaye k-u=pàakat=o'.
one-CL.AN PREP:DET=street IMPF=A3=look=D2
'Look for another two men. One is looking at Jaime, one is looking towards the street.' (M&T 4.7)

Although the data presented above shows that all three types of FoRs are in use in Yucatec, there are vast differences with respect to the command that individuals and identifiable groups of speakers have over different kinds of FoRs. Most widely distributed across consultants is the intrinsic FoR. All speakers of Yucatec who acted as consultants in the research on spatial reference reported in Bohnemeyer & Stolz 2006 used this FoR freely and frequently. Table 3 provides an analysis of four pairs of Yucatec speakers who played game 2 of the Men and Tree series (which appears to be quite representative of the general usage):

Table 3. FoRs and strategies employed during game 2 of Men and Tree

FoR	**Strategies**		**Total number of reference acts**
absolute	cardinal directions		2
relative	physio-morphic projections		2
ad hoc landmarks	speech act participant as ad-hoc landmark: 4	other ad-hoc landmarks external to the picture: 3	7
other intrinsic	intrinsic FoR anchored in the ground		12

Virtually every consultant we interviewed used the intrinsic FoR frequently. As for the use of local or ad-hoc landmarks, this is at least not restricted to a particular group of consultants. Women use this strategy as freely as men and adolescents as freely as adults. For the other two FoRs, however, some restrictions with respect to the command people have of them can be stated. Consultants who employed the absolute FoR by using cardinal directions were predominantly adult males. (Very few women employ the absolute FoR.) Male adult speakers use expressions for cardinal directions not only for large-scale geographical localization, but also for small-scale localization, which appears unusual from an English-speaking point of view. Many of the men who used cardinal directions in the linguistic elicitation sessions (though not all of them) proved to be employing an absolute FoR in cognitive tests of recollection and reasoning as well, i.e. they proved to be absolute thinkers.

The use of the relative FoR is not as restricted to a particular group as that of cardinal directions. It is our impression, however, that most men have command of the relative FoR (even if they prefer the absolute FoR) whereas only a smaller percentage of the women have it. All interviewed males and also many, though by no means all, females made use of this FoR regularly or occasionally. Many of them proved to be relative thinkers in the accompanying cognitive tests. In other words, if there are speakers of Yucatec who exclusively use the intrinsic FoR, these speakers are very likely female.

There is, thus, apparently a gender-specific distribution with respect to the command of FoRs, at least in the area where the pertinent field research was conducted: all speakers employ the intrinsic FoR and use local or ad-hoc landmarks in pseudo-absolute reference, many men and a some women use the relative FoR, and many men but almost no women use cardinal directions and the absolute FoR.

4. Typological questionnaire

This questionnaire was developed by Purnima Shakthi and Jürgen Bohnemeyer on the basis of Campbell, Kaufman, & Smith-Stark 1986. The objective is to create a typological profile of each language in the MesoSpace sample based on the properties discussed in Campbell, Kaufman, & Smith-Stark as potentially shared across Mesoamerican (MA) languages as areal features. There are three goals: first, to accumulate background knowledge of the MespSpace languages that might be relevant to the group analyses to be carried out at UB; secondly, to assess the extent to which each language is integrated in the MA sprachbund, so as to be able to judge the likelihood of the features we are interested in being diffused areally; and thirdly, to gather data for the testing of statistical methods as diagnostics of language contact.

4.1 Language variety and community – please identify

- the language and its genealogical affiliation (if known)
- the variety you work on
- where this variety is spoken geographically
- any contact languages spoken in the same area (incl. Spanish)
- the extent to which speakers are bi- or multi-lingual
- by whom (socio-culturally) and where (in terms of contexts or "arenas" of language use; e.g., on the street, at school, at church, at home,...) the language is spoken in case there are restrictions
- whether there are – as far as you know - still children learning the language/variety as their first/second language

4.2. Phonological features

4.2.1. Phoneme inventory

- Phonemic voicing contrast: Does the language/variety show a phonemic voicing contrast in consonants? If so, in which (classes of) consonants does this occur?
- Ejectives: Does the language/variety phonemically contrast glottalized/ejective and non-glottalized/non-ejective consonants?
- Aspiration: Does the language/variety phonemically contrast aspirated and unaspirated stops? If so, which stops?
- Affricates: Are there any phonemic affricates (incl., e.g., the lateral affricate /tl/)? If so, please specify.
- Retroflex consonants: Are there any retroflex stops or fricatives in the phoneme inventory of the language/variety?

- Uvulars: does the language/variety have uvular consonant phonemes (/q/ etc.)? If so, please specify.
- Tone: Is there phonemic pitch? In other words, are there any morphemes or grammatical processes that are distinguished exclusively by pitch? If so, is tone a pervasive or rather a restricted phenomenon? Can you briefly characterize the complexity of the tone system?
- Central vowel: Does the phoneme inventory of the language/variety include a central vowel (schwa or barred i)?

4.2.2. Phonological processes; morpho-phonology; prosody

- Sonorant devoicing: Does the language/variety have a rule of devoicing sonorants in (word-)final position?
- Obstruent voicing after nasals: Does the language/variety have a rule of voicing unvoiced obstruents preceded by nasals?
- Vowel (dis)harmony: Does the language/variety have productive vowel harmony, either in the sense of a constraint on possible words in terms of the vowels that may co-occur in them (as in Turkish or Finnish) or in terms of productive affixes that include a vowel whose realization depends on the/a root vowel? If so, please elaborate.
- Stress: Does the language have stress? If so, is it (mostly) lexically assigned or (mostly) predicted by general rules?

4.3. Morphosyntax

4.3.1. Basic clause structure

- Constituent order: Please characterize the basic constituent order of the language/variety.
- Head- vs. dependent-marking: To what extent do verbs, adpositions, and/or relational nouns agree with or cross-reference their nominal arguments/complements ("head-marking")? Conversely, to what extent are nominals morphologically case-marked when occurring as the arguments/complements of verbs, adpositions, and/or relational nouns?

4.3.2. Predication

- Equative predication: Does the language employ some sort of copula in equative predications (i.e., predications that assert the identity of the referents of two nominals, as in "Floyd was the culprit")?
- Non-verbal predication: Do non-verbal predicates agree with/cross-reference their subjects/themes? (1) is a Yucatec example. The nonverbal predicate is constituted by the quantifier pro-form mixba'l 'nothin'. It carries an "absolutive" = Set-B suffix cross-referencing the theme, which is in the 1st-person plural.

(20) Mix-ba'l-o'n t-aw=ich
NEG.EMPH-thing-B.1.PL PREP-A2=eye
'We are nothing to you (lit. in your eye)'

- Possessive predications: Are possessive predications expressed as metaphorical locative predications (i.e., with the same construction and lexical head)?

4.3.3. Adnominal possession

- Constituent order: What is the predominant order of possessor and possessum in adnominal possessive constructions (when both are realized nominally)?
- Alienable-inalienable distinction: Does the language/variety distinguish different classes of nouns on the basis of their privileges of occurring as possessum in an adnominal possession construction? If so, are there different constructions for different classes of nominals?
- "Absolute" morphology: In case there is a morphosyntactic alienability distinction, are there derivational operations between the various classes of possessa? In particular, is there an "absolute" derivation that produces alienable stems from inalienable bases?
- Adpositions and relational nouns: Does the language/variety have pre- or postpositions? If so, are there many or only a few? Does the form of the adpositional phrase resemble that of a possessed nominal? To what extent does the language/variety use relational/inalienable nouns instead of adpositions? Please provide examples!

