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Bilingual Spaces: Approaches to Linguistic Relativity in Bilingual Mexico

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor

of Philosophy

in

Anthropology

by

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2015

The dissertation of Melanie Erin McComsey is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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2015

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ABSTRACT OF THE DISSERTATION

Bilingual Spaces: Approaches to Linguistic Relativity in Bilingual Mexico

by

Melanie Erin McComsey

Doctor of Philosophy in Anthropology

University of California, San Diego 2015

Professor John B. Haviland, Chair

Bilingual speakers of Spanish and Juchitán Zapotec (JCH), two languages that have been said to differ substantially in their semantics for expressing information about space, offer a fresh perspective on the classic problem of linguistic relativity because they allow us to test the extent to which cognitive styles may be related to linguistic codes or to other socio-cultural variables. This dissertation aims to combine the theoretical and methodological approaches of linguistic anthropology with some more recent quantitative innovations from other disciplines in order to probe further the question of why cross-cultural variation in styles of cognition exists, and how people come to adopt their

particular cognitive styles. In this dissertation, I argue that the typology of the language a speaker knows or is using at a given moment does not reliably predict patterns in spatial thinking. Instead, I argue that different conceptualizations of space emerge in interaction on the basis of different conceptualizations of multiple layers of context. I present evidence from a battery of semi-experimental tasks that demonstrates a mixed profile of spatial reasoning strategies in Juchitán. The distribution of these strategies did not correlate with language dominance or language used on the task. However, variability in frame of reference use by children participating in the elicitation tasks indexes cultural differences among the children, related not obviously to spatial conceptualization but to different narrative and gestural styles. I propose that the particular ways in which language is used and thought of in modern settings, especially the school, may driving conceptual change in Juchitán. This manifests both as language shift from JCH to Spanish, but also as conceptual shift independent of code. Variation in the use of "spatial frames of reference," then, is potentially indicative of different ways of conceptualizing language in relation to context, and self in relation to world.

CHAPTER 1: Introduction

1.1 Overview of the dissertation

Bilingual speakers of Spanish and Juchitán Zapotec (JCH), two languages that have been said to differ substantially in their semantics for expressing information about space, offer a fresh perspective on the classic problem of linguistic relativity because they allow us to test the extent to which cognitive styles may be related to linguistic codes or to other socio-cultural variables. The study of linguistic relativity—most basically the study of how language shapes thinking—has a rich tradition in linguistic anthropology, but is also enjoying recent attention by scholars in fields such as psychology and cognitive science. This dissertation aims to combine the theoretical and methodological approaches of linguistic anthropology with some more recent quantitative innovations from other disciplines in order to probe further the question of why cross-cultural variation in styles of cognition exists, and how people come to adopt their particular cognitive styles.

In this dissertation I argue that the typology of the language a speaker knows or is using at a given moment does not reliably predict patterns in spatial thinking. Instead, I demonstrate how different conceptualizations of the environment emerge in interaction on the basis of different sets of interactional norms. In Chapter 2, I present evidence from a battery of semi-experimental tasks that demonstrates a mixed profile of spatial reasoning strategies in Juchitán. The distribution of these strategies did not correlate with language dominance or language used on the task, but did correlate with competence with specific spatial terms. Chapter 3 focuses on spatial language in a communicative

elicitation task, demonstrating that in this context, frame of reference choice in Juchitán does vary according to language dominance and language of instruction. This variability is surprising given the homogeneity of spatial language use by bilingual speakers of the same languages, on some of the same tasks, in the neighboring town of La Ventosa. I argue that several phenomena may account for this disparity, including: differences in linguistic ideologies in the two places, differences in indexical meanings of spatial terms in the two places, differences in topography in the two places, and differences in coding schemes used by researchers. On the topic of this latter point, I propose that a coding scheme sensitive to the distinction between Binary and Ternary frames of reference reveals that JCH grammar may actually distinguish between the encoding of these different frames of reference. The research presented in these two chapters takes a perspective investigating primarily the referential function of language as deployed in several classic and novel spatial language and cognition elicitation tasks. It suggests that typological linguistic features related to referential speech may play less of a role than other variables in scaffolding spatial cognition.

The second part of this dissertation searches for possible sources of the variation in cognitive and linguistic practices revealed in the elicitation tasks by considering that data in relation to ethnographic and micro-ethnographic video data. In Chapter 4, I investigate the claim for "interpretive relativity" (Hanks 1996), showing how cultural and interactional "common ground" are central to referential spatial practice in Juchitán. I discuss how some problems encountered with one particular elicitation task— intended to elicit walking and driving directions in the city—revealed the key role of intersubjectivity in spatial talk in Juchitán. I then give some examples of video-recorded natural

interaction about space, showing how this genre of speech relies crucially on deictic pointing, deictic language, and complex knowledge of local social relations. I argue that the worldview associated with spatial talk in Juchitán, which cuts across generations and linguistic codes, is related to interpretive conventions at the level of the wider speech community. Chapter 5 continues in this vein but examines the interpretation of speech at the level of "activities" (Goodwin and Goodwin 1992) as signaled through "contextualization cues" (Gumperz 1982). I show how differing interpretations of a spatial elicitation task as an activity can lead to different results. This chapter draws on data collected among children in Juchitán, and thus also takes a developmental approach to the topic of linguistic relativity. I analyze in-depth ethnographic and naturalistic video data collected in the homes of four children in Juchitán, arguing that contrasting socialization practices can account for differing interpretations of the task. This chapter suggests a potential avenue for an empirical approach to interpretive relativity through the use of semi-experimental methods that can reveal variation in the interpretation of contextualization cues.

In what follows in this Introduction to the dissertation, I provide historical and ethnographic background about the field site where this research was conducted—Juchitán de Zaragoza, Oaxaca, Mexico—about the people who live there, and about the languages they speak. Through this background, I hope to give the reader a sense of what it is like to experience Juchitán with the senses. I also contextualize this project within several key bodies of literature, including the literature on linguistic relativity, a multidisciplinary body of literature on bilingualism, and the literature on spatial language and cognition. Finally, I discuss the methodologies and key technical concepts used in

this study. I discuss how the methods evolved over the course of the study and provide a critical discussion of their limitations.

1.2 Juchitán: A sense of the place

Sometime in 2008, after my first summer of fieldwork in Juchitán, I was presenting some early data to an audience of linguistic anthropologists. I had shown some still frames from a video in which a mother performed a series of pointing gestures by way of helping her two-year-old son fetch a balloon. A prominent Mesoamerican linguistic anthropologist was in the audience and expressed disbelief that this video portrayed an indigenous Mexican woman because she had never seen one so animated. At the time, I worried that my sample of one might be unrepresentative; I now know that it was not. The people of Juchitán stand out among other indigenous groups, likely because Juchitán itself stands out among indigenous places in Mexico.

Juchitán de Zaragoza, located in southern Oaxaca state in a region known as the Isthmus of Tehuantepec (Figure 1.1), is the only urban center in Mexico dominated by a single indigenous group. Juchitán is a truly urban indigenous community: of its population of 93,038, 85% (79,138) are members of a household where the head of household speaks an indigenous language (INEGI 2010). Of all statistics reported in the 2010 Mexican census, this is the one for which Juchitán and Oaxaca state as a whole show the largest disparity, differing by 41%. Although the census does not specify which indigenous language is spoken by these heads of households, there are very few speakers of languages besides JCH within the Juchitán municipal region. A small number speak Huave, Mixe or Chontal.

Figure 1.1: The location of Juchitán in the state of Oaxaca, Mexico.

Relative to the small farming villages where much of Mexico's indigenous population can be found, Juchitán has a stronger economy and less migration. As a point of comparison, we might take the village of San Lucas Quiaviní (SLQ), a Valley Zapotec community located just south of Oaxaca City. Prior to choosing Juchitán as my field site, I considered conducting research in this community and spent several weeks there in the summer of 2008. I was shocked to observe that this town, like others in the Valley, consisted almost exclusively of women, children, and elderly men. Locals explained to me that nearly all able-bodied men of working age have left the villages for the U.S. Although the Mexican census does not explicitly document international migration, some of the other numbers point to this pattern. Only 41% of the population of SLQ are men, compared to 49% for Juchitán. While only 36% of men present in SLQ in 2010 were also there in 2005, 42% of men in Juchitán were present both years. And while 37% of Juchitecos had work during census week, only 28% of individuals living in SLQ did (INEGI 2010). Although these disparities may seem slight, there were few other census statistics for which any differences between the two places exceeded one percentage

point. The other areas of difference included indigenous language use and enrollment in government health programs, which were much higher in SLQ.

Even compared to Oaxaca state as a whole, Juchitán exhibits signs of wealth and economic stability. In 2010, employment was 3% higher in Juchitán than in Oaxaca state, and Juchitán had 8% more households with all basic services (tap water, sewage, electricity) than Oaxaca state (INEGI 2010). My own ethnographic evidence from Juchitán suggests that very few residents have relatives working in the United States. Of the 93 households surrounding the *callejón* 'alley' on which I lived in Juchitán, only 2 had ever sent family to the U.S. One man had gone to New Jersey, worked for several years, been imprisoned, and then was aided in getting released by an anthropologist who worked in the neighborhood before I arrived. He had made enough money to build a nice house for his family and returned to Juchitán to live in it with them. The other family had a daughter who went to Arizona, married a "gringo," and sent their children back to live with their grandparents in Juchitán. These anecdotes are worth mentioning because they demonstrate that even those who do make the journey to the U.S. often maintain strong ties to Juchitán and do intend to return or send their children back.

In addition to the small farming communities like SLQ, many indigenous Mexicans reside in large, heterogeneous state capitals. Compared to these, Juchitán is more culturally and linguistically homogeneous. Although 8% of Oaxaca City residents over age 3 speak an indigenous language (compared to Juchitán's 58%) (INEGI 2010), these individuals may speak any of dozens of indigenous languages from Oaxaca state, or indeed, from other parts of Mexico. In contrast, Pérez Báez (2011) estimates that 80% of indigenous language speakers in Juchitán speak JCH. Furthermore, 94% of Juchitán

residents were born in Oaxaca state, while only 88% of Oaxaca City residents were born

in the state (INEGI 2010).

Juchitán also has a more small-town feel than cities like Oaxaca despite its size

and level of development. Houses not far from the city center, for example, may have

open yards with fruit trees, chickens, and pigs (Figure 1.2). Traffic on the city streets

includes a merry mixture of taxis, motorcycles, horse-drawn garbage wagons, and ox-

drawn carts returning from a day on the farmland (Figure 1.3), while streets in residential

neighborhoods are relatively free of motorized traffic (Figure 1.4). Although Juchitán and

Oaxaca City have almost identical percentages of households with all basic services,

Juchitán has about 6% fewer households with a car, 6% fewer with a computer, 8% fewer

with a cell phone, and 5% fewer with Internet service (INEGI 2010). Thus, although the

residents are relatively wealthy and the city highly developed, residents choose a lifestyle

that is perhaps less cosmopolitan than that found in state capitals such as Oaxaca City.

If this unique place remains unknown to some contemporary scholars of the

region, it has nevertheless been discovered, rediscovered, and celebrated by many a

traveler passing through the Isthmus of Tehuantepec. In his documentation of his travels

through the Isthmus in 1859-1860, the Frenchman Charles Brasseur offers some

commentary on the distinctive geography of the Isthmus.

> Por una especie de encogimiento que la naturaleza ha formado en estas
> montañas, se baja rápidamente desde las llanuras superiores a las llanuras
> de la costa del Pacífico, que componen, al sur, la tercera sección del istmo.
> El ancho promedio de estas llanuras es de 20 millas, de la base de los
> montes a la costa del océano, con un declive de 10 a 15 pies por milla
> hasta las lagunas de Tehuantepec, formando así un inmenso plano
> inclinado de 250 pies de altura sobre el mar, donde comienza el descenso,
> con una superficie notablemente pareja aunque con una ligera pendiente
> hacia la costa. De vez en cuando se encuentra una loma o alguna aislada

Figure 1.2: A typical house in the southern part of the city. The back yard of the house is suitable for raising some plants and animals.

Figure 1.3: A street near the market in Juchitán. Horse-drawn transportation is common even in the urban center.

Figure 1.4: A woman pushes a tricycle laden with produce for sale along a typical residential street in one of the northern neighborhoods.

de origen volcánico que da al paisaje un carácter eminentemente pintoresco. Ocho ríos bajan de estas montañas y, después de haber regado sus llanuras inferiores, desembocan en las lagunas que se extienden sobre la costa, uniéndose al mar mediante un estrecho paso llamado la *Boca-Barra* (Brasseur 1981:66-67).

Brasseur's description touches on the most notable geographical features of the region, namely, how the northern mountain chain gives way to a gently sloping plain, bordered on the south by a series of protected lagoons, into which the region's rivers drain and in which the fisherman make their livelihood. Beyond the lagoons lies the open ocean (Figures 1.5 & 1.6).

Other noteworthy features of the geography of the Isthmus are the vegetation and the weather. One has only to witness the rainy season in the Isthmus to be unsurprised by the lush greenery. Banana trees, palms, almond trees, tamarinds, and mango trees are abundant throughout the town, and unattended lots grow over quickly with an assortment of bushes and vines. Although kitchen gardens are uncommon within the city, many people care for fruit trees, medicinal herbs, and potted flowers (Figure 1.7). Just outside the city center, the land has been cleared for grazing and farming and its flatness becomes even more apparent.

Juchitán has two main seasons: rainy and windy. The rainy season lasts from about June through September. The rain falls in sheets by day and is accompanied by thunder and lightning at night. Ever since a majority of roads in the city were paved in the early 2000s, the rainy season brings flooding and general mayhem. Knee-deep rivers form in the streets, rushing downhill and whisking away tricycles, pigs, and drunk people. Nevertheless, a life of work and parties continues as usual, with slightly muddier feet and

dress hems. The rain also brings swarms of *Aedes aegypti*, the odious mosquito that is the carrier of Dengue fever, and, as of summer 2015, the Chikungunya virus.

In October, the rain ceases and the winds begin, lasting until some time in April. Though the rain of Juchitán is awesome, it is unexceptional among tropical rains; the wind, on the other hand, is exceptional at a global scale, as evidenced by the international corporations[1] that have come to harness its power (Figure 1.8). The wind comes from the north and is known in JCH as *bii yoxho'* 'old wind.' When it tears through the town, it upsets meals and laundry, and coats everything with a layer of dust, especially the insides of ears. Although it drives away the mosquitos, the wind brings tiny biting flies. It also brings cooler temperatures—in the 60s and 70s Fahrenheit—a relief after the sweltering rainy season.

Figure 1.5: Juchitan's river, *el río de los perros*, runs south through the center of the city before draining into the *Laguna Superior*.

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[1] The politics surrounding the construction of wind turbines in and around Juchitán are extremely fraught. During my time in the city, residents were involved in protests, highway blockades, and other political action aimed at stopping further construction. Many people who made their livelihood from the sea worried that the machines would decimate the fish population, while landowners worried about retaining hunting rights on lands near the turbines. One of the largest companies installing wind turbines in Juchitán was a Spanish company, and so of course the symbolic link to conquest and domination was a powerful one. At a time when the politics of drug-related violence was consuming other parts of Mexico, the politics of wind was taking center stage in Juchitán.

Figure 1.6: The *Laguna Superior* is a popular weekend destination for Juchitecos. To the south is visible the narrow chain of hills that protects the lagoon from the open Pacific Ocean.

Figure 1.7: Looking west from atop one of the tallest buildings in Juchitán. The view gives a sense of the tropical vegetation and colorful architecture of the city.

Figure 1.8: A view toward the north from the Panamerican highway as it leaves Juchitán heading east. Wind turbines share pasture land with cows.

May and June make up a hellish mini-season between the wind and the rain. They are the hottest months, and there is none of the relief of a mid-day drizzle or breeze. Occasionally, *bii nisa*, the 'ocean wind', wafts lazily from the south, offering the faintest

breath on sweaty skin. Unlike the north wind, however, this breeze is hot and humid and is said to cause illness among people prone to headaches. This is the season in which babies are coated head to toe in powder—and anthropologists too—to fend off heat rash. May is also the month of parties in Juchitán, with nearly each day of the month dedicated to a different saint, neighborhood, or professional guild. Dressed to the nines in velvet and linen, the people of Juchitán dance, drink, and sweat until the rains give reprieve.

La pachanga, the party, is the epicenter of the social universe in Juchitán, binding the community together through raucous nights of drinking and an elaborate web of exchange obligations. For women especially, going to parties is serious business, and promptly at 4, when the music starts to rumble from some distant street, the women of the neighborhood bathe and dress as if suiting up for work. They start arriving in their colorful uniforms—brightly embroidered _huipiles_ and long flowing skirts trimmed with white lace. They walk into the tent, erected mid-street, stomping confidently to the music; on their shoulders or hips they carry a carton of beer for the host, and in one fist a bit of tissue pokes out, which wraps the 50 pesos they will covertly slip into the hostess's hand. A husband may follow behind in a plain white linen _guayavera_, with a carton of beer to give.

These gifts—the money and the beer—will come back to them later when they throw their own party—perhaps a wedding for a child, a 50th birthday, or a celebration in honor of a patron saint. Most of those who attend parties already have a future occasion in mind for which they will reap this capital, and so in this sense, each party they attend is work in preparation for that big day. Not only are they accumulating debts of cash and beer, but also of gifts, food, and physical labor. Some women will arrive with a tub of

prepared food to add to the array of *botanas* 'snacks' that help the beer go down; others will arrange in advance to pay for the cake, or the music, or some other large expense, thus becoming the *madrina* or *padrino*, 'godmother' or 'godfather', of that item. For a birthday or wedding, some may bring a gift. The understanding is that you will get back exactly what you give, so paying for someone's band today could be a wise investment if the price of a band is going up; that person will owe you a band for your party regardless of the future price.

The physical labor that goes into preparing for a party is another type of work, called "helping." Women wake up early, before their usual work time, to go "help" for a party, which means preparing the food that will be served. While the neighbor women labor frying fish, cheese balls, and empanadas; chopping huge quantities of tomatoes for shrimp ceviche; and concocting creamy sauces in various blenders to pour on top of everything, the relatives of the party-throwers serve them bread and coffee, and then cook a cauldron of mole and boiled chickens to send home with each helper. She will feed her family breakfast with this since her labor means she won't have had time to make food at home. As the women make the familiar *botanas*, they gossip and make dirty jokes about going home to their husbands with hot chili oils on their hands, or about who will get to knead the tamarind paste.

In 1918, an American who wrote under the penname Kamar Al-Shimas, traveled to the Isthmus as part of a prospecting tour and was struck by the contrast with other indigenous Americans he had encountered. Indeed, judging from the early travel literature, it seems Westerners perceived Istmeñans as being more like themselves than like other American Indians. Al-Shimas writes,

> The Zapotecs are far and away the best Indians in Mexico. They alone never bowed to the lordly Aztec or Mexican…Juchitán in particular is renowned for the valor of her sons, with whom the military service has for generations been a profession…The Zapotec and the North American Indian of the western plains are as different as light and darkness. The latter is savage, taciturn, and sullen; the former is joyous and happy. The women in particular are forever smiling and laughing. In fact, the Tehuano has few of the characteristics which we generally ascribe to the Indian. It is seldom that one sees him frown. His face is open and he looks you full in the eye. He loves a jolly time and nothing pleases him better than a hearty slap on the back, though it be administered by a total stranger (1922:131).

Western travelers especially valued this perceived similarity to European culture in the women of the Isthmus. The travel literature tends to emphasize the height, corpulence, and apparent lack of modesty on the part of Istmeñan women. Here, I reproduce some of Al-Shimas' writing on the women of Tehuantepec, excluding the more sexually explicit paragraphs:

> With her open face and ready laugh the Tehuana is the reverse of the Oriental; she is most decidedly of the Occident. But, aside from this, surface indications are to the contrary; and beholding these gaudily dressed creatures moving upon the streets, each with a tray or jar balanced on her head, I saw as through a mist the Persian marts of my youth. The Tehuanas persist in carrying everything on their heads, even in the most violent winds. Sometimes they are compelled to navigate pretty slowly, but they never under any circumstances permit their burden to fall. It is no uncommon sight to see a woman pass, balancing a squash on her head…The Tehuanas are very strong and walk off with a stride, even in the hottest weather. After the manner of Norwegian peasant women they are much given to trotting when in a hurry (1922:122).