4.3.4. Number and numeral classification

- Nominal number: Does the language/variety have number marking on nouns? If so, is number marking obligatory whenever the noun has a plural referent?
- Numeral classification: Does the language/variety have numeral classification, in the sense that enumeration (combination with a numeral) of nouns describing "discrete" objects of more or less permanent shape requires a classifier?

4.3.5. Other morphosyntactic properties

- Switch-reference: Does the language/variety have a type of clauses or verbal projections marked for whether their subject/pivot is coreferent with that of another clause or verbal projection or not?
- Inclusive-exclusive distinction: Does the language/variety have distinct inclusive and exclusive 1st-person forms in the pronominal and/or agreement/cross-reference system?
- Aspect-dominance: Does the language/variety have tense marking, in the sense that main/independent clauses headed by semantically "finite" dynamic verb forms are regularly or obligatorily marked for whether they refer to a time in the past, present, or future of the time of utterance or some reference time? Does the language/variety have aspect marking, in the sense that main/independent clauses headed by semantically "finite" dynamic verb forms are regularly or obligatorily marked for whether the eventuality they describe is completed or in progress or about to commence or has already produced a result state in/at/with respect to the time frame that is being talked about? If the language/variety has both tense and aspect marking, which system is more complex, in the sense that the number of subcategories distinguished is larger?
- Object incorporation: Do transitive verbs "incorporate" the head of direct or indirect objects into the stem? If so, how productive is this process? Is the resulting compound stem intransitive?
- Body part incorporation: Do verbs "incorporate" body part terms? If so, does the process serve to express (a) where a theme or patient is affected by the event or (b) that a certain part of the agent/actor is involved in the event as an instrument or (c) both?
- Directionals: Does the language/variety express direction vectors (towards/away from the speech situation; up/down; into or out of some ground; etc.) using a special path verb form? Does the language have verbal affixes that express such meanings?

4.4. Semantic features

- Numeral system: Does the language have a vigesimal numeral system (i.e., a system based on units of 20)?
- Pan-Mesoamerican calques: How many of the following 55 metaphors (Campbell, Kaufman, & Smith-Stark 1986: 553) occur in the language/variety?

1 . door: mouth of house 2. bark: skinhack of tree 3. knee: head of leg 4. wrist: neck of hand 5. calf: excrementhelly of leg 6, eye: fruitlseedlbean of face 7. bile: bitter 8, finger: child of hand 9. boa constrictor: deer-snake 10. moon: grandmother 1 1 . ring: coy01 palm-hand 12. witch: owl, sleep(er) 13. cramp: (associated in some way with) deer 14. fiesta, ceremony: (big) day 15. root: hair of tree 16, twenty: man 17. lime: (stone-)ash 18. egg: stoneibone of bird 19. wife: intimately possessed 'woman' 20. porcupine: thorn-opposum, thorn-lion, thorn-peccary, thorn-pig 21. cougar: red jaguar 22. anteater: honey sucker, suck-honey 23. to kiss: to suck 24. to smoke: to suck 25. branch: arm (of tree) 26. to marry: to join, to find 27. gold/silver: excrement of sunlgod 28. eclipse: eat the sunlmoon; the sunlmoon dies; sunlmoon to rot 29. coral snake: mother of driver ant 30. bladder: house (of) urine	31 , vein: road (of blood) 32, canine tooth: dog-tooth, snake-tooth 33. molar: grindstone (metate) 34. edge: mouth 35. thumb: mother of hand 36. mano (of metate): handlchild of metate 37. poor: orphan, widow 38. rainbow: snake, cougar, turtle, squirrel, or weasel 39. otter: water-dog, water-fox 40. cedar: god tree 41. medicine: liquor, poison 42. to cure: to suck (to smoke) 43, pataxte (non-domesticated cacao): tigercacao (jaguar-cacao) 44. town: water-mountain 45. soot: noselmucus of fire 46. to write: to paint, to stripe 47. to read: to look, to count, to shout 48. alive: awake 49. son and daughter: man's are distinguished, but a single term for woman's 50. head: bottle gourd (tecomate) 51. thirst: water-die 52. need: want, be wanted 53, enter: house-enter 54. cockroach: contains the root for 'house', often compounded with 'in' or something equivalent 55. feather: fur

5. Future perspectives

The MesoSpace project is intended as the first part of a larger investigation of the semantic properties of locative and motion event descriptions in the Mesoamerican (MA) area. This larger project will also deal with the lexicalization of "dispositions" – non-inherent spatial properties that may be thought of as "manners" of location; the semantic type of the "ground phrase", the expression encoding the referential ground in locative and motion event descriptions; and the use of directionals – subordinate forms derived from path verbs – in MA languages. Dispositions are much more richly lexicalized in Mayan languages than in Indo-European languages; dispositional roots range in the hundreds in Mayan (Martin 1977, Haviland 1994, Bohnemeyer & Brown in press). Smaller sets of dispositional roots have also been attested in Mixe-Zoquean and Otomanguean languages. MA languages often employ dispositional expressions as locative predicates. Whereas ground phrases in Indo-European languages denote locative and path functions (Jackendoff 1983:ch.9), ground phrases in some Mayan and Otomanguean languages denote merely place functions or even merely object parts (Bohnemeyer in press, Pérez Báez & Bohnemeyer ms.). It has been hypothesized that the use of directionals to encode path functions is directly related to the path-neutrality of ground phrases (Grinevald in press). However, not all languages with path-neutral ground phrases have directionals (Bohnemeyer & Stolz 2006, Bohnemeyer in press). It will be investigated whether the use of meronyms in the ground phrase affects the selection of locative predicates and, more generally, to what extent dispositionals, meronyms, and adpositions overlap in the types of information they encode (Brown 1994, Bohnemeyer & Brown in press). Furthermore, it will be examined to what extent the structure of the ground phrase predicts the accessibility of certain types of frames of reference. For instance, it may be expected that languages in which the ground phrase is (almost) always headed by a body-part-derived meronym (MacLaury 1989; Pérez Báez in press) disfavor the use of absolute frames of reference in the horizontal plane, since all known cases of body-part based meronymies are used exclusively with intrinsic and relative frames of reference. Finally, the greater extent of lexicalization of dispositions in MA as opposed to Western languages will be exploited for an investigation into whether and how the lexicalization of concepts affects the encoding of the relevant properties in recall memory, given preliminary evidence for "thinking-for-speaking" effects in this domain (Belloro et al. ms.).

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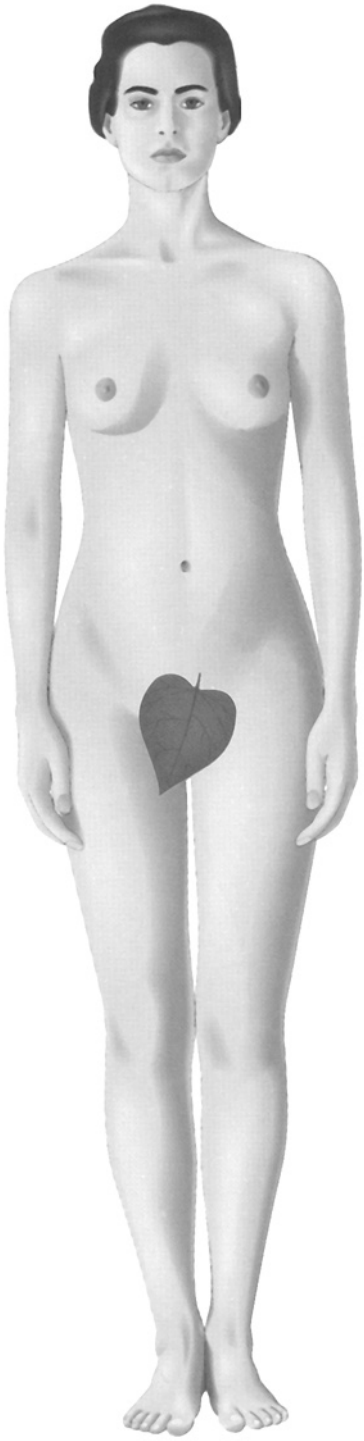
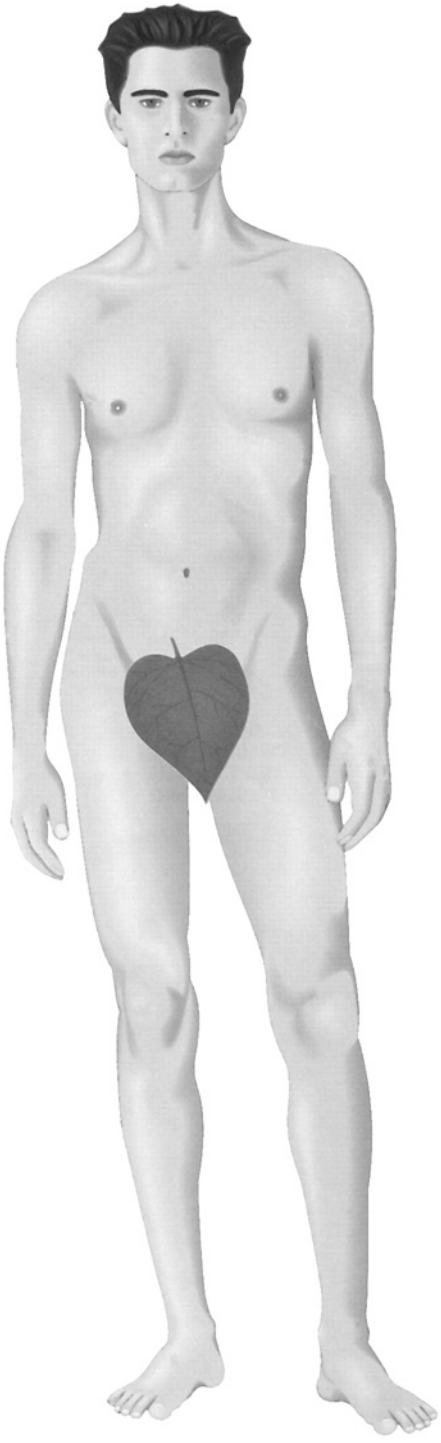
Appendix A. Body part illustrations

Appendix A. Body part illustrations

Appendix A. Body part illustrations



Appendix A. Body part illustrations



Appendix A. Body part illustrations

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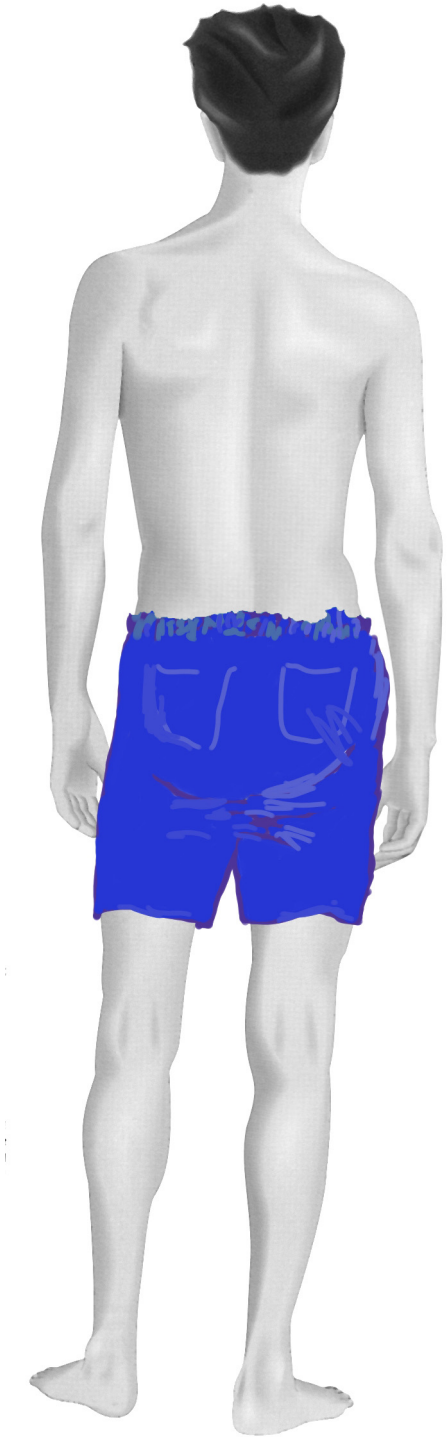