In these two excerpts, Al-Shimas explicitly contrasts Istmeñans with other American Indians and with "Orientals," while likening them to Westerners, and, in the case of the women, drawing a comparison between them and Norwegian women.

Without belaboring these kinds of dubious comparisons, I would hypothesize that

Al-Shimas arrived at his conclusions not because the Istmeñans are any more human than

other Others, but because those characteristics that serve to humanize the Other—joy,

humor, anger, sadness—are displayed more readily in public and in front of strangers in

the Isthmus. One telling contrast, for example, between Juchitán and a Valley Zapotec

town such as San Lucas Quiaviní, is in the architecture. In SLQ, extended families live in

walled compounds with several living structures surrounding a patio. Life inside the

compounds is well insulated from prying eyes or ears. In contrast, houses in Juchitán—

especially in the southern neighborhoods—tend to be open to the streets. Neighbors are

close and dividing walls uncommon, so that household affairs are quite publically known.

Domestic rows sometimes spill into the streets or erupt at a party, and such scandals are

relished for the conversational fodder they provide. In Chapter 5 I discuss Juchitán

household architecture in more detail, and give further ethnographic details of family life.

1.3 Previous scholarship on Juchitán and the Isthmus

Since this earlier genre of travel literature, anthropological scholarship in Juchitán

and the surrounding region has concentrated on topics that confirm its importance as a

cultural and economic heart—or perhaps "liver," as the Zapotec would say—within

Mexico. The legendary Zapotec nationalist political movements have been well

catalogued (Binford 1985; de la Cruz 1983; Rubin 1994, 1997; Smith 2007) and the

language revitalization campaigns to come out of them have set many precedents for

indigenous language revitalization worldwide (Campbell 1996). Isthmus gender politics

have also been the subject of intense anthropological interest due to the purported strong

role of women in the household (Bennholdt-Thomsen 1997, Campbell & Green 1996, Chiñas 2002, Saynes-Vázquez 1996, Stephen 1990, 1991) and the existence of a "third gender," the *muxe'* (Borruso 2002, Chiñas 1995, Stephen 2002). Some popular writing on these topics has been accused of distorting the truth; claims that this is a "matriarchal" culture where the women rule and the men are lazy have left locals justifiably suspicious of anthropologists. And claims that these tolerant people accept the *muxe'* with no signs of prejudice do an injustice to those who have been socially ostracized and even suffered violent deaths due to their gender identity. However, without romanticizing these realities, it remains the case that the women and *muxe'* of Juchitán represent a very different culture of gender relations than is found in other parts of Mexico. Today, *muxe'* culture has become more strongly influenced by U.S. gay culture as filtered through the cosmopolitan population of Mexico City (Figure 1.9). In my experience, *muxe'* were among the most likely Juchitecos to have traveled to Mexico City, usually for participation in gay pride events or to undergo sex change surgery. A forthcoming dissertation discusses *muxe'* identity in the context of these recent changes (Laaksonen 2015).

More recently, scholars have been interested in the ideological conditions driving language shift in Juchitán (Saynes-Vázquez 2002, Augsburger 2004). Although many have been heralding the loss of Zapotec in Juchitán for some time, this threat never seemed to materialize until relatively recently. A forthcoming dissertation by Haley De Korne (2016) focuses on the practices and ideologies surrounding the use of JCH in several formal and non-formal education settings throughout the Isthmus.

Figure 1.9: At the annual *muxe'* ball, members elected to the "royalty" gather on stage. Their dress demonstrates a range of traditional and contemporary style.

1.4 The sounds of bilingualism in Juchitán

If Al-Shimas' description of the people of the Isthmus, quoted above, sounds outdated, his discussion of language use in the region in 1918 seems startlingly familiar. On the topic of bilingualism he writes:

> It is estimated that the Zapotecan tongue is spoken by at least 500,000 souls. True, Spanish is spoken in the larger towns of Zapoteca. It is the language of law, religion, and public affairs; of school, such as there are. But even in the towns you hear the aboriginal tongue on every hand, and in the villages it alone is spoken. Indeed, I do not exaggerate in saying that outside the cities of Tehuantepec, Juchitán, Salina Cruz, and San Gerónimo but little Spanish is heard upon the Pacific plains of the Isthmus (122-123).

And on language endangerment:

> The Zapotecan seems to be in the process of dissolution. It is the language of the lower class, of the Indian, and the Spanish-speaking element ever speak of it with a species of contempt which it is far from deserving. The cultivated Mexican will tell you that it has no grammar and is only a 'dialect,' and makes a point of never calling it a language. It is true that is has none of the needless grammatical complexities of the Castilian, but that is rather in its favor. It possesses its own simple grammar and, though not as sweet as the Spanish, strikes not unpleasantly upon the ear (127).

This latter quotation is especially surprising because a hundred years hence JCH continues to be spoken, and intellectuals continue to herald its immanent demise with similar argumentation: as the language becomes ideologically laden with negative class associations, the younger generations will cease to speak it. Though recent research in this vein is compelling, and my own research further points to diminishing numbers of young speakers of JCH, it seems that earlier predictions of doom have not yet materialized.

The distribution of the two languages has become less dichotomous since Al-Shimas' observations, but his remark that the language is heard "even in the towns" continues to be one of the distinguishing features of the language-scape in Juchitán. Despite any threat of its impending loss, the sound of Juchitán Zapotec remains ubiquitous throughout the city. Juchitán deserves special note for its vibrant and somewhat jarring soundscape; it is dominated by flocks of squawking grackles, but the women of the market hawking their wares take a close second. Many travelers to the Isthmus arrive by bus, stopping first at the smaller terminal of Tehuantepec before pulling in a short fifteen minutes later at Juchitán. When the doors open at Tehuantepec, local women board the bus to sell snacks to the travelers. Their cry is distinctive and so typical of the cadence of Isthmus speech, with the final syllable—usually the question particle *la*—stretched long and rising: *Gueta bi'ngui la?* 'shrimp tortillas?' The corpulent women with their reams of flowing skirts and bundles of whatever they are selling squeeze through the bus aisle, knocking people awake and making general commotion. It's a fitting entry to the Isthmus. In central Juchitán, women sell all manner of food items either itinerantly or at stationary stalls, from fresh seafood and produce to prepared meals

and tortillas. They are known for flattering would-be buyers by yelling compliments about their light skin or general good looks, so much so that the typical call of those who sell Juchitán's distinctive crispy tortillas, called *gueta biguíí* or *totopos*, has become a sort of nationalist slogan: *Totopo hüero!* 'Totopo, handsome?'

The grackles and the women are but part of the din. Vehicular traffic in the downtown area has become especially noisy in the last three years or so due to an influx of motorcycle taxis. The large *urbanos*, or city buses, blow exhaust at the corners, while collective taxis line the streets and the drivers heckle passers-by to fill their cars. Just outside the center, in the residential areas, the streets are quiet in the mornings. But by afternoon, when the parties begin, music blasts from giant speakers and lasts into the night. When the parties end, the gangs of stray dogs begin their cacophonous communiqués across town, which last until dawn. Then, just before the sun begins to rise, but before the roosters crow, begins one of the most distinctive features of the Juchitán soundscape—the *bocinas*.

The *bocinas* are loudspeaker systems run out of individual homes and used as a public announcement system. People who wish to make an announcement about a product for sale, a death or birthday, an upcoming political rally, or anything else, can take their announcement to one of the *bocina* operators, and, for a fee, have it read aloud. In the southern parts of town, there are *bocinas* every few blocks, so that any individual household is usually within range of three or four different ones. Different types of announcements are typical of different times of day, and in southern Juchitán, every day begins with a chant of overlapping poems about seafood. One sings the praises of Na Petrona's shrimp; another marvels at the size of the fish eggs Juanita has today. The

fisherman have worked throughout the night and delivered their catch to their wives. By

4 a.m., the women have set up a pop-up fish market on the infamous *esquina del pescado*

'fish corner' in the southern part of town, and the *bocinas* urge the people out of their

hammocks to get it while it's fresh. The first one to break the silence of the night is

tentative and eerie, but by the time roosters and grackles join in, the voices behind the

bocinas have become urgent and animated. And they have diversified to announce

prepared food now: breakfasts, juices, breads to have with your morning coffee, tortillas,

low prices, good deals. In the transcript below, one well-known announcer I call Ta Paco[2]

sing-songs a late morning routine about empanadas, orange juice, and iguana stew.

Transcript 1.1: A late morning *bocina* announcement by Ta Paco (January 2012).

ra   lidxi   na.K   za-dxela-tu   empanada casi ca-dxuuni' de beela
LOC POSS.house NAME FUT-find-2PL empanada just CONT-fry   of meat
ne   de quesiú
and of cheese
at Mrs. K's house you will find empanadas, just fried, meat and cheese

ru-dii-be   ziá salsa ne repoyo
HAB-give-3H lots salsa and cabbage
she gives lots of salsa and cabbage

n-apa   na.K empanada casi ca-dxuuni de beela ne   de quesiú
STA-have NAME empanada just CONT-fry   of meat and of cheese
Mrs. K has empanadas, just fried, meat and cheese

ra   lidxi   na.K   za-dxela-tu   empanada casi ca-dxuuni' de beela
LOC POSS.house NAME FUT-find-2PL empanada just CONT-fry   of meat
ne   de quesiú
and of cheese
at Mrs. K's house you will find empanadas, just fried, meat and cheese

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[2] All names are pseudonyms. Throughout the dissertation, I attempt to preserve any relevant aspects of the phonology or etymology of personal names in my choice of pseudonyms. *Ta* and *Na* are common terms of address used for older or married men and women, respectively. These can be used in conjunction with a given name or with a nickname.

Transcript 1.1: A late morning *bocina* announcement by Ta Paco (January 2012), continued

5. ru-dii-be ziá salsa ne repoyo
HAB-give-3H lots salsa and cabbage
she gives lots of salsa and cabbage

6. pa u-luí' la'dxi-tu ti basu jugu la,
if POT-seem liver-2PL INDF glass juice FOC
If you feel like a glass of juice

7. ra lidxi na.C xiiñi na.D ra-cá za-dxela-tu jugu
LOC POSS.house NAME POSS.offspring NAME LOC-DET FUT-find-2PL
juice
de naranja
of orange
at the house of Mrs. C, the daughter of Mrs. D, there you will find
orange juice

8. ne cu-t-oo-be naranja pur veinti cincu pur menudiado
and CONT-CAUS-sell-3H orange for twenty five for retail
and she's selling oranges, 25 at retail

9. n-apa na.C xiiñi na.D jugu de naranja
STA-have NAME POSS.offspring NAME juice of orange
Mrs. C, the daughter of Mrs. D, has orange juice

10. ne cu-t-oo-be naranja pur veinti cincu pur menudiado n-uu
and CONT-CAUS-sell-3H orange for twenty five for retail STA-is
para gui-dubi dxí
for all-CLF day
and she's selling oranges for 25 at retail, they will be here all day

11. n-apa na.G guchachi guiiña
STA-have NAME iguana chile.pepper
Mrs. G has iguana stew

12. n-apa na.G guchachi guiiña, pa güe-ne-tu ti
STA-have NAME iguana chile.pepper if POT.drink-WITH-2PL INDF
bladu guchachi guiiña la,
plate iguana chile.pepper FOC
Mrs. G has iguana stew, if you want to have a plate of iguana stew for
breakfast

13. n-apa na.G guchachi guiiña
STA-have NAME iguana chile.pepper
Mrs. G has iguana stew

14. n-uu-be ra   lidxi   jña-be,   ra   lidxi   na.T cayejón
     STA-is LOC POSS.house POSS.mother-3H LOC POSS.house NAME alley
     del Cobre
     of NAME
     she is at her mother's house, at the house of Mrs. T, in Del Cobre Alley

15. n-apa   na.G guchachi guiiña
     STA-have NAME iguana   chile.pepper
     Mrs. G has iguana stew

With JCH being proclaimed at all hours across the rooftops, the visitor to town has no trouble catching examples of the language. But for someone interested in other genres of speech, it is almost as easy to hear it in any other context. Juchitán is noteworthy in Mexico for its particular pattern of bilingualism. Throughout most of indigenous Mexico, a pattern of diglossia is the norm: indigenous languages are spoken at home and in indigenous institutions such as markets, while Spanish is spoken in government institutions, including schools, and in the Catholic church. Spanish would also be expected in corporate environments such as banks and grocery stores.

Juchitán, however, exhibits a slightly different pattern, partially the result of language shift and reactions thereto, and partially the result of its status as a relatively homogeneous urban center. Home language choice in Juchitán varies both by generation and by geography, which serves as an index for certain kinds of class distinctions. Wealthier, more modern Juchitecos and non-Juchitecos who have settled in the city tend to cluster in the parts of town north of the central commercial zone (Figure 1.10). This is the area I will call Cubi throughout this dissertation. In these households, language shift toward Spanish began about a generation earlier than in the southern parts of the city. Thus, parents of school-age children tend to be fluent bilinguals in the northern

neighborhoods, while their children tend to be native Spanish speakers with only passive

competence in Juchitán Zapotec, if any. Juchitecos who follow a more traditional lifestyle

and are sometimes less wealthy (but not necessarily) tend to live in the southern parts of

the city and in the suburban neighborhoods surrounding the city. This is the area I will

refer to as Yoxho[3]. In these households, young adults may be bilingual but more

comfortable speaking JCH.
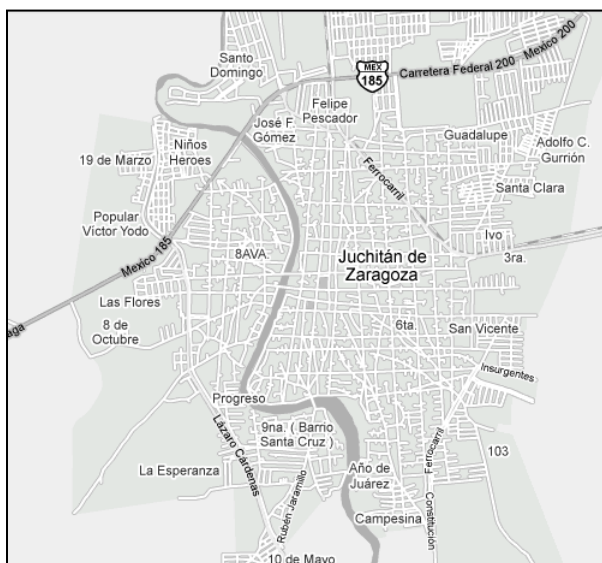
Figure 1.10: Map of the city of Juchitán. The center of the city is located approximately where the map label "Juchitán de Zaragoza" is placed.

Teenagers and children as young as 9 or 10 tend to be fluent bilinguals, while the

youngest children are being raised as Spanish speakers. In the southern parts of town,

however, these young Spanish speakers do tend to have passive competence in JCH, and

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[3] The names "Cubi" and "Yoxho" that I have chosen to represent the neighborhoods mean 'new' and 'old' in JCH. These are the terms used in Juchitán to refer to different methods of timekeeping. *Ora yoxho'* 'old time' refers to non-daylight saving time; while *ora cubi* 'new time' refers to daylight saving time. Some people in Juchitán keep "new time" and some keep "old time" and so when making appointments or plans one often has to specify which schedule one intends. I found that whether an individual keeps "old time" or "new time" is an important distinction that indexes a host of potentially significant cultural differences. Thus, although most people in the northern part of town keep "new time," the southern part of town is quite mixed. By using these terms as names for the two parts of town, I intend to index this variation, but not to imply that the division is absolute.

integrate more JCH contact phenomena into their Spanish than do their uptown age mates. In Chapter 5 of this dissertation I elaborate on some of the social, economic, and geographical factors related to language choice in Juchitán, as well as on some characteristics of child-directed speech and children's speech. Many adults claim that their children "like" speaking Spanish better than JCH, and on this basis address them only in Spanish. Overall, then, home language use in Juchitán includes both Spanish and Juchitán Zapotec, and code selection is based upon perceptions of interlocutor preference or competence.

In general, any person who regularly speaks JCH is a fully competent native speaker. Although there are individuals who are Spanish speakers with passive competence in JCH, a strong local ideology about language and identity prevents these would-be semi-speakers or second language learners from attempting to speak JCH in public for fear of ridicule. The effect of this ideology is that only native speakers ever do speak JCH, while non-native speakers may capitalize on their ability to understand the language, but never speak it. Thus, JCH speakers in Juchitán may be divided into only two groups: native speakers and passive bilinguals.

In contrast, there is a wide range of abilities in Spanish among Juchitecos and the ideological prescriptions against linguistic butchery are not quite as strong for Spanish. Although I often heard statements characterizing an individual's Spanish as "good" or "bad," I never witnessed someone be publically humiliated for a "mistake" made in Spanish, which I witnessed on several occasions in the case of JCH. A small number of older speakers are completely monolingual with no ability to understand Spanish at all; most older speakers, however, do understand at least some Spanish, but may be reluctant

to speak it. Individuals under about 40 years of age tend to be competent Spanish speakers who vary in competence on the basis of age of acquisition and level of schooling. Adults who did not attend school often report learning Spanish in their teens when they needed it for work, while adults who did attend school report their first exposure to Spanish when starting kindergarten. Adults who attended high school usually attain a high level of Spanish proficiency, while those who attended only a few years of elementary school remain less proficient. Only the youngest generation of Juchitecos— teenagers in the northern parts of the city and those under age 10 in the southern parts— were first exposed to Spanish in the home before attending school. As a result of this pattern, it is relatively easy for Juchitecos to determine which language to speak with a given individual. Native JCH speakers will speak JCH with each other, while passive bilinguals or Spanish-monolinguals will speak and be spoken to in Spanish. It is quite rare for a truly monolingual JCH speaker to interact with a truly monolingual Spanish speaker within Juchitán, but when such interactions do occur, they can usually be managed through the use of bivalent linguistic resources and help from other participants in the interaction. One example of such an interaction appears later in this chapter.

Public language choice is determined by these same interlocutor-related principles. Unlike in many other parts of Mexico, indigenous language speakers occupy many government and corporate positions in Juchitán and employ the language there. JCH is just as likely to be heard when shopping at Wal-Mart, conducting business at the bank, or filing paperwork at the municipal palace as it is when buying fish at the market. Juchitán is a small enough town that people know almost everyone they encounter at least by sight, and so judgments about which language to select are usually based on previous

experience with an individual or their family. In fact, corporations that make deliveries in

the city, such as Coca-Cola, Frito Lay, and the beer companies, take advantage of the

strong social fabric of Juchitán to prevent hijackings of their delivery vehicles. They

employ JCH-speaking locals to drive the trucks because they believe thieves will be less

likely to target their own compatriots. Thus, the use of JCH in corporate settings is not

only tolerated in Juchitán, but actively encouraged. JCH is also heard publically at

political rallies and meetings and on multiple radio stations.

The Catholic Church is probably the only major institution in which JCH is not

used. Mass is conducted in Spanish, as are church affairs such as the signing of marriage

or baptism documents. But again, this convention follows the same principal of

interlocutor-based code selection, as priests tend to come from out of town. However,

local *xuana'* 'moral authorities' of the community conduct in-home Catholic ceremonies

in JCH on the occasion of deaths and marriages. Juchitán is also a hotbed of protestant

evangelization and many of these churches are conducted in JCH with just a smattering

of Spanish, usually reserved for songs or readings that cannot be obtained in JCH

translation. A JCH translation of the New Testament exists (Pickett 1972) and is as likely

to be found in evangelical churches as the Spanish Bible. These churches are one of the

few sites of literacy in JCH and many even produce their own pamphlets and pedagogical

materials in JCH.