Appendix A. Body part illustrations

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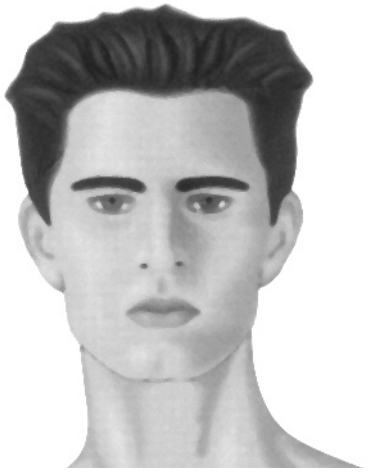
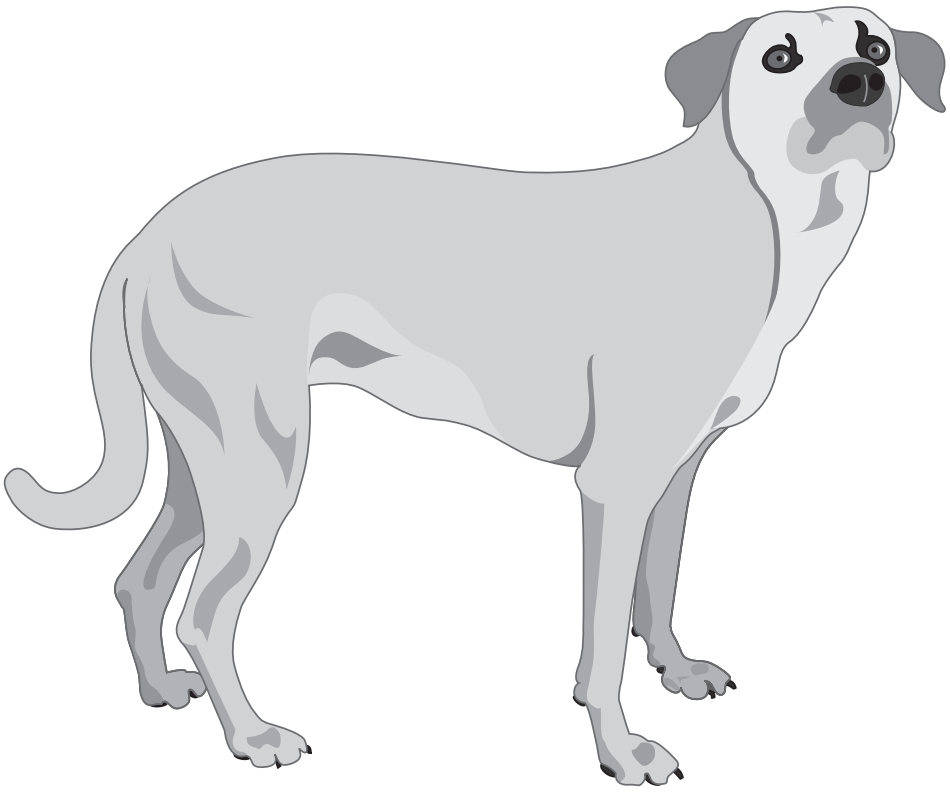
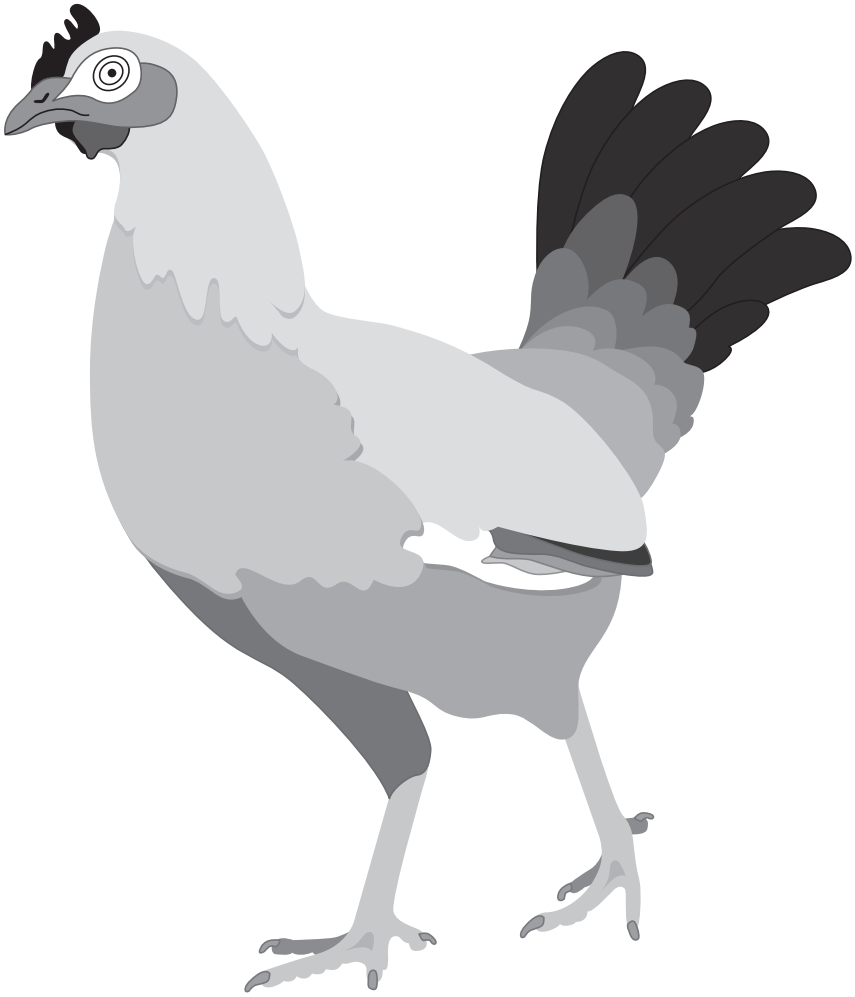