Schooling is the one area of life where the interlocutor-based rule of code

selection does not apply. With the exception of a handful of bilingual schools, schooling

is conducted exclusively in Spanish. Furthermore, although many of the teachers are

locals known to be fluent JCH-speakers, they are expected to speak exclusively in

Spanish while at school even to parents and grandparents who may not be strong Spanish speakers. In reality, the expectation of interlocutor-based code selection is so strong that few teachers actually do this; but some do and are universally derided by parents as *creídos*, 'stuck up.' If JCH semi-speakers are discouraged from attempting JCH for fear of revealing themselves as inauthentic, native JCH speakers are discouraged from speaking gratuitous Spanish for fear of appearing pretentious.

These language ideologies may also be behind the relative lack of metaphorical codeswitching in Juchitán. By metaphorical codeswitching I refer to the phenomenon whereby elements perceived by the speakers as pertaining to different codes are juxtaposed within the same utterance or speech event; this juxtaposition itself carries additional indexical meanings interpretable by participants (Gumperz 1982). When speaking in JCH, speakers in Juchitán switch to Spanish primarily when directly quoting something said in Spanish. When speaking in Spanish to a passive bilingual, a JCH speaker may use a JCH lexical item whose Spanish equivalent they are unsure of, but will usually apologize for doing so and ask what the Spanish word is. Other types of codeswitching are uncommon, and thought of as humorous if they occur. This, however, may be changing among the youngest generation of teens and children living in the southern parts of the city. For these youth, metaphorical codeswitching is more common among both fluent bilinguals and semi-speakers of JCH; a more mixed language variety, sometimes jokingly referred to as *Zapo-chueco*, 'crooked Zapotec,' may be emerging.

Despite the general lack of metaphorical codeswitching in Juchitán, contact phenomena are abundant in both JCH and the local variety of Spanish. In Chapter 3 I will discuss some of the contact phenomena specific to the semantic domain of space.

Although it is beyond the scope of this dissertation to discuss contact phenomena in the languages in depth, I should mention that, in general, such phenomena have been better described for JCH and other Zapotecan languages than for Spanish. Because I could find no sources documenting JCH contact phenomena in Spanish, I began collecting some notes on features I judged to be non-standard, which should be investigated as being potential contact phenomena and is an area for future research.

1.5 On bilingualism as a phenomenon

What does it really mean to say that an individual "speaks two languages," or that a whole community can be characterized as bilingual? One of the first recordings I ever made in Juchitán, in the summer of 2008, featured two members of the household with whom I would live throughout my dissertation research. Although this interaction features minimal speech and an apparently insignificant task, I have returned to it again and again as I think about this problem of bilingualism in the context of Juchitán. In the video, a young baby Jordan, one of the children featured in the later chapters of this dissertation, interacts with his namesake and maternal great uncle—his mother's father's elder brother. We can call him Jordan Senior; may he rest in peace[4]. This interaction was more rare than I appreciated at the time because it featured one of the few truly monolingual JCH speakers I ever met in Juchitán, and a child who was being raised to speak only Spanish. Senior was generally known as a little "slow," and had experienced severe bouts of addiction that prevented him from working for much of his life. These

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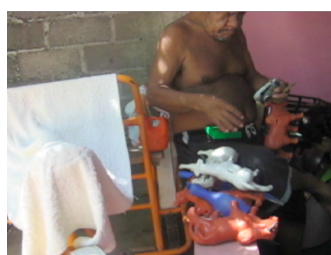
[4] A table of key participants in this study and their family relationships can be found in the Appendix.

factors combined meant that he had rarely left his home, and did not have the kind of life experience through which many men of his generation picked up at least a little Spanish. His family members and my own experience confirmed that he didn't understand even basic Spanish such as greetings or numbers. Jordan's linguistic situation was also of note because he was one of the first of the emerging generation of children not learning JCH at home. His brother, seen in the foreground of the still frame in Line 1 of the transcript below, is only four years older and a fluent JCH speaker. Although I had hoped Jordan would grow up to learn JCH despite not having learned it as a baby, my more recent research confirms that this was not to happen.

As represented in Transcript 1.2, below, Jordan Senior has come visit and is sitting on the low wall of the portico at Jordan's house, right next to the recently reorganized toy bucket. Jordan approaches his uncle and the toy bucket, and initiates the interaction by fishing a toy out and handing it to his uncle while saying, "*ja'a*" with a rising intonation and a prolonged final vowel sound. This presentative deictic is one of the first words acquired by Juchiteco children. Senior takes the toy and holds it in his lap. Jordan repeats this exercise multiple times (only three of which are represented in the transcript). Each time, Senior takes the toy and either holds it in his lap or stacks it on the wall where he is sitting.

While my master's thesis grappled with the grammatical status of the particle *ja'a* (McComsey 2010), I would here like to grapple with its linguistic status. Indeed, each of the utterances in this transcript is ambiguous as to which code it belongs. The phonology

Transcript 1.2: Jordan (J) and Jordan Senior (S) play a game (August 2008).

1.	J	ja'a:? *here*	*J hands a broken cell phone to S.*	
2.	S	m:hm' *mhm*	*S takes the phone and begins to examine it. His gaze is down on the phone.* *J roots around in the toy bucket.*	
3.	J	ja:'a::? *here*	*J emerges with a video game joystick.* *J turns toward S to hand it to him.*	
4.	S	bueno *ok*	*S takes the joystick and sets it on his lap.* *S arranges some other toys on the ledge.* *S examines the broken cell phone.*	
5.	J	ja'a:? *here*	*J tries to hand a plastic cow to S but S is occupied and does not act to take the toy.*	
6.	S	((unintelligible))	*J stacks the cow on the ledge with the other toys.*	

of *ja'a* is more consistent with JCH phonology than with standard Spanish phonology. The glottal stop occurring between the vowels, the nasal quality of the second vowel, and rising tone on the second vowel all mark it as non-Spanish. However, the word is used ubiquitously by all Juchitecos when giving an item or pointing something out, regardless of the language they are speaking. Similarly, the word *mhm'* has distinctively JCH phonology due to the glottal stop and intonation pattern. Furthermore, this style of affirmation is considered distinctively Zapotec due to the fact that JCH does not have another word for "yes" besides *aja'*. In Juchitán Spanish, *mhm'* and *aja'* are far more common than standard Spanish *sí* 'yes,' which is often taken as an indication of uncertainty rather than affirmation, much like the English "sure." The word *bueno* 'good, okay' clearly originated from Spanish, but has been thoroughly integrated into JCH with functions not found in standard Spanish. Most saliently, it is the standard way of greeting in JCH. It is also used for affirmation and leave-taking. In turn, these functions have been adopted into Juchitán Spanish to the exclusion of other Spanish terms such as *hola* 'hello' or *adios* 'goodbye.' Thus, through the use of these bivalent (Woolard 1998) linguistic features, Jordan and his great uncle easily engage in a shared activity.

On the one hand, this example illustrates that there may be different "kinds" of bilinguals within the same speech community whose linguistic repertoires differ according to when, how, and in what order the two languages were acquired. If this is the case, how is communication among these different kinds of bilinguals (and monolinguals) managed? To what extent can Juchitecos with different linguistic repertoires even be considered part of the "same" speech community or as sharing the "same" culture, given the typological and genetic distance of the two languages

involved? On the other hand, this example also illustrates the extent to which linguistic codes are not completely distinct entities within the context of a bilingual community. A rich tradition of anthropological research on bilingual linguistic practice has argued that not only are linguistic "codes" ideological constructions, but the apparent divide between bilingualism and monolingualism is as well (e.g. Woolard 2004). If this is the case, what are speakers' own conceptions of their culture and community as monoglot, bilingual, syncretic, etc.? Which linguistic features do they see as belonging to one code or the other, and which features do they see as belonging to both or neither? And finally, how do these ideologies play out in interaction?

1.6 The "Bilingual Spaces" Project

It was in the context of this extraordinary place, and because of some of the extraordinary linguistic characteristics of its inhabitants, that the present project emerged. Dubbed "Bilingual Spaces" at its inception, this project set out to explore spatial language use among the bilingual adults and children of Juchitán, to investigate the effects of language contact on communication about space, and to understand the implications of these effects for language change[5]. In theory, the above questions about the bilingual mind and bilingual linguistic repertoires could be explored in any number of contexts, but the domain of spatial language was selected for several reasons.

First, as one of the classic areas of research on linguistic relativity, along with color and time, the topic has inherent intrigue. If one important aim of early anthropological work was to document the extraordinary diversity of human populations, the findings from research on spatial cognition continue to serve as an important reminder that members of "WEIRD" populations (Western, Educated, Industrialized, Rich, Democratic) (Henrich et al. 2010) are often the outliers of the species. This realization, if unsurprising for the anthropologist, is not well known in the general public or even among academics in other disciplines. I believe anthropologists have a responsibility to contribute to public debates on the topic of linguistic relativity (e.g. Boroditsky 2010, Deutscher 2010) even if the topic seems passé.

But this is not to deny exciting innovations in this area of investigation, which have often been initiated in disciplines other than anthropology. Indeed, yet another reason to focus on the domain of space is in the interest of comparison with work in this more recent tradition, which cuts across psychological, linguistic, and cognitive science traditions. Furthermore, the semi-experimental methodologies developed for the study of spatial language and reasoning have a relatively long history, which can be traced at least as far as the early 1990s to a pioneering group of researchers at the Max Planck Institute; thanks to their efforts, the strengths and weaknesses of the various methodologies are well known, paving the way for improvement and innovation. By continuing in this well-trodden path, I seek to contribute what I see as the essential methodological innovation of investigating within-population variation in spatial language and cognition, and also seek to make this work comparable with its precursors.

At the outset of the project, I hypothesized that the competing language systems of Spanish and JCH would be associated with competing gestural-conceptual systems among adult monolinguals, which systems could be taken as evidence of both different ways of conceptualizing space non-linguistically and of different ways of "thinking for speaking" about space (Slobin 1996). Furthermore, I hypothesized that young bilingual speakers of Spanish and JCH would be socialized to use their gestural-conceptual system in different ways—relating acts of spatial orientation to the physical and interactional context differently—and that this would have implications for the children's communicative competence in each language.

The results of the project paint a much more complex picture than these hypotheses allowed. Perhaps the most surprising finding from a linguistic relativity standpoint was that there were no clear correlations between linguistic code and cognitive style. Although there was a fascinating range of variation in adult gestural-conceptual systems, these did not align neatly with their language dominance or with the language they were speaking on the task. And although I found some evidence for language-specific styles of spatial communication, I found stronger evidence that these are not related to primarily syntactic or referential semantic features of language. Another surprising finding was that naturalistic spatial talk appeared to be of a different genre than talk elicited in the semi-experimental tasks. In order to contextualize these findings and explore them in greater depth, I now turn to an overview of some previous literature on linguistic relativity, bilingualism, and spatial language and cognition.

1.7 Linguistic relativity and bilingualism

Edward Sapir and Benjamin Lee Whorf, two of the founding scholars of the discipline of linguistic anthropology, are probably best known for what has been called the "Sapir-Whorf hypothesis," or the theory of linguistic relativity. In his 1941 essay on "The Relation of Habitual Thought and Behavior to Language," Whorf contrasts linguistic and cultural patterns between Hopi and what he called "Standard Average European" (SAE) to challenge the assumption of an objective reality that is reflected transparently through language. He also sought to dispel the myth that European languages perceived and articulated reality more accurately than other languages. The two questions that frame his work are whether the concepts of time, space and matter are experienced uniformly by all humans, or influenced by linguistic structure; and whether cultural norms are related to linguistic patterns (Whorf 1995:67). He argued that, indeed, experience is related to "fashions of speaking" (83) and that there are "connections but not correlations or diagnostic correspondences between cultural norms and linguistic patterns" (84).

Since Whorf, anthropologists have improved upon the theory of linguistic relativity by more carefully interrogating its core notions of "language," "thought," "reality," and "culture." Volumes by Lucy (1992a, 1992b) and Gumperz and Levinson (1996) review some of these developments in addition to making their own substantial contributions. In the introduction to their edited volume, Gumperz and Levinson (1996) explain the way in which the theory of linguistic relativity is ultimately a theory of meaning, and as such can benefit from advances in theories of meaning that move beyond the "encoding" of semantic concepts in lexical items and grammatical structures. Instead,

meaning must be understood as interpreted by positioned actors within contexts, which can include "culture-specific activities and practices" (8-9). This approach also understands interaction as externalized thinking (9) and linguistic and cultural units as potentially deterritorialized networks of interacting individuals (11).

Lucy's (1992a, 1992b) work exposes some of the shortcomings of psycholinguistic work on linguistic relativity, some of which persist today. First, he argues that these studies often approach "language" in terms of lexical denotation, rather than the structures of meaning Whorf had in mind, thus treating language as a "mere dependent variable" (1992a:261). A second concern Lucy highlights is that early psycholinguistic studies focused on potential behavior rather than the habitual behavior central to Whorf's hypothesis (1992a:261). Finally, Lucy criticizes methodologies used for bridging the language-thought divide, which often seek to relate linguistic patterns to non-linguistic reasoning measured through participants' reactions to and manipulations of physical objects assumed to represent reality. But on the one hand this "reality" is biased toward researchers' conceptions of reality, and on the other hand this method avoids the important step of linking the structures in question to other linguistic and cultural patterns (1992a:260-261).

Bilingual individuals pose an interesting test case for linguistic relativity because they prompt questions of whether bilingualism results in dual or shared conceptual systems, draws on dual or shared cultural systems, and how the system(s) are deployed in interaction. However, despite the anthropological pedigree of the linguistic relativity hypothesis, the intersection of bilingualism and linguistic relativity is being most actively investigated today not by anthropologists but by psycholinguists. Partially, this may be a

response to Lucy's (1992b) claim that the original linguistic relativity hypothesis was never rigorously tested and his call for more empirical research. Indeed, one strength of the psycholinguistic work is its methodological rigor; yet it often falls short of integrating the theoretical advances proposed by linguistic anthropologists in the decades since Whorf. Here, I review some of the key studies in this tradition.

Athanasopoulos (2007) tested English and Japanese monolinguals and English-Japanese bilinguals in a triads matching test in which they were asked to label the contents of white paper plates as "the same" or not, based either on shape or material. Athanasopoulos hypothesized that English speakers would make a shape match when the object is quantifiable more often than Japanese speakers would, due to the grammatical distinction between count and mass nouns in English that does not exist in Japanese. He found that English proficiency was a significant predictor of shape responses (696), suggesting that "acquisition of L2-specific concepts may alter bilinguals' underlying cognitive representations" (697).

Cook, Bassetti, Kasai, Sasaki and Takahashi (2006) also use a fixed-choice triad task to test for differences in the conceptualization of shape by English- and Japanese-speaking monolinguals and bilinguals. In contrast to Athanasopoulos (2007), however, these authors found only an effect for length of stay in an English-speaking country, and not for L2 proficiency. They interpret these results as demonstrating that "categories may change as a consequence of exposure to the English-speaking sociocultural *milieu*, so that it is not the language itself that causes these changes so much as the culture that goes with it" (150). Cook et al. (2006) also provide a more nuanced account of some of the difficulties in interpreting the results of studies such as theirs. They underscore four

potential pitfalls, including the extent to which language and cognition are divorced; the problem of defining a "concept;" the link between language and culture (140); and the problem of defining "bilingual" and "monolingual" (142). Citing Pavlenko (2002a), the authors define "concepts" as "mental representations which affect individuals' immediate perception, attention, and recall and allow identification, comprehension, inferencing, and categorization" (139).

Pavlenko's (2002b) work on bilingualism and emotions explores perception, categorization, and narrative construction of emotions among a group of Russian speakers who learned English as teenagers. Based on the speakers' narrative recounting of a short, dialogue-free film, Pavlenko argues that conceptual restructuring takes place during L2 socialization and that emotions are therefore linguistically, culturally, and locally constructed and defined (51). Specifically, she shows that the bilinguals paid more attention to the link between emotion and body than the monolinguals, and that the bilinguals did transfer subtle semantic and syntactic information into their Russian narratives (65-67). In contrast to the above definition of "concept" from Pavlenko (2002a), this study highlights the extent to which concepts are not just abstract mental representations, but often explicitly articulated, ideologically and discursively constructed notions that can be learned later in life.

Stepanova Sachs and Coley (2006) also investigated language-specific patterns of emotion coding in Russian and American English monolinguals and Russian-English bilinguals. Specifically, they tested speakers' use of the terms *jealous* and *envious* and their Russian translation equivalents *revnuet* and *zaviduet* in a story-labeling task and in a situation-sorting task. These authors also found a clear linguistic difference between the

groups: the Russian speakers differentiated more between *revnuet* and *zaviduet* while the English speakers rated both *jealous* and *envious* as appropriate in labeling envy stories; the bilinguals patterned with the language they were tested in (216-217). However, these authors did not find that such linguistic differences led to conceptual differences, as the participants were remarkably similar in how they grouped and sorted situations. They did find a significant effect for exposure to English and for being a native Russian speaker, but no effect for the language being spoken online (224).

Bassetti (2007) is one of few studies to investigate themes of bilingualism and thought among children. She explored whether German-Italian bilingual children conceptualized objects differently than their monolingual counterparts based on the fact that the two languages often assign opposite grammatical genders to the same entities (260). Bassetti claims the study helps to disentangle linguistic from cultural effects by testing children who had been living in the "same" sociolinguistic environment[6]. The results of Bassetti's voice-matching experiment[7] demonstrated that bilingual children classified objects differently from monolinguals: while the monolingual Italian speakers assigned voices to objects corresponding to Italian grammatical gender, the bilingual children did not (262). One potential problem with studies of grammatical gender and linguistic relativity is that they rely on a correlation between arbitrary grammatical gender and natural gender. As Bassetti herself acknowledges, "the effects of grammatical

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[6] By this she means that the children were from the same Italian town, though she does not provide any other details about their backgrounds.

[7] In voice-matching experiments, children are shown line drawings of objects that have different grammatical gender in each language. They then hear a recording that is supposed to represent the object talking, first in an apparently female voice and then in an apparently male voice, and must say which voice seems most appropriate.

gender interact with real world experiences" of culturally constructed natural gender (267).

Indeed, a study by Kousta, Vinson and Vigliocco (2008) on grammatical gender in English-Italian bilinguals and their monolingual counterparts found that L1 had little effect in shaping thinking in L2. In their experimental design, English and Italian monolinguals and English-Italian bilinguals were required to verbally label animals shown in rapid succession on a screen. The purpose was to measure "semantic substitution errors," such as saying "horse" when "bear" was intended. The authors show that the Italian monolinguals preserved Italian grammatical gender in such errors at a rate twice that of the English monolinguals, suggesting that grammatical gender affected semantic similarity for the Italian monolinguals (851). Bilinguals tested in both languages produced more (Italian) gender-preserving errors in Italian than in English. The authors interpret this as evidence for "intraspeaker linguistic relativity," meaning that speakers relied on language-specific semantic representations, elected according to the language they were speaking (853).

Ervin-Tripp (2011) traces some developments in the field of bilingualism and cognition since the 1950s. Treating several different genres separately, categorized according to semantic domains or methodological approaches, Ervin-Tripp shows how, over time, new insights have helped resolve many of the contradictory results that emerged early in the psycholinguistic literature. She stresses the importance of the discovery that relative dominance plays an important role in bilingual thinking, arguing that proper interpretation of the results of studies on bilingualism and cognition must take into account a typology of bilingual speakers that measures a variety of dimensions of

competence. Ervin-Tripp also urges researchers to look beyond the competence of individual speakers when confronting variation in bilinguals, pointing out that "One cannot do good psycholinguistic research on bilinguals without sociolinguistic and anthropological/cultural knowledge. The conditions and life history of monolinguals and bilinguals often differ" (2011).

Most recent studies on bilingualism and thought say little about the communities participants come from or the circumstances of their acquisition of the two languages. However, it seems that most participants in the studies cited above are either L2 learners living in a place where their L1 is predominant, or immigrants or students living in a place where their L2 is predominant. These participants, then, may not actually belong to a bilingual community, or may belong to an immigrant community. In any case, the literature on bilingualism and thought makes little use of communities that have become bilingual due to conquest. As Sankoff (2002) argues, conquest and immigration are two sociohistorical situations that give rise to very different kinds of contact situations. Minimally, the former might lead to slower shift, stable bilingualism and "integration," while the latter might result in more rapid linguistic assimilation (Sankoff 2002:642). These differences may have important implications for understanding how bilinguals differ from monolinguals in their non-linguistic concepts and in their thinking-for-speaking. The distinction suggests another way to construct a typology of bilingual speakers, based on the sociohistorical causes and conditions of their bilingualism. This is a point that has also been articulated by Fishman (1964:56). He suggested that the involvement of individuals and groups in socio-cultural processes is an important variable in bilingual typologies.

This dissertation aims to combine the methodological rigor offered by psycholinguistic approaches to linguistic relativity with anthropological interrogation of taken-for-granted categories. Thus, Chapters 2 and 3 apply methodologies in the psycholinguistic tradition to the study of referential language use among bilinguals in Juchitán, as has been the focus of most studies in this tradition. However, these results are contextualized within an extensive ethnographic understanding of the participant's lives, of their levels of bilingualism, and of the speech community as a whole. Chapters 4 and 5, in turn, apply ethnographic and micro-ethnographic methods to the study of a kind of "interpretive relativism." However, the comparison of these results with elicited results allow for a more empirical approach to the study of relativity beyond referential speech.

1.8 Socialization and practice

If particular grammatical resources help construct and are constructed by social and cultural information, children must be socialized to language both through its symbolic content and through practice and use, as has been argued in the literature on language socialization (Ochs 2002; Ochs & Schieffelin 1984[1994], 1995; Schieffelin & Ochs 1986a, 1986b). Ochs (1996) further explains that "A basic tenet of language socialization research is that *socialization is in part a process of assigning situational, i.e., indexical, meanings*…to particular forms (410, emphasis in original). In other words, children learn that linguistic forms can point to (index) information about social identity, social acts, and affective and epistemic stances. Platt (1986), for example, found that the Samoan deictic verbs *sau*, "come," and *alu*, "go," index the higher social rank of the speaker who is able to direct them to someone of lower rank (in Ochs 1996:412). Thus,

Ochs (1996) argues that "language acquisition and language socialization can be seen as the unfolding understanding of the indexical potential of particular linguistic forms and the skill to apply that understanding to construct situations with other interlocutors" (419).

This "practice and use" approach to language socialization, as Ochs explains, "links language socialization research to post-structural sociological paradigms that portray *social structures as outcomes of social practices…*and to psychological paradigms that portray *cognitive structures as outcomes of speaking… and of social interaction*" (1996:408). From these more general praxis approaches, a parallel might be drawn to phenomenological work that links practice to space in particular—which might be termed "spatialized practice." On the one hand, this term is meant to stress that space is not a given physical reality, but is produced through political processes, social action, and embodied routine (Lefebvre 1991[1974]). On the other hand, this term is also intended to convey the sense that the actuality and potentiality for the positioning of bodies in space is partially habituated (Merleau-Ponty 2002[1945]); that bodily knowledge and cognitive representations work in concert in human practice (Hanks 1990:82-83).

Attention to language socialization and the ways in which bilingual speakers come to have concepts that differ from their parents' and come to learn indexical meanings is a promising avenue for exploring questions of bilingualism and linguistic relativity. In Chapter 5, I address these lines of research by investigating the ways in which caregivers' socialization practices suggest social meanings rooted in more than one semiotic system. I investigate whether there are differences in how the children learn to assign indexical meanings to language, and if this results in differences in how they

performed on spatial language elicitation tasks. This portion of the project takes a practice- and interaction-oriented perspective, focusing on language socialization as a series of micro-interactions negotiated in real-time among participants.

1.9 Spatial language and cognition

"Semantic typology" is a relatively recent area of study developed by Wilkins and Evans (see Pederson et al. 1998, Evans 1995). The field seeks to make cross-linguistic comparisons of "how languages express meaning by way of signs" regardless of the formal or syntactic structures they implicate (Evans 2010). Two volumes (Levinson 2003, Levinson & Wilkins 2006) represent the first extended foray into the semantic typology of space and are the product of a collective effort of over 40 scholars working on a dozen languages from seven different language families (Levinson & Wilkins 2006:6). One of the major accomplishments of this innovative project is to demonstrate the previously unknown diversity of spatial concepts in the world's languages. Indeed, the authors found that many of the supposed universals formerly attested for human spatial conceptualization were easily falsified by data from non-European languages.

A second large-scale, multi-researcher project has focused on spatial language and cognition specifically in Mesoamerica. The Spatial Language and Cognition in Mesoamerica (MesoSpace) Project, led by Jürgen Bohnemeyer, is a research project currently investigating spatial language and cognition in 15 Mesoamerican languages. In addition to searching for areal features of spatial language in Mesamerica, they are also investigating the relationship of specific typological features to frame of reference

preferences. Their first round of results has appeared in a special issue of *Language Sciences* (O'Meara and Pérez Báez 2011).

These studies follow the tradition of identifying three main sub-domains of the domain of space: motion, topology, and frame of reference (FoR). Although this project focuses primarily on the sub-domain of FoR, some reference will be made to the others. The sub-domain of motion includes language that encodes movement from a "source" to or toward a "goal." Linguistic constructions that encode motion may also include information that distinguishes "path" (over the hill, down the road) from "manner" (ran, flew, skipped) (Talmy 1985). When the source or goal is specified in relation to the place of speaking, the motion is called "deictic motion" (Fillmore 1966). Typical deictic verbs in English include "come" and "go."

Topology is a branch of mathematics sometimes referred to as "rubber sheet geometry;" when applied to natural language, it concerns the spatial coincidence of a Figure—"a moving or conceptually moveable entity whose path, site, or orientation is conceived as variable"—and a Ground—"a reference entity, one that has a stationary setting relative to a reference frame, with respect to which the Figure's path, site, or orientation is characterized" (Talmy 2000:312). Topological relationships include relations of containment, contact, and part-whole. Their conceptual acquisition was studied early on by Piaget & Inhelder (1956).

Languages also have a number of resources for describing relations between a Figure and Ground that are separated in space; this constitutes the sub-domain of FoR. For example, imagine how one might describe the relationship of the ball relative to the chair in Figure 1.11.

Figure 1.11: Sample stimulus photo: Ball & Chair (Bohnemeyer and Pérez Báez 2008a).

For some speakers, an utterance such as "The ball is to the left of the chair" comes to mind most readily. Others might choose to say, "The ball is at the chair's back." Yet another strategy might involve using a reference point external to the scene such as a landmark or cardinal direction: "The ball is east of the chair" or "The ball is toward the freeway from the chair." Each of these constructions exemplifies the use of a different frame of reference.

Unfortunately, typologies of frames of reference are a bit of a muddle, with new ones regularly proposed, old ones revised, and supposedly different categories used interchangeably. This muddle is likely not a coincidence, and is probably a good indicator of the shaky empirical ground on which the typologies rely. For example, an early version of FoR typology that appeared in Levinson 1996 and included the FoR categories "relative," "absolute" and "intrinsic," was engaged in a thoughtful debate by Haviland (1998). With evidence from Guugu Yimithirr, an Australian language that, as he notes, is often taken as the prototypical example of a language that insists on an "absolute" FoR, Haviland questions the utility of the category "absolute" as well as the distinction among the three "different" frames (1998:27). Guugu Yimithirr has a set of four roots that encode cardinal directions and have very productive morphology. Each root has seven cases as well as reduplicated and suffixed forms. These various inflections

result in meanings such as "East from a point," "to a point East," "a bit East," etc. (Haviland 1998:30, 32). Haviland argues that these forms, although assembled from cardinal direction roots that typically have been understood as encoding an absolute FoR, actually differ from one another on the basis of *perspective,* which is typically taken as a characteristic of "relative" FoR. Indeed, he shows that Guugu Yimithirr combines in discrete lexical items the frames of reference that Levinson distinguished (Haviland 1998:35). In addition to this morphological evidence, Haviland illustrates with interactive evidence that Guugu Yimithirr cardinal terms require the same sort of contextual fixing as other indexicals (36): they routinely co-occur in utterances with deictic elements suggesting similar "anchoring" processes (37), and can be transposed onto narrated contexts (41). Thus, he argues, Guugu Yimithirr spatial discourse "is essentially indexical in nature" (36).

Haviland's analysis draws attention to methodological issues as well. A high frequency of cardinal direction terms or part-whole constructions in a sample of elicited data may lead a researcher to conclude that those terms define the system. However, elicited data often fall short of representing how complex spatial language is actually deployed in discourse and used with a communicative purpose. With these caveats in mind, I have chosen to rely in this dissertation on the FoR typology proposed by Danziger (2010), with a few modifications, because her typology takes into account the variable of "perspective," and because it captures well the range of responses I found in my data. Her typology is reproduced for reference in Table 1.1.

Table 1.1: Frames of reference as proposed by Danziger (2010). I propose the additional category of "Geo-centered."

	Allocentric Anchor is not a speech-situation participant	**Egocentric** Anchor is a speech-situation participant
Ternary Anchor is clearly distinguishable from Ground	**Absolute** *The ball is west of the chair*	**Relative** *The ball is to the left* of the chair* *from the speaker's perspective
Binary Anchor is not clearly distinguishable from Ground	**Object-Centered** *The ball is at the chair's back* **Geo-Centered** *The chair is facing west*	**Direct** *The ball is in front* of me* *with reference to the speaker's own front

In addition to the entities of Figure and Ground, Danziger's typology introduces the notion of Anchor. "The Anchor is the zero point from which the vector is calculated that narrows the search space from Ground to Figure. The Anchor therefore, is that part of the scene which the speaker treats as immovable, fixed, in relation to the others" (Levinson 1996 in Danziger 2010:168). In Figure 1.11, above, for example, the ball is the Figure and the chair is the Ground in relation to which the ball must be located. A shift in Anchor characterizes a shift in frame of reference. In the utterance, "The ball is to the left of the chair," the speaker is the Anchor; the search vector is calculated from the speaker's left, which is projected onto the chair. In the utterance, "The ball is west of the chair," an external point or region serves as the Anchor. To interpret the utterance, one must locate the "west," however that might be calculated in a given cultural or communicative context, and from there calculate a vector leading to the chair. Danziger thus distinguishes between Anchors that are not one of the speech-situation participants,

versus Anchors that are one of the speech-situation participants. These frames of reference will be referred to as the Relative and Absolute, respectively.

Danziger's typology also includes a distinction between "Ternary" and "Binary" frames of reference. This is a significant contribution because the Allocentric/Egocentric contrast has historically been privileged in the literature; however, as I believe is true of JCH, it may be that this distinction is not as salient in some languages as is the Binary/Ternary distinction. In a Ternary frame of reference, the Anchor and Ground are separate entities; in a Binary type, they are the same entity. For example, in the utterance "The ball is at the chair's back," the chair's back serves as both Anchor and Ground. It is the object in relation to which the ball is located, but it is also the source of the search vector for locating the ball. Similarly, in the utterance, "The ball is in front of me," the speaker's body serves as both Anchor and Ground. Note that these two frames of reference, the Object-Centered and Direct, respectively, also contrast along the dimension of whether the Anchor is a speech-situation participant.

On the basis of the analysis reported in Chapter 3 of this dissertation, an additional conceptual problem emerged regarding current FoR typologies. In many studies, any instance of a cardinal direction term is immediately taken to be a specimen of the absolute frame of reference. However, take for example, the utterance, as said of Figure 1.11, "The chair is facing west." Even though a cardinal direction term is used, this is not a Ternary frame of reference because the Anchor and Ground are not clearly distinguishable. Thus, I have proposed the category "Geo-centered," on analogy with "Object-Centered" to distinguish these types of constructions. An instance of the geo-

centered frame of reference will employ a cardinal direction term, landmark, or other geographical feature in a Binary frame of reference.

The supra-categories of Ternary/Binary and Allocentric/Egocentric are also relevant to some analyses in this dissertation. In some instances, better justice is done to the data by collapsing them into these larger categories. In Chapter 2, for example, the Allocentric/Egocentric terminology is used because the elicitation tasks that were conducted—as is case for all such elicitation tasks that I know of—were specifically designed to test this conceptual distinction. In Chapter 3, the Ternary/Binary distinction reveals itself as more relevant to understanding the speech data from Juchitán, and so that terminology is used and discussed. I am aware that the jargon is cumbersome and beg the forgiveness of my readers. It is not employed gratuitously however, and I hope that one contribution of this dissertation can be to further refine the typology. A replica of Table 1.1 appears in the Appendix on a separate page that can be easily removed for reference while reading the dissertation.

It should also be noted that the above typology applies equally well to cases where either the Figure or Ground is deictic, or to spatial gestures. Take for example, an utterance such as "The house is west of there," in which "there" is construed as, say, the freeway, based on the context of speaking. This would be a case of the absolute frame of reference even though the Ground object is indexically construed.

Additionally, spatial gestures may be classified according to this typology. Ternary and Binary gestures are distinguished on the basis of the presence or absence of a Ground object construed in gesture or narrative space. For example, a gesture using a Binary FoR would consist of a direct point to the object or region from the place of

speaking; in this case, the gesturer's body serves as both Ground and Anchor. An example of such a gesture can be seen in the discussion at the end of this Introduction, in Figure 19a-e. A relative FoR gesture may be distinguished because the gesturer will use her own perspective internal to the imagined narrative in order to locate a Figure relative to a Ground in gesture space. An example of such a gesture appears in the final section of this Introduction in Figure 1.18a-c. In the example, the speaker gestures up and to his right when describing the location of the cemetery in Juchitán. Based on a comparison with a map of Juchitán, we can discern that he is locating the cemetery relative to his own right side *as if he were* on the highway traveling outside of Juchitán. Thus, his location as imagined from the road serves as the Ground object, and the imagined cemetery serves as the Figure object. His own "right side" as imagined while on the road is projected onto the Ground in order to locate the Figure. In an absolute gesture depicting this same scene, the gesturer would first locate a Ground object in gesture space, say, the road, and then locate the Figure—the cemetery—by gesturing to the south of where he located the road in gesture space. This is because the cemetery lies south of the road and so "south" is the Anchor. Thus, relative and absolute gestures are Ternary in that the Figure and Ground objects, both located in gesture space, are distinct from the Anchor. A summary of this description appears in Table 1.2. This table is also repeated in the Appendix.

This typology of frames of reference allows us to account for a range of strategies that appeared in the data, and is especially important as a way to acknowledge the central role that deixis and pointing gestures often play in descriptions of the relation of objects to one another. I now turn to the literature of another kind of gesture central to research on spatial language and cognition.

Table 1.2: Frames of reference as they may be applied to gesture.

	Allocentric Anchor is not a speech-situation participant	**Egocentric** Anchor is a speech-situation participant
Ternary Anchor is clearly distinguishable from Ground	**Absolute ("Transposed pointing")** *A Ground object is construed in gesture space and a Figure is located in gesture space with reference to the Ground object. Some external object or region serves as the Anchor.*	**Relative** *A Ground object is construed in gesture space and a Figure is located in gesture space with reference to the Ground object. The gesturer's real or imagined perspective is the Anchor.*
Binary Anchor is not clearly distinguishable from Ground	**Direct** *The gesturer points directly at the object or region in question, contorting her body or body parts as necessary.*	

Typological differences among languages have been shown to correspond to differences in gestural practices. According to Slobin's (1996) notion of "thinking-for-speaking" (TFS) children acquire with their native language a particular way of conceptualizing and linguistically encoding events. TFS is a "weaker" version of the linguistic relativity hypothesis. Rather than relating static, abstract notions of thought and language, Slobin's approach understands thinking and speaking as dynamic, real-time events. As he explains, "'Thinking for speaking' involves picking those characteristics of objects and events that (a) fit some conceptualization of the event, and (b) are readily encodable in the language" (Slobin 1996:76).

McNeill (1992) in turn makes the argument that gesture can allow analysts to "mind read," meaning to see TFS externalized in the bodily communication channel. A study by Kita et al. (2007) corroborates this hypothesis by demonstrating that a speaker's online gestural choice is influenced by the particular utterance spoken rather than by some kind of cognitive hardwiring. Other differences in gestural patterning based on

syntactic and lexical differences among languages may be due to differences in cognitive

processing rather than TFS (Kita 2009). For example, Haviland (1993) found that

speakers of Guugu Yimithirr, an Australian language known for its geocentric absolute

FoR, consistently produce directionally anchored gestures when layering interactional

space on narrated space (26). Haviland alludes to the possibility of cognitive

preconditions that "allow Guugu Yimithirr speakers, in order to talk appropriately about

scenes, locations, and motion, [to] attend to, calculate, store, and retrieve directions" (2).

Indeed in a later article, Haviland (2005) finds that speakers of the Mayan language

Tzotzil also encode in gestures large amounts of directional and orientational information

even when this information is not encoded in words (42). A further example of diversity

in spatial speech and gesture coordination comes from work by Núñez and Sweetser

(2006), who argue based on gestural data that speakers of the Andean language Aymara

may metaphorically code "future" time as spatially behind the ego and "past" time as

spatially in front of the ego.

Turning now to research on children, the most important finding of research on

acquisition and space is that spatial concepts appear to be language-specific from a much

earlier age than had been supposed by Piaget & Inhelder (1956). They predicted a

universal path of spatial development beginning with "topological" space, then

"projective" space, and finally "Euclidian" space. In an experiment testing European

children's comprehension of the latter, which corresponds roughly to an absolute system,

Piaget & Inhelder found that only after age 10 could children accurately recreate a

landscape diagram that took into account all dimensions of orientation and distance

(1956:428-429). A series of studies followed in Piaget's footsteps over the following

decades, touching on topics such as the acquisition of orientational terms (E. Clark 1980), deictics (Tanz 1980), deictic verbs of motion (Clark & Garnica 1974), the semantics of location (Greenfield & Smith 1976), and the mapping of spatial linguistic terms onto spatial conceptions (H. Clark 1973).

However, the first study of spatial acquisition in a language that favors the absolute FoR (de León 1994), found that Tzotzil-speaking children acquire their language's geocentric absolute system earlier than predicted by Piaget's universal model. Brown & Levinson (2000) provide detailed evidence from another Mayan language confirming these results: they find that Tzeltal-speaking children acquire their language's absolute system simultaneously with or even earlier than its intrinsic system around the age of four (183). A host of other studies confirms the language-specific hypothesis, investigating topological categories in English, Korean and Dutch (Bowerman 1996, 2007; Bowerman & Choi 2001; Choi 1997); vertical motion in Mayan languages (Brown 2001, de León 2001); paths of motion (Choi & Bowerman 1991, Slobin 1996); and FoR in Nepali (Niraula, Mishra & Dasen 2004). Research on the acquisition of body part terms in Zapotecan languages points to similar conclusions (Lillehaugen 2003, Jensen de López 2007).

Another strain of work on the acquisition of spatial language has begun integrating data from children's gestural practices. One important finding is that children's gesturing is different from adults' as it relates to spatial typology; for example, children around 3-4 years of age, from a diverse array of languages, seem to "decompose" manner and path gestures before ultimately adopting the adult pattern for their language (McNeill 2005:184, Senghas et al. 2004). This finding is in line with research on the

acquisition of gesture in general, which shows that gesture can "foreshadow" verbal development, with gesture-speech "mismatches" providing clues about conceptual development to which verbal proficiency has not yet caught up (Breckinridge & Goldin-Meadow 1986, Özçalışkan & Goldin-Meadow 2005, Rowe et al. 2008). Gullberg et.al. 2008, on the basis of experiments with French-speaking adults' and children's gestural encoding of voluntary motion, demonstrate that children's gesture follows from the language-specific properties of French and differs only slightly from adult gesture. In the study, the youngest children tended to conflate path-manner gestures when adults separated them, and to produce additional manner gestures when adults did not (225). The authors speculate that this mismatch between children's manner gestures and French verb typology (which highlights path) indicates an earlier, "holistic" conceptualization of motion or might be evidence for "transitional knowledge" in the developmental trajectory (229). Thus, research examining children's gesture must take into consideration both the typological properties of the language as well as possible patterns in the development of co-speech gesturing.