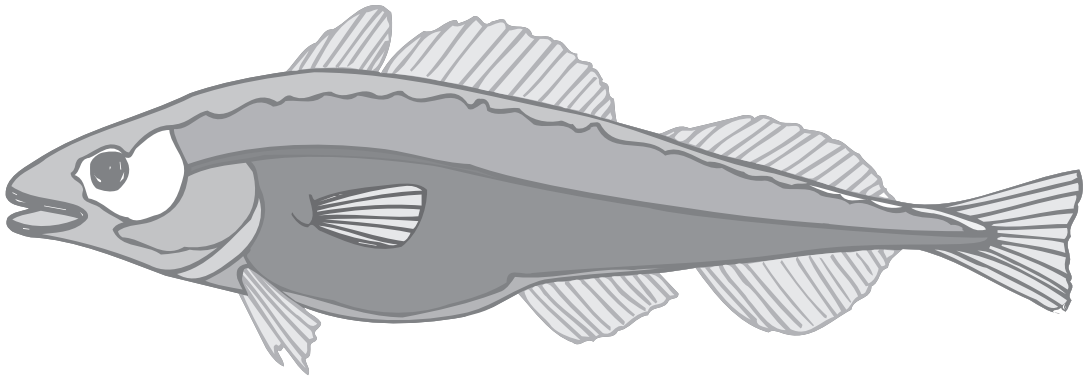
Appendix A. Body part illustrations



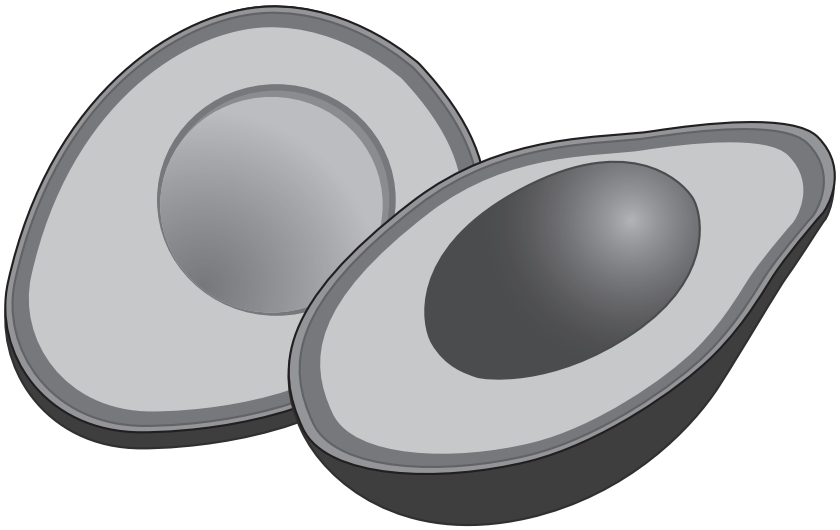
Appendix A. Body part illustrations



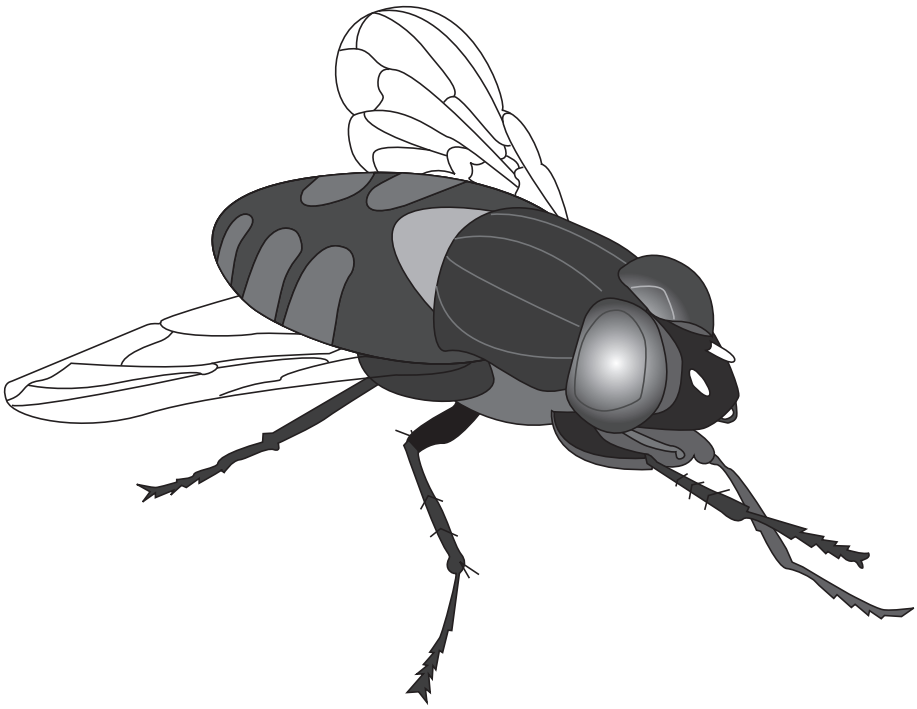
Appendix A. Body part illustrations



Appendix A. Body part illustrations



Appendix A. Body part illustrations



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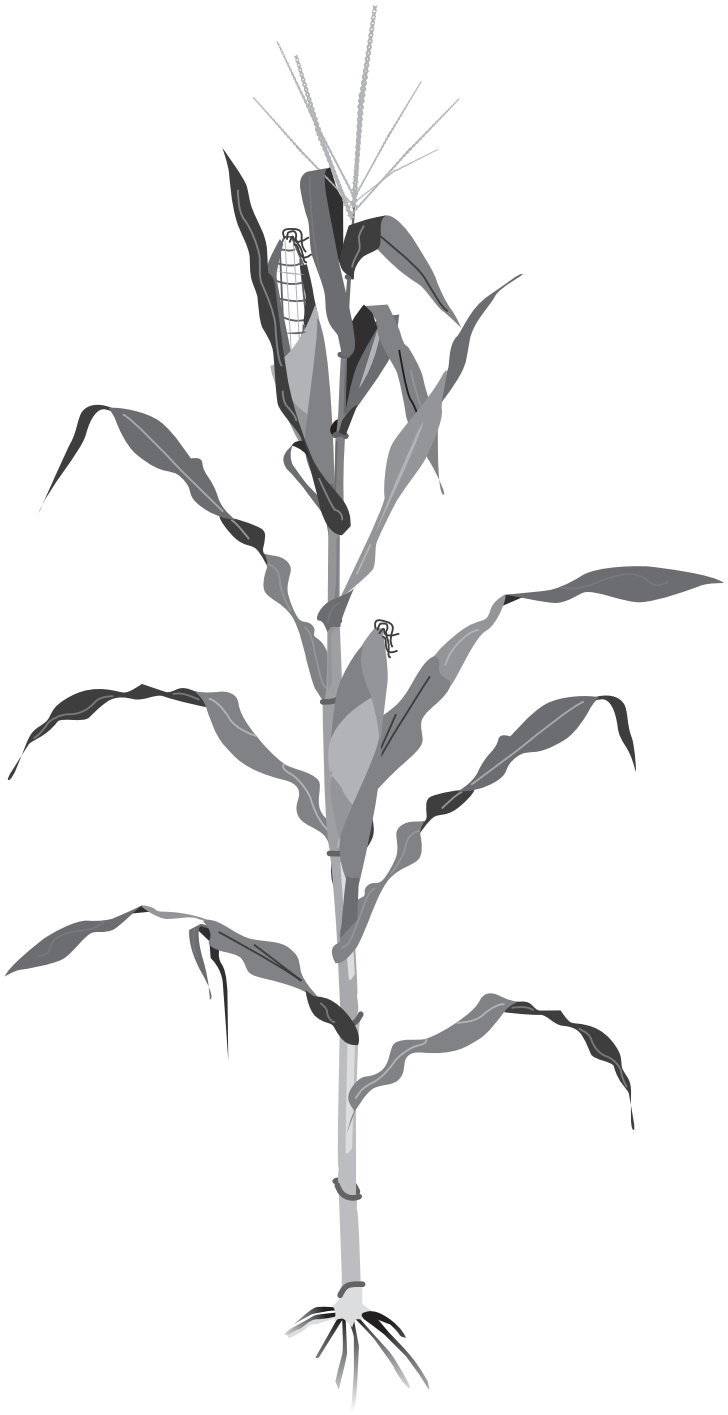


Appendix A. Body part illustrations

Appendix B. Artifact photographs

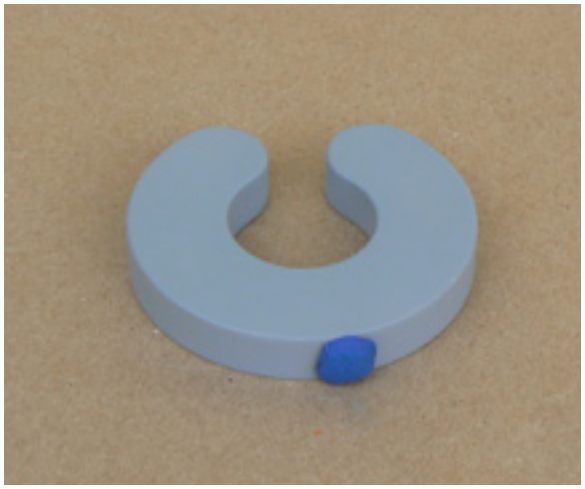
Appendix B. Artifact photographs

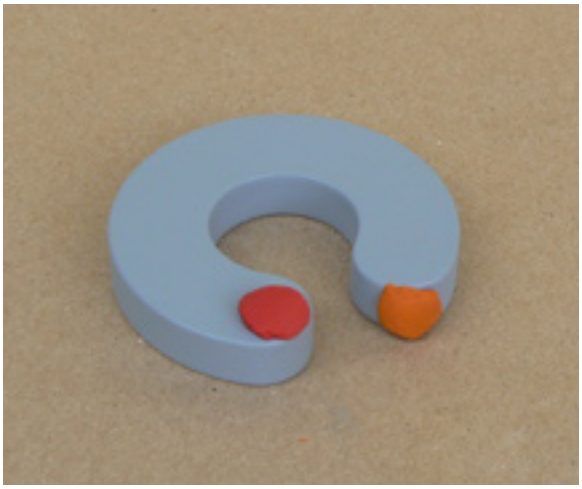
Appendix B. Artifact photographs

Appendix B. Artifact photographs

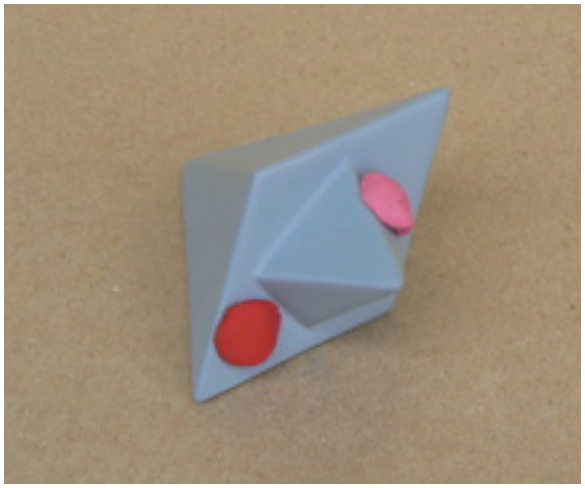
Appendix C. Novel object part identification landing sites