Bilingual gesture constitutes another area of research on spatial language and cognition. Gullberg (2010) reasons that bilinguals might be expected to display one of two different gesture patterns: either matching monolinguals in each language, or using gestures that are similar in both languages but different from monolinguals, thus suggesting a set of shared conceptualizations for both languages (81). One might also expect some instances of "cross-linguistic gestural transfer"—the use of some gestures in one language that seem characteristic of the other (Nicoladis 2007, Pika et al. 2006). A small number of studies has sought to test these hypotheses with bilinguals and second

language learners. While some studies find evidence for "hybrid" gestural systems or for

cross-linguistic transfer (Brown & Gullberg 2008, Cadierno & Ruiz 2006, Choi &

Lantolf 2008, Kellerman & van Hoof 2003, Nicoladis et al. 2007, Stam 2006), others find

evidence for highly language-specific systems (Navarro & Nicoladis 2005, Neguerela et

al. 2004, Özçalışkan & Slobin 2000), even in very young bilingual children (Nicoladis et

al. 2010), signifying separate conceptual systems for each language.

1.10 Grammatical sketch of Juchitán Zapotec

Juchitán Zapotec, which has also been called Isthmus Zapotec, is a member of the

Zapotecan branch of the Otomanguean language family (Campbell, Kaufman and Smith-

Stark 1986). Zapotecan includes Chatino and up to five "virtual" Zapotec languages:

northern, central, southern, Papabuco and western/Lachixío. Each of these has several

mutually unintelligible varieties. In this scheme, JCH is considered a central variety

(Pérez Báez 2011). Here, I present a brief overview of the grammar, drawing primarily

from Pickett (1960) and other sources as cited below. A table of abbreviations used in the

glossing of JCH and Spanish examples may be found in the Appendix.

1.10.1 Orthography and phonology

In this dissertation, I represent JCH with the standard orthography used in texts

and dictionaries of the language. The brief phonetic description that follows is adapted

from Pérez Báez (2011) and Marlett and Pickett (1987). The consonantal phonemes in

their standard orthographic representation are shown in Table 1.3. The distinction

between pairs of consonants with the same place and manner of articulation is one of

fortis/lenis. This distinction is usually realized as unvoiced/voiced for obstruents and as long/short for resonants. Consonants found only in Spanish loans are in bold typeface.

Table 1.3: Juchitán Zapotec consonant phonemes in standard orthography.

	Bilabial	Labio-dental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Stop	p b		t d				k g	'
Nasal	m		nn n			ññ ñ		
Trill			**rr**					
Flap			r					
Fricative		**f**		s z	xh x	ch dx		j
Lateral			ll l					

There are five vowels: i, u, e, a, and o, which can occur as simple (written V), checked (written V') or laryngealized (written VV). When high vowels occur at the edge of a syllable they may be perceived as the glides [w] and [j]. Because standard JCH orthography was partially modeled on Spanish orthography, these are usually written respectively as "hu" and "i"/"y." JCH has phonemic tone; vowels can have either a low, high, or rising tone. JCH has previously been described as a pitch accent language in which underlying tone melodies map onto the accented syllable and spread from left-to-right (Mock 1988). In a forthcoming dissertation, Bueno Holle (2016) argues that the tonal distribution is not word-based, but syllable-based. He proposes that JCH tone can best be understood by referring to underlying H tones linked to specific moras within the syllable such that four types of syllables are found: syllables with H linked to the first mora, syllables with H linked to the second mora, syllables with a floating H and syllables that carry no underlying tone. Thus, H is the only underlying tone and its distribution depends on whether the syllable is heavy (two moras), glottalized (one mora), or laryngealized (two moras).

Tone is not usually marked orthographically. However, JCH orthography makes use of an accent mark on some vowels, which has two possible meanings: to mark irregular stress (regular stress falls on the penultimate syllable of a word); and to distinguish homographs orthographically. Homographs often do differ in tone, though the accent does not mark the tone, *per se*.

1.10.2 Word classes and morphology

JCH is not a morphologically complex language. There is no classification of nouns or case marking. However, mass and count nouns can be distinguished through the use of the contrasting terms for 'all' when combined with a given noun.

(1) a. gui-rá dxi
       all-CLF day
       every day

     b. gui-dubi dxi
       all-CLF day
       all day long

The expression of number is not obligatory; when it is overtly marked, the plural particle *ca* precedes the noun phrase. The indefinite marker *ti* also precedes the noun phrase, while definiteness is expressed with several particles that follow the noun phrase. The neutral particle is *ca*, while *que* and *ndi'* have the senses of 'that' and 'this,' respectively.

(2) a. gui-rá ca dxi ca
       all-CLF PL day PL
       all the days

     b. gu-yá ti   dxi
       COMPL-go-1SG INDF day
       I went one day

Abstract nouns may be formed by prefixing the term *guenda-* to a noun, adjective or verb.

(3) a. guenda-biaani'   Noun
         NMLZ-light
         intelligence

     b. guenda-huará   Adjective
         NMLZ-sick
         sickness

     c. guenda-ró   Verb
         NMLZ-eat
         dinner ((la comida))

Nouns can be modified for possession. For the purposes of possession, JCH nouns fall into two classes: un-possessed and inalienably possessed. For un-possessed nouns, possession is expressed either by insertion of the particle *sti* or *xti* after the possessed noun phrase and before the possessor noun phrase as in (4a); or by procliticization of the possessive marker [s] or [ʃ] onto the possessed noun[8]. The possessor may then be expressed with a bound pronoun on the possessed noun. An example of this latter construction appears in (4b), where the noun *tia* "aunt" becomes *x-tia-lu* "your aunt".

(4) a. tronco **xti'** yaga
         trunk POSS tree
         trunk of the tree

     b. ra   lidxi   **x-tia-lu'**
         LOC POSS.house POSS-aunt-2SG
         at your aunt's house

---

[8] The possessive prefix is sometimes written s-, sometimes x-, and sometimes xh-, but this orthographic convention does not accurately represent the phonetic effects of affixation, which will not be discussed here.

For inalienably possessed nouns, the possessed meaning of the above particles [s]/[ʃ]- is already part of the meaning of the bare noun; thus inalienably possessed nouns do not and cannot take these particles. Instead, possessive constructions are formed either by juxtaposing the head noun and the possessor—in that order—as in (5a); or by suffixation of a bound pronoun that refers to the possessor onto the head noun, as in (5b). In JCH inalienably possessed nouns include human and animal body parts, kin terms, and a few other select nouns such as *lidxi* 'house.'

(5) a. n-uu-ni   ique hombre ca
          STA-is-3I head man   DET
          it is on the head of the man

     b. xii ti   bayu'   ique-be
          tight INDF bandana head-3H
          a bandana is squeezing his head

JCH pronouns have both free and bound forms. The first and second person singular free forms are mono-morphemic. The other free forms combine the bound form with the generic pronoun *laa*. The third person plural is formed by suffixing the plural marker *–ca-* before the pronoun suffix. Thus, *laa-ca-be* is the third person plural human form. JCH does not distinguish between subject and object pronouns.

Table 1.4: JCH pronouns.

Free form	Bound form	
naa	-a', aa', e'	1st person singular
lii	-lu', u'	2nd person singular
laa-be	-be	3rd person human
laa-me	-me	3rd person animal
laa-ni	-ni	3rd person inanimate
laa-nu	-nu	1st person plural inclusive
laa-du	-du	1st person plural exclusive
laa-tu	-tu	2nd person plural

The verb is the grammatical category in JCH with the most potential for morphological complexity. Its elements may be schematized in a diagram of morphological sequence limitations as follows:

(movement-intention)	aspect/ tense	(causative)	verb stem	(modifier)	(subject)	(object)
che-	gu-	-si-	-STEM	-pe'	-be	-ca-ni
PRES.GO	POT	CAUS	stem	exactly	3H	PL-3I

This diagram shows the required ordering of the morphemes relative to the verb stem and provides a representative example of each type. Morphemes in parenthesis are optional; thus each verb must minimally consist of a stem and an aspect marker. Each of these elements will now be discussed, with the exception of subject and object markers which are the same pronoun forms shown above.

JCH has seven aspects and one tense. JCH verbs fall into four classes of regular verbs on the basis of the form of the aspectual prefixes they take. These prefixes are shown in Table 1.6. The habitual form is the dictionary form and is used throughout this dissertation when glossing verb stems. The [g] of the potential and completive forms is often not pronounced and is therefore sometimes omitted orthographically.

Table 1.5: JCH aspect prefixes for each of four classes of verbs.

	1a	1b	1c	2
Habitual	ri-	ri-	ri-	ru-
Completive	bi-	gu-	gu-	bi-
Continuative	ca-	ca-	ca-	cu-
Potential	gui-	gui-	∅	gu-
Future	za-	za-	za-	zu-
Perfective	hua-	hua-	hua-	hua-
Irrealis	ni-/ñ-	ni-/ñ-	ni-/ñ-	nu-/ñ-

The following examples illustrate each of the aspects and the future tense as used in naturalistic speech. Note that the completive aspect is used to indicate an action

completed and is also used in imperative constructions, as in (6b). The present tense in

JCH is a special form that occurs only with the verb *rie* 'go.'

(6) a. de lu iza **ri-nde-lu-a'**   luguiaa   Habitual
            of on year HAB-arrive-eye-1SG market
            once a year I go eye the market

    b. **gu-ní'**   xi **b-iiya-lu'**   Completive
            COMPL-speak what COMPL-see-2SG
            say what you saw

    c. ora **ca-ní'**   ne s-tobi   naa idxa-stiá   ca la   Continuative
            when CONT-speak with POSS-one 1SG word-spanish DET FOC
            when another is speaking to me in Spanish,

    d. pue mejor nga **i-ni'-nu-ni**   idxa-zá   ca xa   Potential
            DM better FOC POT-speak-1PL.INCL-3I word-zapotec DET
            EMPH
            well it's better that we speak it, that we speak Zapotec of
            course

    e. peru qui **zi-ene**   Na.B <u>totomostle</u> xa   Future
            but NEG FUT-understand NAME <u>cornhusk</u>   EMPH
            but Mrs. B won't understand "<u>totomostle,</u>*" obviously*

    f. qui **huay-a-dy-a'**   Perfective
            NEG PERF-go-NEG-1SG
            I haven't gone

    g. n-uu xi caye ra **ña-bi-nu**   laa-ca-be   Irrealis
            STA-is what street LOC IRR-say-1PL.INCL PRON-PL-3H
            there is, what street would we tell them

    h. pue **chaa'**   cheguiigu'   Present
             DM PRES.go.1SG NAME
            well I'm going to Cheguiigu

In addition to these aspects and tenses, about half of JCH verbs, most of its adjectives and

some nouns can take the stative prefix *na-*. Some stative forms do not require the prefix.

An example of each type of construction appears below.

(7)   a.   na-yá-be   Adjective
           STA-green-3H
           she is hung-over

      b.   na-beñe   ra-rí   Noun
           STA-mud LOC-PROX
           it is muddy here

      c.   na-bani-be   Verb
           STA-live-3H
           he is alive

Causative marking in JCH is extremely productive and also has very complex

allomorphy (Marlett and Pickett 1987). Some verbs have multiple causative forms such

as the triplet *riaapa'* "care for oneself", *rapa* "take care of" and *rusigapa* "entrust"

(Picket et al. 1998:65). If the simple form of the verb is intransitive, the causative form

will be transitive with a direct object complement. If the simple form is transitive, the

causative form will be transitive with two complements. Example (8) illustrates the

causative form of the verb *riaba*, 'fall,' which becomes *rusaba* 'throw.'

(8)   **bi-s-aba-be**   lu   tabla que la
      COMPL-CAUS-fall-3H on   board DET FOC
      he threw (it) on the board

The JCH deictic verbs of motion *rie* 'go' and *reeda* 'come' have special auxiliary

forms that can occur as prefixes and express "movement with intention" or movement

during the action. These auxiliary forms carry their own aspectual marking and are

always followed in the verb sequence by the potential aspect marker on the verb stem. As

an example of the former type, movement with intention, are forms such as *chegaazebe*

"he is going to bathe" (Pickett 1955:220), shown in (9a). The second type, movement

during the action, can be seen in (9b).

(9) a. **che-Ø-gaaze-be**
PRES.GO-POT-bathe-3H
he is going to go bathe

b. ne **z-é-gu-xooñe-me** za-cá
and Z-GO-POT-run-3A MANNER.DEIC
and he went running like this

What I am here calling "modifiers" consist of a class of suffixes with diverse meanings, unified by their location in the verb sequence between the stem and the subject marker. Examples of these include the following: *-si* 'as soon as,' *-ru* 'still, yet,' *-ga* 'meanwhile,' and *-ca* 'right away' (Pickett 1955:219-220). These may be seen as contributing to the aspectual marking of the verb, and thus have a similar impact on senses of motion. The example below shows the use the modifier *–ne* 'with,' which adds the sense of accompaniment to the verb *ruxooñe* 'run.'

(10) ne gu-xooñe-**ne**-me   bere   huiini' que la
and COMPL-run-**with**-3A chicken little   DET FOC
and he ran with the little bird

JCH deictic verbs of motion follow the pattern attested by Speck and Pickett (1976) for Texmelucan Zapotec, which allows both the speaker and addressee to serve as possible deictic centers. In JCH, one would respond to a knock on the door using the verb *reeda*, 'come' in the future aspect: *ma zenda'* 'I'm already coming.' This is parallels the English, but contrasts with Spanish in which the deictic center cannot be displaced. JCH deictic motion verb stems can take a special progressive aspect denoting that a round trip has been initiated but not completed, which Pickett has called the Z-form or the "on-the-wayative" (1976:163). I usually gloss this with the English "head off" as in (11a). The completive aspect is used to denote a completed round trip. Another feature of JCH

deictic verbs of motion is that they can take a special modifier, *-bi'-* to stipulate

movement toward or away from one's home, as in (11b).

(11) a. ma **z-e-be** chi-nde-be   nisa-dó   huabi ga   Z-form
     COMPL Z-go-3H PRES.go-arrive-3H water-calm NAME DET
     then he heads off arrives at the Sea of the Huaves

    b. ma chi-**bi'**-du'   Go "home"
     COMPL PRES.GO-HOME-1PL.INCL
     we are going home now

1.10.3 Constituent order

     JCH is a head-initial language. Table 1.7 presents examples of canonical

constituent order for each of the parameters suggested in Comrie 1981. Non-canonical

constituent order is usually marked with a clause-final focus marker, either *la* or *nga*.

(12) a. Jordan.Grande **la**, pue qui ri-ní'   qui ni-ní'-di-be
     NAME   FOC DM NEG HAB-speak NEG IRR-speak-NEG-3H
     Jordan Senior, well he doesn't speak, he didn't speak

    b. mismu laca laa-nu   **nga** r-aca burlar   de laa-nu
     same   also PRON-1PL.INCL FOC HAB-do make.fun of PRON-1PL.INCL
     we ourselves are the ones who make fun of ourselves

     Subordinate clauses are formed with the third person inanimate particle, *ni* 'that'

or with the term *ora* 'when' from Spanish <u>*hora*</u> 'hour.' Note that in (13b), the subordinate

clause is fronted with the use of the focus marker *la*.

(13) a. nga nga ti   herencia   **ni** bi-sana-ne   ca binni gola
     DEM FOC INDF inheritance 3I COMPL-walk-with PL people old
     that is an inheritance that the elders brought

    b. **ora** cu-zulu-ca   i-ziidi-ca   gui-ní'-ca   ti   dialectu la,
     when CONT-start-PL POT-learn-PL POT-speak-PL INDF dialect   FOC

     ru-ch-enda-ca-be   binni
     HAB-CAUS-tangle-PL-3H people
     when someone starts to learn to speak some dialect, they get tangled up

Table 1.6: Profile of Juchitán Zapotec constituent order.

Parameter	JCH canonical order	Example
Order of subject, object, and verb at the clausal level.	VSO	n-apa-ca-be stale guie' STA-have-PL-3H much flower *they have a lot of flowers*
The relative order of adjective (A) and noun (N) within a noun phrase.	NA	fuera de yoo huiini' ca outside of house small DET *outside the little house*
The order of head noun (N) and relative clause (Rel) in the relative clause construction.	NRel	desviación z-ee Chicapa turnoff Z-go name *turn that heads to Chicapa*
The relative order of possessive/genitive (G) and head noun (N).	NG	tronco s-ti yaga trunk POSS-INDF tree *trunk of the tree*
The relative order of adposition (Ap) and head noun (N). Adpositions can be either prepositions or postpositions.	ApN	zu-huaa-ni lu mexa' ca STA-stand-3I on table DET *it is standing on the table*
The order of auxiliary verb (Aux) and main verb (V).	AuxV	z-anda gui-ree-du' FUT-be.able POT-exit-1PL.EXCL *we can leave*
The order of the comparative adjective (C) and standard of comparison (S) in comparative constructions.	CS	jma na-ro'ba more STA-big *bigger*
Whether the language is overwhelmingly suffixing or overwhelmingly prefixing.	Only verbs can take prefixes; verbs, nouns and adjectives can take suffixes.	ti neza-si INDF road-only *only one road* zu-huaa-ni STA-stand-3I *it is standing*

1.11 Methodology

The study of the linguistic relativity hypothesis is inherently interdisciplinary and,

indeed, much of the debate concerning its validity might just as well be explained by

differences in methodological approaches. Many scholars have called to more integrated

and interdisciplinary treatments of the problem. But the fundamental discrepancy remains

that psychologists, linguists, and anthropologists might themselves be said to speak

different "languages." Joshua Fishman has explained this problem eloquently:

> What is data, what constitutes proof, what is disconfirmation—indeed, just
> what is the problem—these all become less rather than more consensual as
> interdisciplinary perspective increases. Indeed, this is the price we pay
> (and that work on the Whorfian hypothesis has paid) whenever we focus
> disparate methodological perspectives on the same problem. Different
> methodologies are different languages. They are not duplicates of one
> another. They intertranslate only roughly rather than exactly. They are
> different *weltanschauungen* and, therefore, rather than being articulate in
> any fine grained manner they are immediately valuable precisely because
> they highlight different aspects of reality (Fishman 1982:4).

Scholars interested in the question of linguistic relativity must take seriously this

methodological imperative to communicate across disciplines. One of the primary aims

of this dissertation is to attempt such an interdisciplinary discussion, to truly bridge

psychological, structural linguistic and anthropological approaches to the study of

language. It is for this reason that I proposed the collaborative project with two cognitive

scientists that resulted in the co-authored work appearing in Chapter 2. That chapter

begins with a particular approach to linguistic relativity that takes referential practice as

the comparative "linguistic" feature. This approach continues in Chapter 3, but in the

context of a communicative task. Part of the purpose of these chapters is to engage with

linguistic relativity research that has privileged the investigation of the referential

function of language, while demonstrating that cross-linguistic differences in semantic

denotation are insufficient for explaining the variation in spatial reasoning and speaking

found in Juchitán. This conclusion leads to the search for variables with more explanatory

power. In Chapter 4, I entertain the hypothesis that contexts of speaking may be related to

variation in ways of talking about space, relying on naturalistic rather than elicited data.

Although not attempted in this dissertation, I believe such a hypothesis could be tested

empirically. Thus, in the context of previous studies of linguistic relativity in the domain

of space, this project as a whole offers two distinguishing methodological characteristics:

the use of "cross-typological" bilinguals, and the combination of psycholinguistic and

ethnographic methods. "Cross-typological bilinguals" are bilinguals who speak two

languages that differ in some typological feature of scholarly interest.