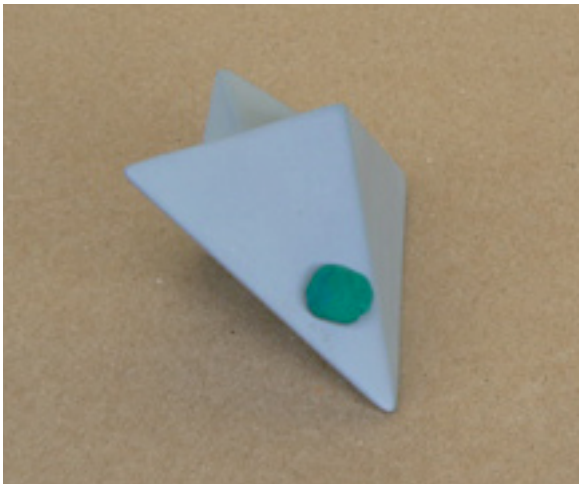
Object 1





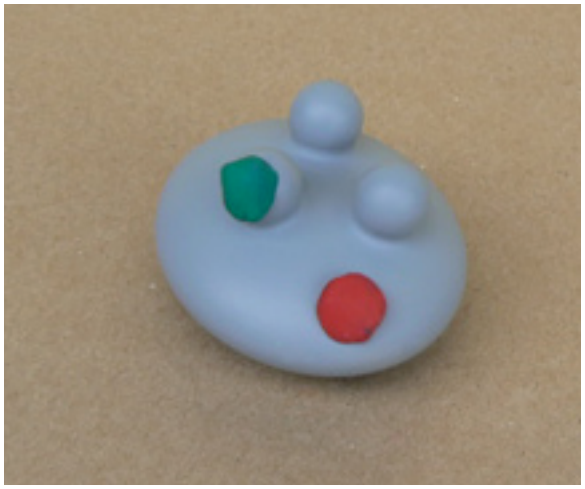
Object 2





Appendix C. Novel object part identification landing sites

Object 3



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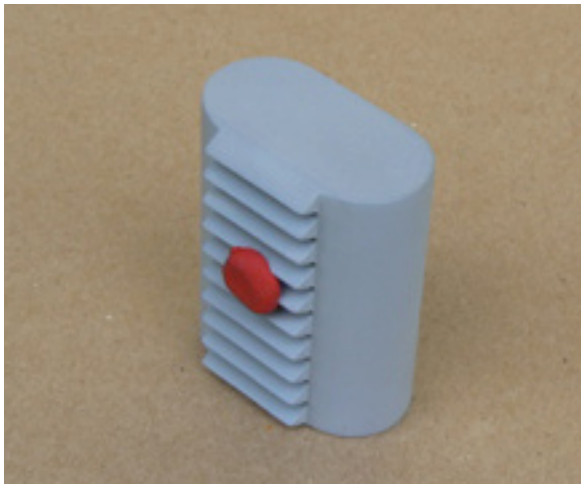
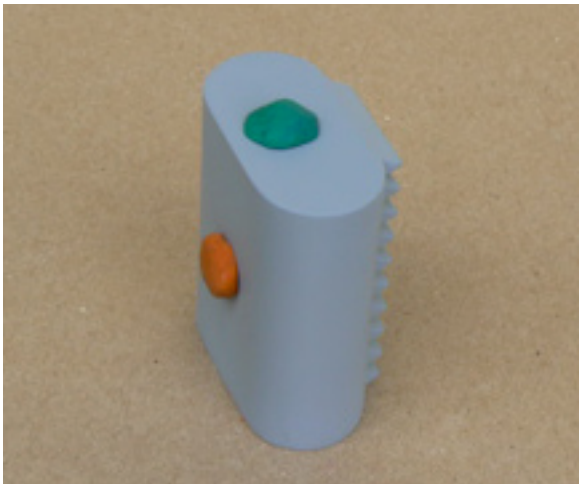
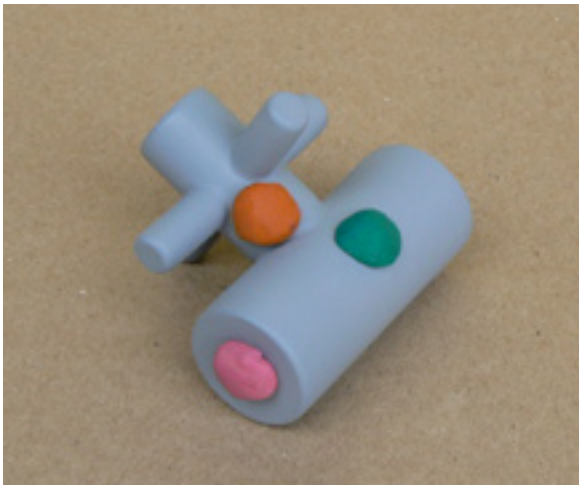




Appendix C. Novel object part identification landing sites

Object 5

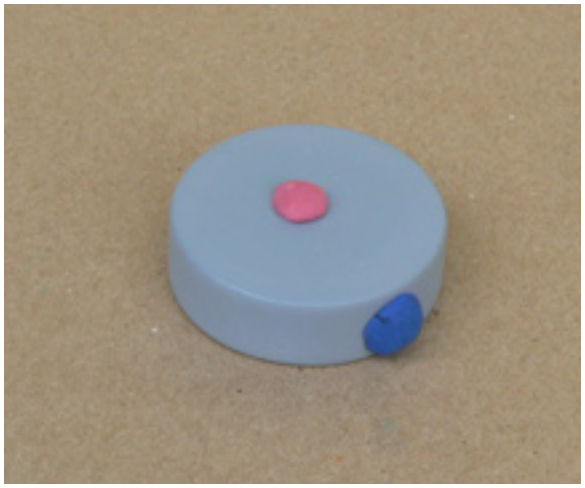


Object 6

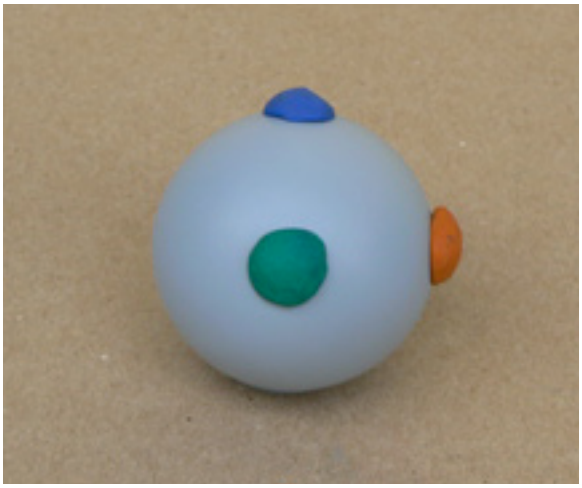
Appendix C. Novel object part identification landing sites