In the case of Spanish and JCH, the relevant contrast is between their semantic

typologies of space, especially in the sub-domain of frame of reference. The MesoSpace

Project is investigating the correlation between two typological features shared by many

Mesoamerican languages: the preference for intrinsic or absolute FoR and the use of

highly productive "body part" terminologies ("meronyms") in constructions describing

topological location. In their special issue, the team argues that meronyms "are used

within the Mesoamerican sprachbund in a particularly productive way… [and] meronymy

as it occurs in Mesoamerican languages may be a linguistic predictor of a bias against the

projection of FoRs derived from the observer's body—the "relative" type of FoRs, which

plays a dominant role in more widely studied languages such as Spanish, English, Dutch

and Japanese" (O'Meara and Pérez Báez 2011:838). In other words, the predominance of

meronyms in JCH topological descriptions, in contrast to the predominance of relative

partonomies in Spanish topological descriptions, is argued to correlate with differences in the conceptualization of frames of reference.

Although I argue in Chapter 3 of this dissertation that the MesoSpace conclusions are only partially supported, the general hypothesis that typological features will predict cognitive styles was central to the methodological design of my own research project. In Chapter 3, I also discuss the notion of "linguistic typology" and define it in more detail. If the two languages differ in their spatial language typologies and in their corresponding styles of spatial conceptualization, and if the bilinguals differ in their relative proficiencies in each language, then we can test the extent to which differences in spatial cognition are related to proficiency in Spanish and JCH. I tested this hypothesis using a battery of experimental tasks, which, in turn, were combined with extensive ethnographic and micro-ethnographic methods, allowing for comparison of elicited speech and gesture with naturalistic samples, and also for deeper inquiry into the sources of the results. Microethnography consists most basically of the audio or video recording of "natural" interactions. It is interested in the emergence of meaning through moment-by-moment practice, and allows for "fine-grained analyses of talk and bodily action situated in cultural contexts" (Streeck & Mehus 2005).

Semantic domain-centered approaches to language in general and to spatial language in particular have been subject to criticism. Evans (2010) discusses some of these criticisms, explaining that relativist and structuralist traditions in anthropological linguistics have conspired to stress the "incommensurability of different conceptual traditions and the unsatisfactory nature of translation equivalents across languages" (508). Gumperz and Levinson (1996), while conceding that such a Durkheimian methodological

stance is a reasonable one, propose the retort that "subscribers to this doctrine have mistaken methodological prescription for theory: the result of comparison between systems may be a robust finding of universal principles governing individual traits" (5). At the same time, comparison between systems is complicated by the fragmented nature of semantic approaches to representing meaning, and the lack of an agreed-upon metalanguage (Evans 2010:508-509). In Chapter 3 I discuss the problem of "cross-linguistic" comparison and review more literature on the topic.

One way to begin tackling the problems associated with domain-centered approaches is to think in terms of "etic" versus "emic" categories of classification. An etic approach, based on all logically possible categories regardless of how a particular language may group them (Evans 2010:509), helps resolve some of the issues of cross-linguistic comparability. An emic approach, which would outline categories from the perspective of a particular language (509), has the benefit of considering the meaning of terms within the context of their own language's paradigmatic structure. With the right kind of reflexive method to recognizing the limits of each, etic and emic approaches may be fruitfully combined.

The continued use of these semi-experimental tasks, which were developed several decades ago, does not sit well with some anthropologists because they are admittedly removed from other local cultural practices, often decontextualized, possibly misunderstood by participants, and subject to a host of other such problems of cultural validity. However, I believe that with the right culturally relevant adaptations and with supporting ethnographic work, these tasks can actually be quite revealing. For example, as I will show in Chapter 5, one task did seem to reveal an important difference in

language use within Juchitán—just not the one that was expected. Furthermore, I believe it is important for these data from cross-typological bilinguals, a population that has not been directly tested before, to be comparable to previous research on the topic of spatial language and cognition. For these reasons, I have chosen to employ these semi-experimental methods in this dissertation research.

Data collection was conducted in two phases. During the first phase, elicitation methods were used to collect data on the spatial speaking, gesturing, and reasoning practices of adult Juchitecos of varying degrees of bilingual proficiency. The method for assessing bilingual proficiency is addressed below. Within this phase, two sets of tasks were conducted. The first set of six tasks was conducted with 16 adults classified as JCH-Dominant, and 16 adults classified as Balanced Bilingual. These tasks and the results of this study are the topic of Chapter 2. The second set of two tasks was conducted with 16 Balanced Bilinguals, 14 JCH-dominant, 16 Spanish-Dominant, and 2 Spanish Monolingual participants. These tasks and the results of this study are the topic of Chapter 3. Some of these tasks were also conducted with children, but in a less systematic way due to the small number of young children who are proficient in JCH.

The second phase of this project consisted of collecting data through the use of microethnographic and ethnographic methods. These are understood to include participant observation and traditional note taking, as well as video recording of natural interaction. One corpus of such ethnographic data, from which many examples are provided in Chapter 4, focuses on adult talk and interaction, and serves as a baseline against which to compare elicited samples of adult speech and gesture. Another

ethnographic corpus consists of data collected among the four households with small

children who are the primary focus of Chapter 5 of this dissertation.

1.11.1 Assessing bilingual proficiency

Adult participants in this study were categorized as JCH-dominant (JD), Balanced

Bilingual (BB), Spanish-Dominant (SD), or Spanish Monolingual (SM). Given the

characteristics of the language contact situation in Juchitán, discussed above, there are

several assumptions that can be made about these groups: all JD and BB participants

were native JCH speakers; the two groups differed only in their command of Spanish. All

SD participants were native Juchitecos who had grown up around JCH speakers, but did

not speak it. All SM participants were not native to Juchitán and therefore had no

knowledge of JCH.

These categories emerged from data collected through a Language Use Interview,

conducted with each participant. This was a qualitative, holistic interview that afforded

the following measures of language proficiency: 1) general data about schooling, work,

travel, and life history; 2) an open-ended conversation question given in each language;

3) tabulation of conversation partners with whom each language is habitually used; 4)

tabulation of conversational contexts in which each language is habitually used; 5) open-

ended questions about language attitudes and life histories with the two languages; 6)

self-evaluation of proficiency in each language on a scale from 1 to 5. The interview

questions as administered in both Spanish and JCH appear in full in the Appendix.

The interview was offered in either Spanish or JCH to all participants. All except

the participants who were later found to be Spanish Dominant or Spanish Monolingual

preferred to do the interview in JCH. Of these, two ultimately completed the interview in Spanish due to the unavailability of the research assistant. I conducted all Spanish language interviews, and also asked the Spanish language conversation question in all JCH interviews. These Spanish-language segments of the interview were judged for proficiency by the research assistant and me. JCH conversation did not need to be judged for grammaticality since all JCH speakers were native speakers.

The research assistant, Ana, was a woman in her early 20s from my neighborhood who would herself likely be considered a balanced bilingual. I originally began working with her on transcription of JCH recordings because she had some basic literacy in JCH through exposure at her evangelical church. She attended school through middle school, and was married with one child and a second on the way. She was young enough to be not very well known outside of our immediate neighborhood, but was easily identified by participants I introduced her to via both her mother's and father's families. She assisted me in developing all the questionnaire and instruction texts in Spanish and JCH that were used on the various tasks (included in full in the Appendix). She struggled at first with reading these texts fluidly in JCH, but quickly improved, and also became skilled at manipulating the audio and video equipment. It is safe to say this research would not have been possible without her.

Despite the many interview questions intended to reveal potential cultural differences among the various language proficiency groups, only the measure of formal education was indicative of language proficiency. Overall, most of the participants in the JCH-dominant group had no schooling whatsoever. Of those 16 participants, one completed only elementary school; one completed both elementary and middle school as

a child; and one completed elementary school as a child and middle school as an adult. In contrast, all but one of the Balanced Bilingual participants completed at least elementary school, and 6 completed high school.

A statistical analysis confirmed no significant differences in age or gender between the JD and BB groups. Both groups included participants who had traveled throughout Oaxaca and Mexico for work; both groups contained mostly Catholics with a smattering of evangelicals; in both groups participants reported speaking mostly JCH everywhere and to everyone except children. Clara, a balanced bilingual (BB7[9]), Norma, a JCH-dominant participant (JD16), and Dana, a Spanish-dominant participant (SD29), may serve as typical examples of participants from these each of these groups.

Clara was born in 1968 at her parents' home in central Juchitán, where she still resides today. She has two teenage children and also cared for her parents and her elderly grandfather who lives across the street. She is divorced, and as such, tends to have a freer lifestyle than other women her age. Her primary job is selling beer outside parties and running an informal cantina in her grandfather's yard. She also embroiders _huipiles_, the colorful blouses women wear to parties. Before she divorced and started selling beer, sewing and embroidery were her main sources of income. She hasn't traveled for work, but has siblings in other parts of Oaxaca whom she has visited, and she traveled regularly to Mexico City to accompany her father to medical appointments. She is the oldest participant in my sample, and indeed, the oldest woman I know of in Juchitán, who completed high school. Her father, Ta Lalo el Bondadoso, was a well-known poet and

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[9] For the purposes of the quantitative analyses, participants were anonymized by assigning them a code indicating their language group and participant number.

musician who ran with an intellectual crowd and he encouraged all his children to study.

Thus, although she is known in the neighborhood as a bit of a wild woman, she is also

known for her intelligence and education. When she mentions a possible romance with a

biólogo ('biologist') who is passing through town, her friends affectionately tease her for

having such fancy vocabulary for a whore.

The story of how Clara learned Spanish is typical for those who attended school.

As she discusses in the transcript below, she had spoken only JCH at home until

attending school. She claims that by the time she was in fourth grade she was able to get

by in only Spanish, though many of the children still didn't understand what the teacher

was saying and had to be told in Zapotec. The transcript also reveals some ways in which

Clara is not typical. She is able to read and write in JCH and has attended a course in JCH

literacy. This is especially rare for a Catholic. Also, she claims to prefer speaking Spanish

over JCH because it is "faster" and harder to mess up. Very few older participants

claimed to prefer Spanish to JCH, with most lauding the beauty of JCH and the pride they

felt when speaking it. Note that in Line 4, Clara switches into Spanish, likely for my

benefit; this would not have occurred in a regular conversation between Clara and Ana[10],

the research assistant and Clara's neighbor.

Transcript 1.3: Excerpt from Clara's Language Use Interview (May 2012).

1.	Ana	¿Pa dxi bi-ziid-u' gu-ca-lu' ne gu-nda-lu'
		what day COMPL-learn-2SG POT-write-2SG and COMPL-write-2SG
		didxa-stiá?
		word-zapotec
		When did you learn to read and write in Spanish?

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[10] "Ana" is the real name of my research assistant, Ana Luisa Ruiz Regalado, whom I would like to acknowledge by name for her invaluable role this research.

Transcript 1.3: Excerpt from Clara's Language Use Interview (May 2012), continued.

2.	Clara	de	dxi	ma	u-za-yá'		primaria	xa
		from	day	COMPL	POT-walk-1SG		primary.school	EMPH

Since the day I went to elementary school

3.　　segundu,　　tercer　　xa　ora ca ma　r-anda
　　　second.grade third.grade EMPH time DET COMPL HAB-be.able
　　　then secondary, high school, at that point I could do it

4.　　sí ya no el español namás
　　　yes not anymore, just Spanish

5.　　ya más grande pue
　　　when I was older

6.　　como de, andaba yo ya en cuarto año ya
　　　like since, I was already in fourth grade

7.　　ya este, los maestro pues xxx ya nos enseñaban
　　　and um, the teachers well then they taught us

8.　　hablar xx en español
　　　to speak in Spanish

9.　　osea ellos hablaban el español pero casi la mayoría no les entendía
　　　or like, they spoke Spanish but almost the majority didn't understand them

10.　　y ya nos decían en zapoteco lo que quería decir
　　　and then they would tell us in Zapotec what they were trying to say

11.　　y así poco a poco ya íbamos aprendiendo el español
　　　and like that, little by little, we went learning Spanish

12.　　Ana　¿Z-anda　　gu-nda'-lu'　o gu-coo　　didxa-zá?
　　　　　　FUT-be.able POT-read-2SG or POT-write word-zapotec
　　　　　　Can you read or write Zapotec?

13.　　Clara　z-anda'
　　　　　　FUT-be.able.1SG
　　　　　　I can

14.　　Ana　¿Xi　modo bi-ziid-u'?
　　　　　　how way　COMPL-learn-2SG
　　　　　　How did you learn?

Transcript 1.3: Excerpt from Clara's Language Use Interview (May 2012), continued.

15.   Clara   u-yá'   ti   cursu la, de didxa-zá,   ra-cá
                COMPL-go.1SG INDF course FOC of word-zapotec LOC-DEIC
                bi-ziid-e'
                COMPL-learn-1SG
                I went to a course, a Zapotec one, I learned there

16.   purti   n-apa-ni   forma para i-cá-ni   la, ne para
                becaue STA-have-3I way   to   POT-write-3I FOC and to
                because it has a special way of writing it, and to…

17.   gadxe   forma i-ni'-u'-ni   la, ne gadxe   forma u-c-ou'-ni
                different way   POT-speak-2SG-3I FOC and different way   POT-write-3I
                a distinct way of speaking it, so you write it in a distinct way too

18.   Ana   ¿Xi idioma   ri-u-laadxi-lu'   jma ri-ni-u'?
                what language HAB-like-liver-2SG more HAB-speak-2SG
                Which language do you prefer speaking?

19.   Clara   este: didxa-stiá   ca   xa
                HES   word-spanish DET EMPH
                um… well Spanish of course

20.   purti   mas, tobi la, jma na-gueenda-ni pue, jma este...
                because more one FOC more STA-fast-3I   DM   more HES
                because it's more, first because it's faster, it's more um…

21.   qui   su-ca-dy-o'   pues para i-ni-u'
                NEG FUT-halt-NEG-2SG DM   to   POT-speak-2SG
                you're not going to trip up when speaking

22.   za-ni-u'   j-neza   pues, si-ca
                FUT-speak-2SG POSS-road DM   like-DET
                you will speak nicely, like…

Dana is a woman in her early 40's from the northern part of the city. Although her parents both speak JCH, she and her siblings were all raised as Spanish speakers, and do not speak JCH. She understands JCH very well, and says she sometimes ventures to speak it when alone with her husband, who is a balanced bilingual from the central part

of the city. However, she is shy to speak it in public or even with her husband's family.

Dana and her husband both have masters' degrees and are instructors at the local college.

They are the most highly educated of the participants in this study, and among the

wealthiest. Dana is also among the oldest generation of Juchitecos to be raised speaking

only Spanish at home. They live just north of the center of town on a purchased property

with a traditional tile-roofed house that they remodeled to have a modern, indoor kitchen

and bathroom, while retaining the exterior look of a traditional Juchitán house. Dana gets

along well with her husband's very large family, but she stands out among the women for

her way of dressing. She wears trendy, urban clothing, full makeup and jewelry, and she

colors and perms her hair. In Juchitán, this style of dress is typical for younger women

when attending parties, but Dana is one of the few who goes to such lengths on a daily

basis. Dana says she wishes her parents had taught her JCH, but does not wax as

nostalgic as some participants did; she does not think her children would have benefitted

from learning it. She does participate in other local institutions, however, attending

parties and political meetings.

Norma is a widow who was born around 1955, she thinks. She lives on the

property that belonged to her parents but has since built a new house. As a child and

young woman she worked making and selling tortillas, and never attended any school.

Her husband made fireworks for a living and when he passed away she took over that

business. The story she tells of this process is quite remarkable because she had to learn

from scratch all his recipes, which consisted of complicated lists of chemicals. She says

the recipes were written in notebooks, which she was unable to read, so her children read

them to her and she memorized each one. Then, she would travel to Tapachula on the

Guatemalan border to buy chemicals, reciting the names and quantities from memory.

She says that before her husband died she had never been out of Juchitán, but she

managed to ride the bus to Tapachula by getting help from kind strangers along the way

and gesturing until they understood each other.

Norma claims to have picked up a small amount of Spanish from watching

television as a young woman. But she is atypical for her generation for marrying

someone from outside of Juchitán. As she tells it in the transcript below, she was forced

to learn Spanish through "scary" interactions with her in-laws, who were from the town

of Petapa. Her husband would act as a translator or feed her responses to repeat, and that,

she says, is how she learned Spanish.

Transcript 1.4: Excerpt from Norma's Language Use Interview (May 2012).

1. Ana   ¿Xi modo bi-ziid-u-ni?
           what way   COMPL-learn-2SG-3I
           How did you learn it ((Spanish))?

2. Norma pues stale   trabaju xa
           DM   much work   EMPH
           oh it was a lot of work!

3.   para bi-ziid-e'-ni
           to   COMPL-learn-1SG-3I
           to learn it

4.   ne como xheela'   cadi di' de ra-rí   laa n-apa-be
           and since POSS.spouse NED NEG from LOC-PROX PRON STA-have-3H
           familia sti-be   de   Petapa
           family POSS-3H from NAME
           and since my husband isn't from here, his family is from Petapa

5.   de   Petapa, puru didxa-stiá   r-iní'   ca binni ca
           from NAME   pure word-spanish HAB-speak PL people DET
           from Petapa, those people speak only Spanish

Transcript 1.4: Excerpt from Norma's Language Use Interview (May 2012), continued.

6.   Norma   pues ri-dxib-e'   ora   ma   z-eeda ca binni que z-eda
                    DM   HAB-scare-1SG when COMPL Z-come PL people DET Z-come
                    g-uni   visitar-ca naa la,
                    POT-do visit-PL   1SG FOC
                    well I would get scared when those people came to visit me

7.   ma   ca, pues laa-be   nga ma   ca-ni'-be,   ma
                  COMPL DET DM   PRON-3H FOC COMPL CONT-speak-3H COMPL
                  ca-ni'-ne-be   ca binni que la,
                  CONT-speak-3H PL people DET FOC
                  he was the one who would talk, he would talk to those people

8.   tonce naa la, pues, ca   xa,   ma   ca-ni-e'-ni-a'
                  then 1SG FOC DM   DET EMPH COMPL CONT-speak-1SG-with-1SG
                  laa-be   didxa-zá
                  PRON-3H word-zapotec
                  and so I, well, like that, then I would be talking to him in Zapotec

9.   ga-bi-be   naa xxx, ma   ga-bi-be   naa la, gu-ní'
                  COMPL-say-3H 1SG   COMPL COMPL-say-3H 1SG FOC COMPL-speak
                  la, ora   (xxx)
                  FOC when
                  he would say to me(xxx), then he would say to me, talk! when

10.   ora i-ní'   ca ja'a binni que didxa-stiá   que la,
               when POT-speak PL HES people DET word-spanish DET FOC
               when those, um, those people would speak Spanish

11.   ora que ga-bi-be   naa, za-ca-rí   bi-ni   contestar laa
               time DET COMPL-say-3H 1SG like-DET-PROX COMPL-do answer   PRON
               at that time he would say to me, answer them like this

12.   ora que nga ma   i-ni-é'
               time DET FOC COMPL POT-speak-1SG
               and only then would I speak

13.   ma   ca binni neza suegra   ca nga bi-siidi-ca
               COMPL DET people road mother.in.law DET FOC COMPL-CAUS.learn-PL
                naa i-ni-é'   didxa-stiá   vayá
               1SG POT-speak-1SG word-spanish DM
               so my mother-in-law's people are the ones who taught me Spanish

Transcript 1.4: Excerpt from Norma's Language Use Interview (May 2012), continued.

14. peru que ri-ni-e-dy-a'   cadi j-neza   pue la pues
     but NEG HAB-speak-1SG-NEG-1SG NEG POSS-road DM FOC DM
     but I still don't speak very well

15. que-di, nga ma   nga didxa-zá   ca
     NEG-NEG FOC COMPL FOC word-zapotec DET
     no, I better just stick to Zapotec

1.11.2 Pilot study and task development

A pilot study for this dissertation was based on a small corpus of audio and video

data gathered in Juchitán in December 2010 to January 2011[11]. This pilot study sought to

test the suitability for use in Juchitán of various elicitation procedures used by scholars

who have worked on the relation between spatial language and cognition. Many of these

techniques and materials were developed in the 1980s and 1990s by members of the

Cognitive Anthropology Research Group (CARG) at the Max Planck Institute for

Psycholinguistics and distributed informally among that group. The development of the

tasks was often a collective effort in this group regardless of which individual ended up

publishing the results of a given task. Thus, I cite particular publications below, but

acknowledge that many scholars contributed to developing early versions of these tasks,

including: Penelope Brown, Eve Danziger, Lourdes de León, Suzanne Gaskins, John

Haviland, Stephen Levinson, John Lucy, Eric Pederson, Gunter Senft, and David Wilkins.