Object 7

Object 8



Object 9

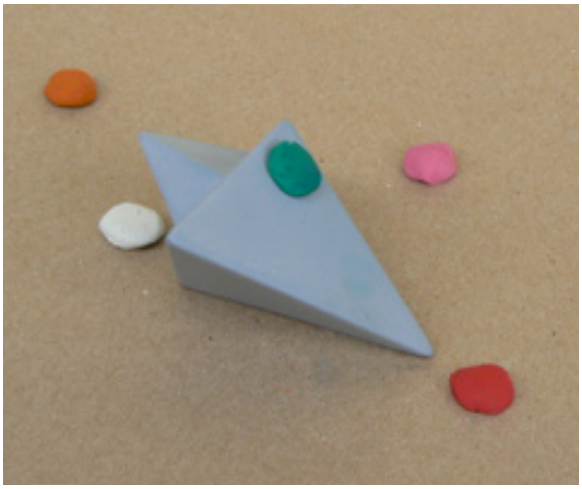


Appendix D. Novel object placement landing sites

Object 1

*Pink chips **is** behind*

Object 2

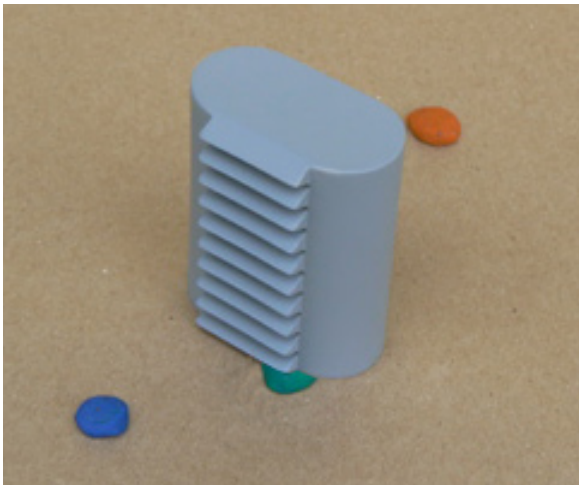


White chip is under

Object 3

Yellow chip is under; green chip is behind; blue chip is on top

Object 4



Green chip **is** *under; orange chip is behind*

Appendix D. Novel object placement landing sites

Object 5

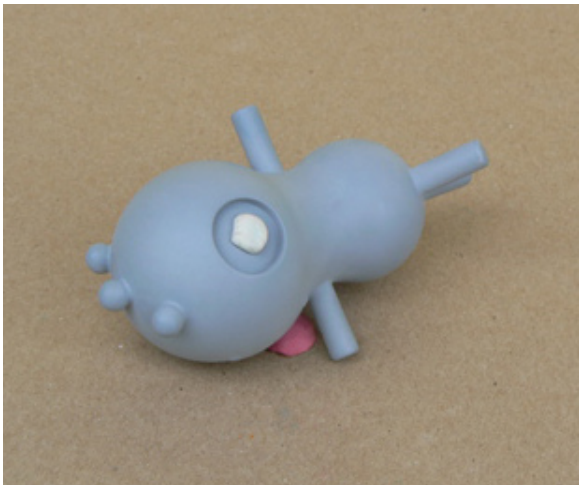
Pink chip is under; orange chip is behind

Object 6

Pink chip is in front of tip of protrusion; blue chip is behind; green chip is beside

Object 7

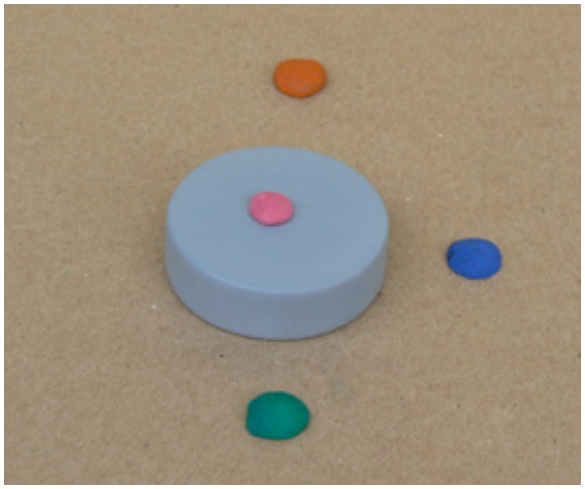
Bllue chip is behind; yellow chip is balanced on top of "rabbit ears"; orange chip is in front of; green chip is beside



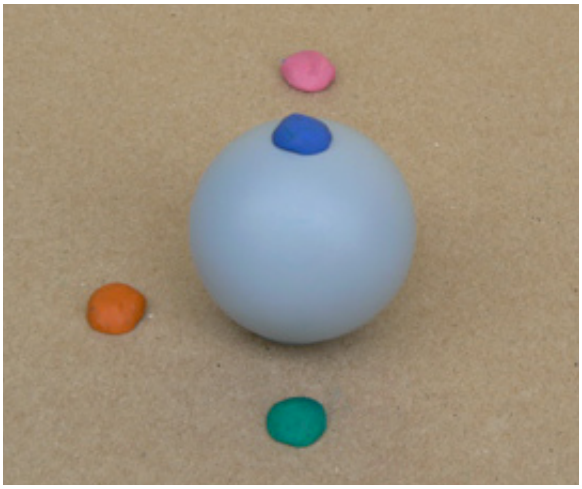
Pink chip in THIS photo is under; white chip is in(side)