Detailed descriptions of many CARG tasks are collected in Pederson et al. (1998), and in

Levinson and Wilkins (2006). The MesoSpace Project has updated some of these original

tasks, and created several more, which they have released in a manual for scholars

interested in utilizing the tasks (Bohnemeyer and Pérez Báez 2008a). Their tasks were adapted specifically for use in Mesoamerican communities with the aim of finding areal features of spatial grammar.

In my pilot study, I tested nearly all of the original CARG and MesoSpace tasks with two adult participants and one child. My experience conducting these tasks allowed me to narrow the number of tasks I would conduct for my dissertation research. This experience also led to the creation of a novel task, the "Toppling Blocks" task, which my co-authors and I used in the post-pilot project. In what follows, I provide a description of the "semi-experimental tasks" referred to throughout this Introduction, and report the most relevant insights from the pilot project in developing the tasks for wider use in Juchitán.

The data for the pilot study came primarily from Javier Senior, a 32-year-old male who reported being equally comfortable speaking JCH and Spanish, and Maite Pilar, his 28-year-old wife. She is also bilingual but did not begin learning Spanish until the age of fourteen. I had originally anticipated testing each participant in only one language, and so Javier completed all tasks in JCH, while Maite Pilar completed all tasks in Spanish. Javier Junior, the nine-year-old son of Javier and Maite Pilar, allowed me to assess the suitability of these tasks for use with children. He completed all tasks in JCH. He is a fluent bilingual who learned JCH first and Spanish after starting school. Although I tested over a dozen of these elicitation tasks with Javier and Maite Pilar, I will report on the results of only seven, listed in Table 1.8 with key sources.

Table 1.7: Elicitation tasks used in the pilot study, and their sources.

Task	Source
Body part and object part drawings	Bohnemeyer and Pérez Báez 2008a
Topological Relations Picture Series	Bowerman and Pederson 1992
Route Matching	Weissenborn 1986, Senft 2000
Animals in a Row	Pederson et al. 1998
Picture Matching	Pederson et al. 1998
Route descriptions	Haviland 2005, Le Guen 2011
Living space descriptions	Linde and Labov 1975, McNeill 1992
Tweety Cartoon	Chafe 1980, McNeill 1992

For the body part and object part drawings task, the participant used crayons to color in the "parts" of humans, animals, plants and inanimate objects in the 21 different line drawings provided in the manual of the MesoSpace Project (Bohnemeyer 2007). While coloring, the participant was asked to name each part in the task language, and I recorded this label in writing on the coloring sheet. The purpose of this task is to elicit term for parts of humans, animals, and inanimate objects.

The Topological Relations Picture Series (TRPS) consists of 71 line drawings representing various conceptually moveable figures in relationship to some ground. The task is designed to elicit constructions expressing static location—basic answers to the question "Where is the X?" where "X" is the figure object. For this task, I used full-page printed copies of the original 71 pictures and elicited answers by pointing to the figure object and asking in JCH, "*Paraa nuuni?*" or in Spanish, "*¿Dónde está?*" meaning "Where is it?" This task was audio-recorded and transcribed. Although these two tasks elicited important information about JCH partonomies and how the language expresses static location, they were not used in the final dissertation project.

In the original Animals-in-a-Row task, the researcher lines up three toy farm animals, head-to-tail and all facing the same direction on a table. The participant is told to

memorize the configuration, and then, after a lull of about 1 minute, to turn 180 degrees to another table where he is asked to recreate the configuration from the first table. The participant has to select the correct three animals out of four choices, the correct order, and the "correct" orientation, which, of course, differs according to whether the participant relies on a relative or absolute frame of reference. In the pilot version of this task, I used two sets of four squishy ball animals—a cow, a pig, a sheep, and a chicken, pictured below—selected because they are laterally symmetrical. Because these animals were successful in the pilot study, they were also used in the main study. However, other aspects of this task were altered after the pilot study. First, the rotation was changed from 180 degrees to 90 degrees. Second, the three animals were arranged in a triangle instead of a line. These two modifications allowed for three possible responses instead of two: relative, absolute, and object-centered. This new version of the task, developed in collaboration with my co-authors, has been dubbed "Animals-in-a-Field." It is described in more detail in Chapter 2.

Figure 1.12: Laterally symmetrical toy animals.

The route description task differs from the other tasks conducted in the significant sense that it invokes a larger scale of space rather than "tabletop" space. Also, because it elicits longer narratives, the task illuminates how different categories of spatial language are used together. For the pilot study, I asked Maite Pilar to act as my research assistant

and to conduct the elicitation with Javier Senior in JCH. I instructed her to elicit a description of an interior space, of a walking route within Juchitán, and of a driving route from Juchitán to some other town or city. This interaction was recorded with audio and video, then transcribed and translated with Maite Pilar's help. This task served as the basis for what later became the Geographical Scale Space Task. This later version of the task, partially inspired by Le Guen 2011, elicited two descriptions of static location, a specific walking route, and a specific driving route. Furthermore, this task was more meticulously engineered to specify the direction the participant should face so that the use of the relative and absolute frames of reference could be easily disambiguated. A preliminary discussion of the results of the Geological Scale Space Task appear in Chapter 2.

In the Tweety Cartoon task, the participant watches a short cartoon and then recounts it from memory on camera. Javier watched the cartoon originally used by McNeill (1992), the "Canary Row" episode of *Tweety and Sylvester*, and then recounted it in JCH for Maite Pilar. The cartoon features a determined cat whose inventive attempts at capturing an innocent pet parakeet from his cage are repeatedly thwarted by his own lack of foresight. Descriptions of the antics of these characters tend to yield speech and gesture useful for analyses of motion conceptualization and encoding. However, I found the results from this pilot task to be dissatisfying. The use of two-dimensional images shown to participants on a screen made it difficult to determine if particular frames of reference were also being used in the conceptualization of motion events. As a result, my co-authors and I sought to develop a task that would elicit motion event descriptions, but also allow us to see how participants conceptualized the position of these motion events

in space. Thus, we developed the "Toppling Blocks Task," which does just that. In this task, which is described in more detail in Chapter 2, participants viewed a motion event constructed out of little wooden blocks. Then, after a 90-degree rotation, they described what they had seen. This allowed us to see, through the direction of their gesturing, whether they conceptualized the motion event in terms of an egocentric or allocentric frame of reference. In addition to giving us this information, the task successfully elicited a plethora of JCH and Spanish motion verbs and motion-related grammatical constructions. Furthermore, this task contrasts nicely with the Geographical Scale Space Task on the dimension of scale by testing participants' conceptualization of "table-top" space.

The original MPI picture matching task, debuted in Pederson et al. (1998), and used by all the authors in Levinson and Wilkins (2006), consists of photographs of a toy man and a toy tree arranged in various "standing" and "facing" relationships—the former having to do with the placement of the man relative to the tree, and the latter with the direction the man is facing (Levinson and Wilkins 2006:545) (Figure 1.13). Two participants, visually obscured from one another, have sets of identical photographs, and the "director" must describe each photo such that the "matcher" can pick it out. MesoSpace has created an updated version of this game with photographs depicting a ball and chair (Figure 1.14). Those researchers argue that the Ball and Chair game improves upon the Man and Tree game because it is less likely to suppress intrinsic choices, forces disambiguation techniques on more occasions, and uses pictures of real objects instead of toys to increase consistency in the encoding of scale.

In my pilot study, I piloted the Ball and Chair version of the task, as well as several other versions using new stimuli developed independently by John Haviland for use with home-signers of Zinacantán. These stimuli required speakers to make fine distinctions among objects such as different kinds of birds, cups, or tools. Additionally, I developed two new sets of picture matching stimuli. The first set featured a doll and a wooden block, and was designed with the intention of featuring both a human and an inanimate object, much like the Man and Tree game, but in updated, photographic form (Figure 1.15). The second set featured a saintly Juchiteca volunteer who posed for photographing in various well-known locations around Juchitán (Figure 1.16). With this set of stimuli, I hoped to elicit more naturalistic locative descriptions by using familiar places and scenes.

As it turned out, however, the new stimuli were no more useful than the Ball and Chair stimuli, so I opted to run only the latter in the dissertation project for ease of comparison with the MesoSpace group's findings. The Haviland stimuli and doll stimuli elicited results very similar to the Ball and Chair stimuli, and the Juchitán stimuli did not actually elicit local descriptions of places. I conducted the Ball and Chair task with no modifications in the original MesoSpace design, except for the use of a population divided according to levels of bilingualism. The results of this task are the topic of Chapter 3 of this dissertation.
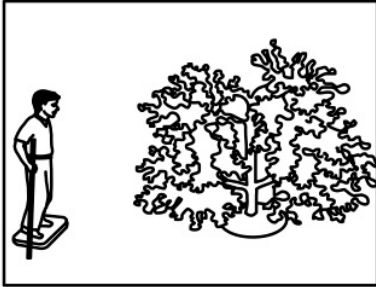
Figure 1.13: A sample image from the Man and Tree stimulus collection (Pederson et al. 1998).

Figure 1.14: A sample image from the Ball and Chair stimulus collection (Bohnemeyer and Pérez Báez 2008a).

Figure 1.15: A sample photo from a novel stimulus set.

Figure 1.16: A sample photo from a novel stimulus set featuring places in Juchitán.

The Route Matching Task is a "director/matcher" task like the Picture Matching task, and the setup is the same. Two participants sit side-by-side at identical tables with a sheet hung between them to obscure visibility. Instead of sets of pictures, however, each participant has an identical wooden board with "structures" on it, meant to represent a model town or landscape (Figure 1.17). The models are constructed to be symmetrical around the central axis. My models were constructed of wooden blocks glued to the board to create the various recommended elements such as arches, a staircase, obstacles, and a corral-like enclosure. The researcher marks a path on the Director's board using a string. The Matcher sees no path marked on her board. The Director must describe the route to the Matcher, who is equipped with a little plastic doll, and will "walk" the doll
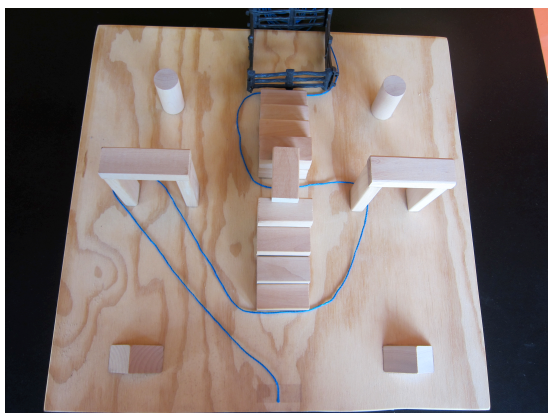
Figure 1.17: One of the wooden "town" models used in the Route Matching Task. Only the Director sees a route marked with string.

along the path as she understands it. The purpose of the task is to elicit basic motion verbs—especially deictic motion verbs—and route descriptions in a communicative context. I was also interested in comparing the results of this task with those of the Geographical Scale space task to understand how they might contrast given the difference in the scale of space in each task. In the pilot study, I determined the task to be too difficult to conduct with 4-6 year old children, the age range I was interested in for the

developmental component of the project. Therefore, I conducted this task with adults

only— the same set of participants who completed the Ball and Chair task, as part of the

same session. The results of the Route Matching Task are forthcoming and are not

reported in this dissertation.

1.11.3 Pilot study results

At the time I conducted the pilot study in 2010, Gabriela Pérez Báez had

completed the MesoSpace tasks in La Ventosa. La Ventosa is a town just 16 km northeast

of Juchitán, where JCH is also spoken. Pérez Báez graciously shared her as-yet-

unpublished results with me, which I expected to match the results from Juchitán. Even

with my very small sample size, however, it became apparent that my main participant

was an outlier by the standards set for JCH in La Ventosa.

Pérez Báez's sample included 19 JCH speakers from La Ventosa. For the

Animals-in-a-Row task, She reported that the dominant response type for 16 out of 19

participants was consistent with absolute FoRs, while the remaining 3 respondents relied

on a unidirectional strategy in which all animals were lined up facing the same direction

at every trial, independently of the direction in which the animals were presented. She

observed no relative responses.

In contrast, my participants showed a mixture of FoR strategies on this task.

Javier Senior completed 6 of 6 trials according to a relative logic, 9-year-old Javier Junior

completed 6 of 6 trials according to an absolute logic, and Maite Pilar completed 4 of 6

trials according to an absolute logic with 2 trials not interpretable due to incorrect animal

choice or ordering. Indeed, while Pérez Báez's results showed an overwhelming

preference among residents of La Ventosa for the absolute frame of reference on all tasks, my tasks as conducted with Javier were demonstrating nothing so consistent. In order to investigate further the extent to which Javier might rely on a relative frame of reference, I conducted a close linguistic and gesture analysis of his narrative on the Route Descriptions task. This analysis, summarized below, revealed that Javier relied on a mixture of strategies.

Javier's speech included tokens of lexical items typically taken as representative of three different frames of reference. He used the term 'go down,' meaning 'go south,' with an allocentrically anchored reading on at least one occasion:

(14) ma **chi-gui-ete-nu**   che-ri-cá'
      now PRES.go-POT-descend-1PL.INCL DIST-LOC-DET
      now we are going to go down/south from the other side

He used body part terms, or "meronyms," to describe relationships to landmarks, using an object-centered FoR strategy:

(15) Ø-qui'ba-nu   **ruaa carretera** ra Tecnológico ca   la
      POT-ascend-1PL.INCL mouth highway   LOC NAME   DET FOC
      we go up/north to the edge of the highway to the Technological school

And he used a loan term from Spanish[12] in order to employ the relative FoR:

(16) mjm' Ø-qui'ba-nu   carretera ca   la
      yes   POT-ascend-1PL.INCL   highway DET FOC
      mhm we go up/north the highway,

      gui-cá-nu   **mano izquierda**
      POT-grab-1PL.INCL hand left
      we take a left

---

[12] JCH does have a native word for 'left': *biga'*.

Another important feature of Javier's route descriptions was the large number of deictic speech elements employed. A tally of deictic tokens in his 1,530-word narrative revealed that 8% of the words in Javier's route descriptions were deictics, including locational deictics and deictic verbs of motion[13]. The deictic terms are vital for understanding Javier's route descriptions because they anchor the path of motion at various points along the way. In (14) for example, *chericá*' 'other side' anchors the source of the path at a particular point in the northern part of town. Furthermore, the use of this term establishes the origo of the speech situation (Hanks 1990) as not-*chericá*', i.e. as on the south side of town. The verb, then, which incorporates a term for a cardinal direction, describes the direction of the path—from that particular point in the north. The full verb form *chiguietenu* 'we are going to go down' does encode the absolute direction of the path; however, when Javier used it in conjunction with a deictic term, he was able to specify not only the path's source, but also its direction relative to himself, the speaker. In fact, it is worth noting that in (15) and (16) as well, Javier does not rely on only one FoR. He combines both the intrinsic and relative strategies with a verb invoking the absolute FoR: *qui'banu* 'we go up,' i.e. north.

Javier's gestures also reveal interesting shifts in frame of reference use and perspective. In the following example, he describes the route he and his Coca-Cola colleagues travel to deliver beverages in Guamuchil, a town about 50 kilometers from Juchitán. He names some of the landmarks they pass as they leave the city:

---

[13] There were also 16 bound deictic auxiliaries used, but these were excluded because I do not have a count of total morphemes in the corpus.

(17) Ø-tidi-du ra pantión la ra cárcel la
POT-pass-1PL.EXCL LOC cemetery FOC LOC jail FOC
we pass where the cemetery is, where the jail is,

As Javier names each landmark he locates it in his gesture space. First, he names the cemetery and turns his gaze up and to his right, pointing in the same direction with a flattened left palm (Figure 1.18a). Then, he names the jail, and, pulling his left elbow back toward his body, cups his hand and "places" the jail in that space (Figure 18b).

(a) (b) (c)
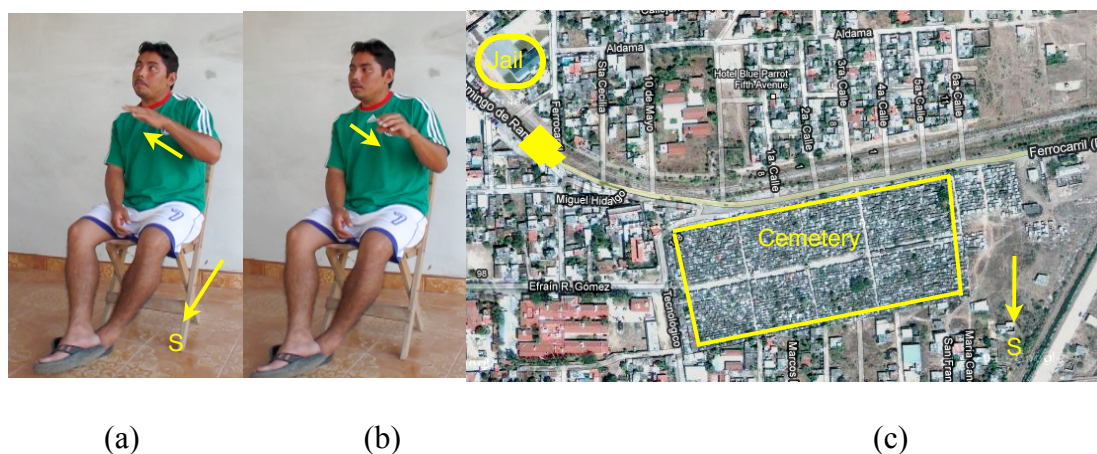
Figure 1.18: Comparison of Javier Senior's gestures with a map of the route he is describing (December 2010).

As the map in Figure 1.18c shows, the main highway out of Juchitán curves slightly southeast out of the city, passing to the right of the jail, and then straightens out to head east, to the left of the cemetery. Given that Javier is facing south in the video, his gestures do not correspond to the absolute locations of these landmarks. Instead, it is clear that Javier is imagining himself transposed to the narrative space (Haviland 1998) and facing in the direction he would be if actually travelling out of Juchitán toward Guamuchil on the highway. Based on a rough approximation of the angle of his gestures, he is likely imagining himself in the area of the yellow "truck" in Figure 1.18c. From that position,

the cemetery would be ahead and to his right and the jail would be slightly behind and to his left.

In the very next utterance, however, Javier shifts perspective. He explains how they must go around the little curve in the highway shown in Figure 1.18c:

(18) ra-cá   ma   ti   curva huiini' que la   ma   zi-uu-du
      LOC-DET COMPL INDF curve small   DET FOC COMPL z-exit-1PL.EXCL
      then there on that little curve, that's where we head out

His corresponding gesture, represented in Figures 1.19a-e, takes the location of speaking as the anchor and traces the absolute curvature of the road. This is a use of the direct frame of reference with a pointing gesture.

(a)   (b)   (c)   (d)   (e)

Figure 1.19: Javier Senior, *"Little curve"* (December 2010).

With a twist of his left hand he shows the curve of the road from the north toward the east (1.19a). In 1.19b and 19c he extends his arm fully, toward the east and slightly north, inscribing the curvature of the road onto the absolute coordinates of the place of speaking. In 1.19d and 1.19e he moves his arm upward, likely to represent the indefinite extension of the road.

The data from Javier's route description task suggested several important topics for consideration in the dissertation project. Most saliently, the above example suggests

that multiple frames of reference are readily available to Javier and encoded in both speech and gesture. It also raises the interesting question of what triggers a switch in frame of reference use. At the time, I hypothesized that this mixture of linguistic and conceptual resources was related to Javier's bilingualism, and that bilingual speakers might draw on conceptual and grammatical resources from both of their languages. I hypothesized that some of these "mixed" strategies might become conventionalized in a bilingual community, such as the use of Spanish loan terms for "left" and "right" even when a JCH term exists; and that some of these "mixed" strategies would appear as nonce tokens, representing individual speaker creativity.