Appendix D. Novel object placement landing sites

Object 8

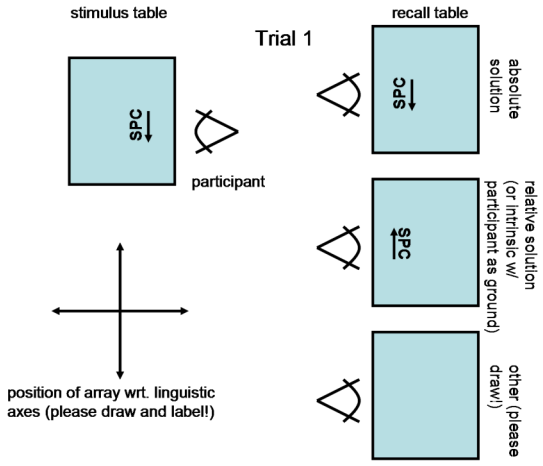


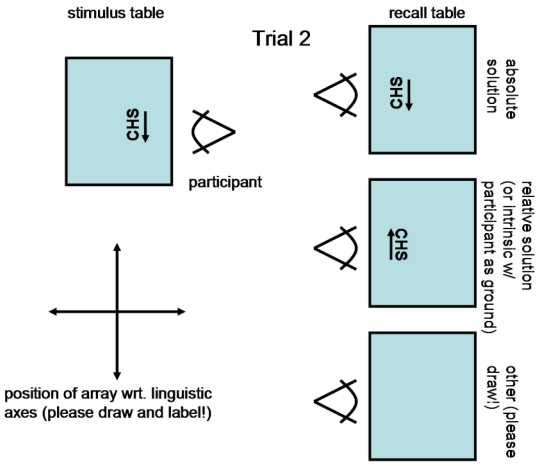
Object 9

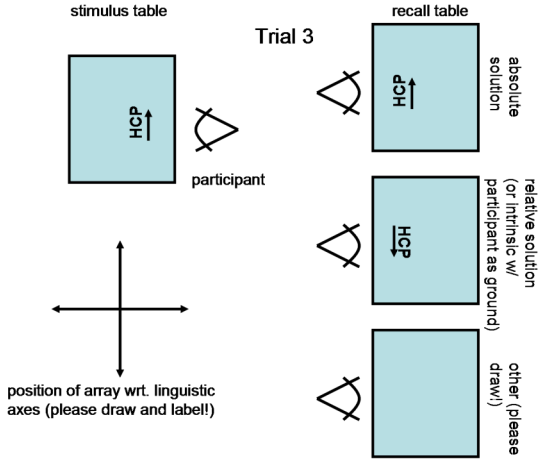


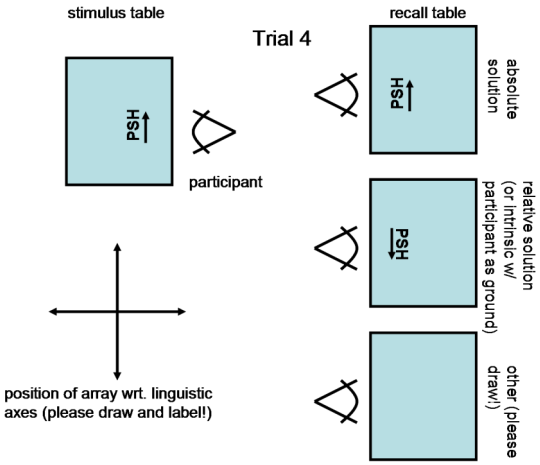
Appendix E. New Animals Coding Sheet

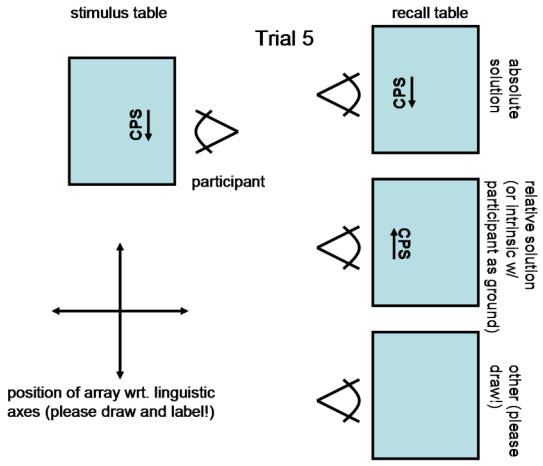
* Researcher: _____ * Population: _____ • Date: _____
* Participant: _____ * Age: ___ * Gender: ___ **TRAINING**: **L-R** **R-L**
* L1: _____ * L2: _____ * Literacy: _____ **TRIAL ORDER**: **1-6** **6-1**

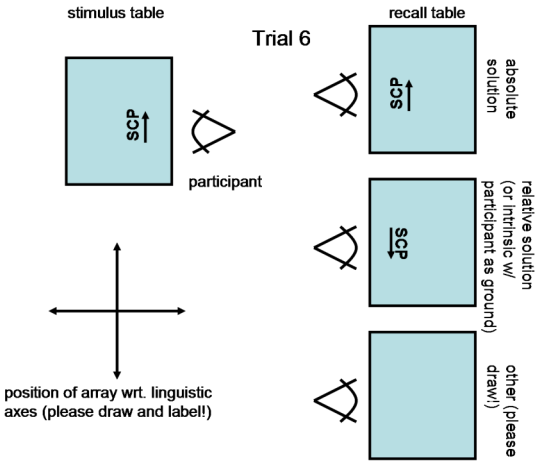












Appendix F. Chair and Ball photo guide

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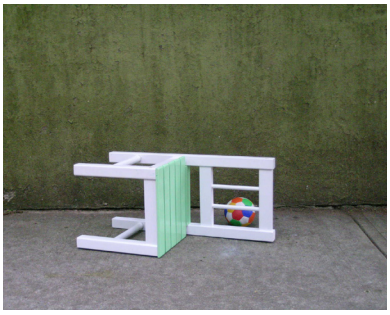

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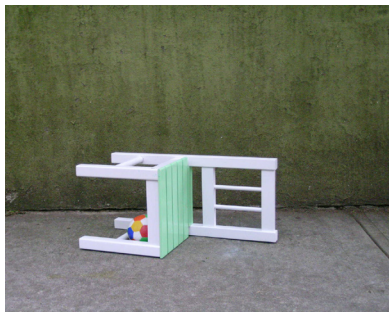

Appendix F. Chair and Ball photo guide

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Appendix F. Chair and Ball photo guide

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Appendix F. Chair and Ball photo guide

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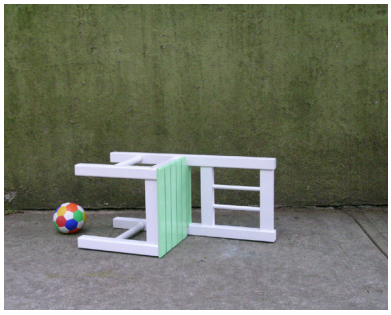

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Appendix G. IRB information sheets

Following is the approved IRB information sheet. Please print enough copies (printouts or photocopies) to provide each of your participants with a hard copy of the information sheet.

UNIVERSITY AT BUFFALO, STATE UNIVERSITY OF NEW YORK
Lenguaje y cognición espacial
FOLLETO DE INFORMACIÓN (VERSION EN ESPAÑOL)

SI TIENE PREGUNTAS RESPECTO DE ESTA INVESTIGACION, CONTACTE al Dr. Roberto Zavala Maldonado, CIESAS-Sureste, Carretera a Chamula Km. 3.5, Barrio la Quinta San Martín, San Cristóbal de las Casas, Chiapas, México C.P 29247 teléfono: (967) 6749112, (967) 6749100 (Ext. 4026), correo electrónico: rzavmal1@hotmail.com.

Este folleto de información explica las condiciones de esta investigación. Por favor léalo detenidamente. Puede preguntar sobre lo que no entienda. Si no tiene preguntas ahora, puede preguntar después.

PROPOSITO: UD. está invitado a participar en una investigación respecto de cómo su lengua nativa expresa dónde objetos están localizados y sí eso tiene algún impacto en su memorización de dónde están localizados los objetos. Esta investigación involucra hablantes de muchas lenguas examinadas por investigadores diferentes.

PROCEDIMIENTO: Es posible que le solicitaré que participe en las siguientes tareas:

- produciendo discursos en su lengua nativa que serán grabados en audio y/o video
- ayudando en la trascripción de grabaciones en audio
- juzgando si ciertas frases en su lengua suenan bien o mal, y qué quieren decir
- memorizando dónde están localizados los objetos y después mostrándolo al investigador

DURACION: Le solicitaré que participe en una o varias sesiones. Cada sesión tomará no más que dos horas.

RIESGOS Y BENEFICIOS: No existen riesgos asociados con su participación en este estudio. Con su contribución al conocimiento científico de su lengua nativa puede ayudar al desarrollo de materiales para la educación escolar en su lengua.

CONFIDENCIALIDAD: Su privacidad será mantenida en todos los datos escritos y publicados en relación con este estudio. En ciertas ocasiones, sus discursos serán grabados en audio o video y es posible que sean citados en publicaciones científicas, sin embargo me aseguraré de que estas citas aparezcan de tal forma de no revelar su identidad. Sus respuestas serán archivadas en la Universidad Estatal de Nueva York en Buffalo, EE.UU. Este archivo será borrado a su pedido en cualquier momento en que UD. lo solicite.

PAGO: UD. recibirá una retribución para cada sesión en que participe según la tarifa determinada por el investigador que trabaja su comunidad.

COLABORACION CON ESTE ESTUDIO: Su participación es voluntaria. UD. tiene el derecho a negarse a responder cualquier pregunta en particular. Eso no afectará su pago.

Si tiene alguna pregunta respecto de sus derechos como participante en este proyecto de investigación, puede contactar (anónimamente, si lo desea) a la Comisión Inspectora para las Ciencias Sociales y de la Conducta, 515 Capen Hall, Universidad en Buffalo, La Universidad Estatal de Nueva York, Buffalo, NY 14260, EE. UU. (o por teléfono +1-716-645-6474) o al Dr. Roberto Zavala Maldonado utilizando la dirección mencionada al principio de este documento.