Another important theme raised by Javier's data is that of the relation of spatial talk to habitual spatial action. Javier's description of the route to Guamuchil was related crucially to his experience traversing that route by truck during the particular activity of delivering soda. His narrative begins at the Coca-Cola plant, includes information about pick-up and drop-off points, and implies a limited timeframe and circular route. On this basis, I hypothesized that the relationship of spatial language to spatial action would be relevant for understanding acquisition of spatial grammar because children's bodily experiences may influence how they learn to conceptualize space.

CHAPTER 2:

Variability in spatial reasoning and gesturing among bilinguals in Juchitán[1]

2.1 Introduction

In recent decades the domain of space has emerged as a critical proving ground for claims about one brand of linguistic relativity, which posits that an individual's habitual use of a particular language has a causal influence on other, non-linguistic thought processes. Much of the debate has centered on spatial frames of reference (FoR) and their use in everyday language and reasoning. FoRs are coordinate systems for relating objects separated in space: egocentric FoRs locate objects with reference to a speech-situation participant's own bodily coordinates (e.g., right, left, front, back); allocentric FoRs are not observer based, instead locating objects with reference to another entity or landmark, or to a salient asymmetry such as a cardinal direction, outside of the speech situation. A surprising finding—and the subject of ongoing controversy—is (1) that language communities exhibit preferences for different FoRs, particularly in how they treat small-scale or "table-top space" and (2) that these linguistic preferences align with speakers' performance on non-linguistic spatial tasks (Majid et al. 2004). For instance, speakers of Dutch and Japanese tend to adopt an egocentric strategy on linguistic and non-linguistic tasks, while speakers of Tseltal and Longgu tend to adopt an

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1 This chapter amalgamates work presented previously in several different venues, all co-authored with Kensy Cooperrider and Tyler Marghetis. Some segments of this Chapter appeared as "Spatial reasoning in bilingual Mexico: Delimiting the influence of language." Proceedings of the Annual Conference of the Cognitive Science Society, 2014. Other segments were presented at Conceptual Structure, Discourse, and Language (CSDL) conference at University of California, Santa Barbara in 2014 and the Linguistic Society of America Annual Meeting in 2016.

allocentric strategy (e.g. Levinson & Wilkins, 2006).

But can such findings be taken as evidence of linguistic relativity? Critics have suggested they cannot (Li & Gleitman 2002). The communities studied have differed in their linguistic code, certainly, but also in numerous extra-linguistic factors, such as a geophysical setting, a built environment, and a host of cultural practices. The "language you speak" is thus only one part of a rich web of influences that might drive a speaker to rely on one spatial FoR over another.

The study presented in this chapter was designed to untangle this web of influences by testing bilingual speakers of two languages that ostensibly differ in how they encode space. Note that much of the previous research on spatial language and cognition has also been conducted with bilinguals, but this bilingualism was not systematically taken into account. The data presented here come from the urban, bilingual community of speakers of Spanish (Indo-European) and Juchitán Zapotec (Otomanguean), from Juchitán, Oaxaca, Mexico. Like other Mesoamerican languages, Juchitán Zapotec has been characterized as "allocentric" (Pérez Báez 2011), while Spanish is expected to pattern with "egocentric" European languages. Because individuals within Juchitán differ in their levels of bilingualism yet share a common culture and environment, this study was able to probe the relations between spatial language and cognition, decoupled from other extra-linguistic factors.

This study was conducted by a multidisciplinary group of scholars with the aim of contributing to an emerging body of literature that straddles psychology, cognitive science, linguistics, and anthropology. We designed a scientifically rigorous study so that our results might be compared to other results, conducted in both lab and field settings. In

the interest of comparability, we use familiar terminology and make use of some classic methodologies. However, we also aim to bring a critical eye to some of the categories and methods that have been used in the study of spatial language and cognition in the psycholinguistic tradition. As our results will demonstrate, the categories we rely on are inadequate for describing some aspects of spatial reasoning and speaking practices common in Juchitán.

We began by considering several general patterns that might emerge in this bilingual population. First, we might see a *language-specific pattern*: depending on the language being used in a particular setting, bilinguals might flexibly adopt a corresponding spatial reasoning strategy. This pattern would be consistent with the idea that speakers infer appropriate behavior from the language being used (Li et al. 2011). Second, we might find a *language-dominance pattern*: bilinguals might adopt the spatial reasoning strategy characteristic of their dominant language, regardless of the language being used in the setting. This pattern would provide evidence of cross-linguistic semantic transfer, with one's dominant language determining the most salient semantic distinctions or relations. Third, a *patchwork pattern*: bilinguals might draw on both languages to build a mixed toolkit of conceptual distinctions, displaying similar spatial reasoning strategies across languages, regardless of the task language or their language dominance. Finally, a *targeted pattern*: an individual's competence with specific semantic distinctions in either language might have a targeted influence on tasks involving those distinctions. Whatever pattern emerges, it will help us delimit the possible influences that language may have on non-linguistic spatial reasoning.

2.2 Methods

All participants completed a battery of six tasks, described in detail below. Sessions of these six tasks were conducted at the homes of the participants or at the local home of author MM, in the semi-outdoor, covered patio that is a feature of almost all houses in Juchitán. Juchitán Zapotec-Dominant participants completed all tasks once in Juchitán Zapotec (JCH). Balanced Bilingual participants completed all tasks twice—once in Spanish, once in JCH—in sessions separated by at least 7 weeks, with the order of the language in which the task was conducted ("language of instruction") counterbalanced. JCH sessions were administered in JCH by a native-speaking assistant; Spanish sessions were administered in Spanish by author McComsey, who has native-like proficiency in Spanish. Sessions were video- and audio-recorded. Participants were compensated with a small gift.

2.2.1 Participants

Potential participants were assessed for bilingual proficiency using a language use interview, discussed in the Introduction of this dissertation. 16 JCH-Dominant (JD) and 16 Balanced Bilingual (BB) participants were selected for participation. All were native speakers of JCH and natives of Juchitán. The two groups did not differ significantly in number of women (*JD*: 14; *BB*: 10; $p = .22$, Fisher's Exact Test) or age ($M_{JD} = 44$, $M_{BB} = 38$, $t_{(30)} = 1.22$, $p = .23$).

2.2.2 Animals-in-a-Field

Animals-in-a-Field is a variation of the Animals-in-a-Row task, commonly used

as a measure of non-linguistic spatial reasoning (Pederson et al., 1998). The new version

differs in two respects: First, it is incrementally more complex, since complex tasks may

be better than simple tasks at tapping FoR preferences (Haun et al. 2011). Second, it uses

a 90º rather than 180º turn, and is thus able to distinguish two different possible

allocentric responses.
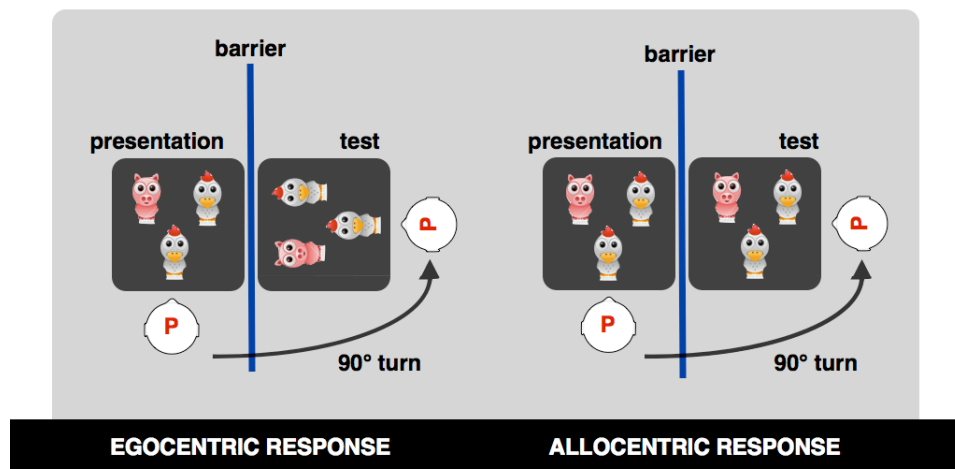
Figure 2.1: Animals-in-a-field procedure. Egocentric and allocentric responses are distinguished by orientation.

Materials consisted of two identical sets of laterally symmetrical toy animals (chicken,

sheep, cows, pigs). Two identical tables were arranged next to each other in the patio,

parallel to the house, separated visually by a hanging sheet (Figure 2.1). In the

presentation phase, the participant was presented with an array of three animals (two

same and one different) in the form of an equilateral triangle, with the base of the triangle

always parallel to the participant's own left-right axis and away from the participant. The

participant was instructed in the language of instruction to "remember how they are.[2]"

Then, following an engineered pause of approximately 30 seconds—attributed to camera

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[2] The instructions for all tasks described here, as read in the original Spanish and JCH, appear in full in the Appendix.

set-up—the participant was asked to move around the sheet to the recall table, thus

rotating 90º. In the recall phase, the participant was handed a bowl containing all eight

animals and asked to "make it again, the same." Each participant completed six trials.

There were two lists of stimuli, used in both a standard and a reversed order. List and list

direction were counterbalanced between subjects. BBs saw a different list on each

session.

2.2.3 Toppling Blocks Task: Watching and doing conditions

Toppling Blocks is a novel task designed to elicit speech and co-speech gesture in

the description of a motion event in tabletop-scale space. The elicited co-speech gesture

can be used as an index of conceptualization of the event as either egocentric or

allocentric. The elicited speech can be analyzed for the presence of spatial terms or

grammatical constructions integral to the expression of special relations in a given

language.

Materials included a set of toy wooden blocks. A table was set up in the patio,

parallel to the house, with a sheet hanging on one side of it. A chair was set up with its

back to the other side of the sheet (Figure 2.2). Each trial of the Toppling Blocks

consisted of a presentation phase followed by an explanation phase. At the start of the

presentation phase, participants would view an array of blocks laid out on the table from

a standing position on one side. In 'watching trials,' the experimenter would slowly

initiate the motion event by pushing or releasing a block. In 'doing trials', the

experimenter would show the participant how to initiate the motion event by nonverbally

demonstrating the action required. All motion events were designed to have a clear

directionality, such as the rolling of a cylinder along a path or a "domino effect"

proceeding in a clear, linear direction (Figure 2.3). After the event, the array was covered

by a cloth and there was an engineered delay of approximately thirty seconds before the

explanation phase. For the explanation phase, participants moved to the other side of the

opaque barrier, rotating 90 degrees in the process. They were seated and prompted to

explain what they had just seen. Participants' explanations were given to an

experimenter, who was always seated to the participant's right side at a 45-degree angle.

Explanations in the JCH sessions were given to a research assistant who was a native

speaker of JCH; explanations in the Spanish sessions were given to MM. Both the

presentation and explanation phases of the session were videotaped.

Each participant participated in a total of twelve trials, separated into two

segments of six trials each. In the "watching" segment, the participant watched as the

experimenter initiated the motion event. In the "doing" segment, the participant initiated

the motion event based on a nonverbal demonstration by the experimenter. For all

participants, watching trials came before doing trials. Each participant was assigned an

axis of presentation— either the left-right or front-back axis— and all the motion events

unfolded on that axis. A participant would see six events that proceeded in one direction

(rightward or away) and six that proceeded in the other (leftward or toward), alternating

from one trial to the next. Axis of presentation was counterbalanced across participants,

and balanced bilinguals got the same axis of presentation in both sessions.
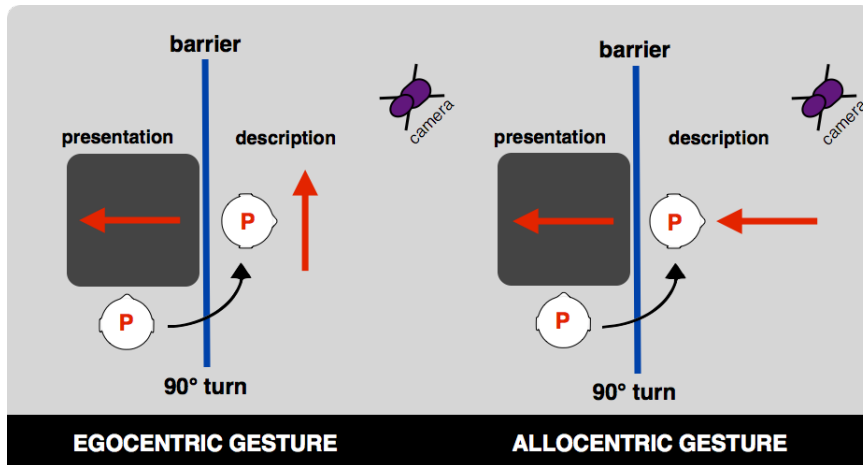
Figure 2.2: Toppling Blocks procedure. Egocentric and allocentric responses are distinguished by gesture direction.
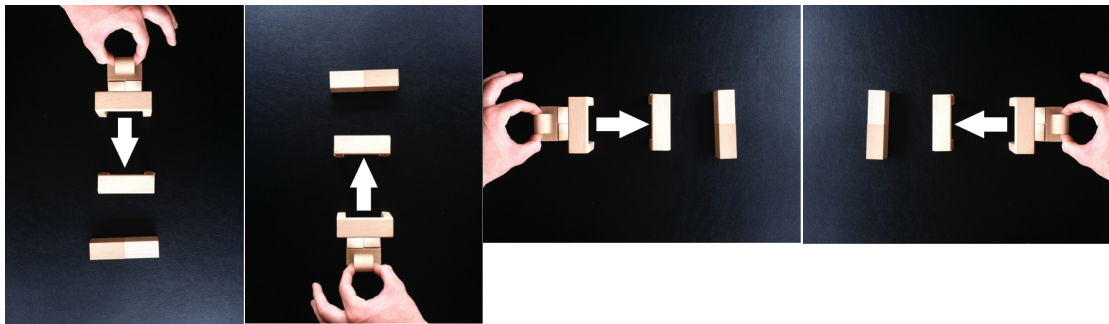
Figure 2.3: Toppling Blocks sample stimuli, demonstrating toward, away, right, and left directions.

Figure 2.4: A participant arranges toy animals in the Animals-in-a-field task.

Figure 2.5: A participant watches as a researcher initiates a motion event in the Toppling Blocks task.

2.2.4 Geographical Scale Task

In this task, participants were asked to describe familiar locations of places within Juchitán. The purpose of this task was to elicit speech and co-speech gesture about space at a larger, geographical scale for comparison with the "table-top scale" tasks above. Due to unexpected results on this task, only the speech data will be analyzed in this chapter. In Chapter 4 of this dissertation, I will discuss in more detail the interactional difficulty this task posed for participants.

This task was conducted away from the house in an open yard in order avoid close visual and/or conceptual interference with the house walls. The participant was seated in a chair facing either south or west, depending on the condition. The experimenter was seated in a chair to the participant's right, at a 45-degree angle. The

camera was positioned in front of the participant and to the left, forming a 45-degree

angle (Figure 2.6).
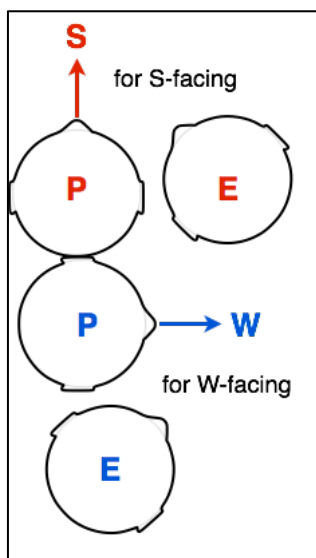
Figure 2.6: Set-up for Geographical Scale task. The Participant (P) faces either south or west, depending on the condition.

The experimenter asked a series of 5 questions in the language of instruction. The

first two questions prompted static locative responses, being in the format, "Where is X

with respect to Y," where Y was a location with no obvious front or back, such as a park

or gas station located on a corner. The next two questions asked the participant to

imagine walking and driving, respectively, from point X to point Y and to describe the

route. The final question required the interpretation of a gesture, appearing in the format,

"If you were at point X and walked *like this*, where would you end up?" While delivering

the prompt, the experimenter gestured by facing her body squarely east (south condition)

or south (west condition), placing her finger in front of her chest, and then sweeping her

finger directly outward away from her chest in a straight line. This gesture allowed the

participant to interpret the directionality either egocentrically or allocentrically. There

were two lists of stimuli and either a southward-facing or westward-facing condition for

the final question. List and facing direction were counterbalanced between subjects. BBs were presented with a different list and facing direction at each session.

2.2.5 Spatial Vocabulary Comprehension Task

At the end of each session, participants were tested for comprehension of different uses of two egocentric terms ('left,' 'right') and allocentric uses of four cardinal direction terms ('north,' 'south,' 'east,' 'west'). They were seated at a table, facing in a cardinal direction. A bowl was overturned on the table, surrounded by four wooden blocks at the four cardinal points (*near* targets). Another bowl was overturned on the floor three meters away, surrounded by four toy animals at the cardinal points (*far* targets) (Figures 2.7, 2.8, and 2.9). The interviewer administered a series of 12 critical questions (plus 5 filler questions) that required participants to identify a body part, animal, or block whose location was described with one of the six spatial terms (e.g. "Show me your left hand." "Touch the block that is to the north of the bowl on the table."). The questions were then repeated after a 180-degree rotation. For each rotation, the two egocentric terms were tested with body-parts (*hands*), and in projective uses to identify *near* and *far* objects; two cardinal direction terms were tested *near* and two *far*, counterbalanced between rotations.
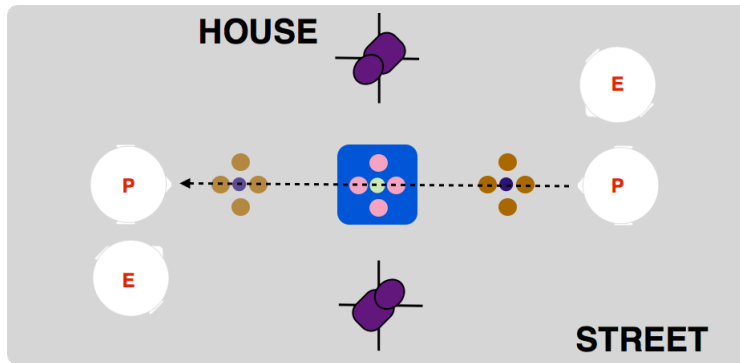
Figure 2.7: Spatial Vocabulary Comprehension task procedure.

Figure 2.8: A participant indicates a "near" object as part of the Spatial Vocabulary Comprehension Task.

Figure 2.9: The "far" objects were arranged several meters in front of the participant.

2.2.6 Coding

Animals-in-a-Field: orientations of the animals were coded as one of four directions by a naïve research assistant using overhead images extracted from the video. One of the authors (KC) determined frame of reference from these coded orientations.

Toppling Blocks Tasks: Speech for all trials was transcribed using ELAN by a research assistant who was a native speaker of JCH and/or Spanish. Utterances containing a motion verb were tagged in ELAN as "motion-event descriptions" by author MM. Tokens of spatial terms were tallied for each participant using the speech transcriptions.

Gesture analysis focused on the motion event descriptions that had already been identified in the speech analysis. It proceeded in two steps: 1) the annotation of individual motion gestures; and 2) the determination of the predominant directionality for the trial as a whole. In the identification step, every instance of a *motion gesture* was identified. A motion gesture was defined as a gesture that (a) was associated with reference to motion in speech and that (b) represented motion along the horizontal plane in its stroke phase. (Gestures representing pure upwards or downwards motion were not included.) Once identified, a motion gesture was then coded for its directionality with respect to the gesturer's body, out of eight possible directions: away, toward, leftward, rightward, away-leftward, away-rightward, toward-leftward, and toward-rightward. Gestures that depicted motion but could not be assigned one of these directionalities were marked as unclear. Additionally, the hand used in the gesture stroke was annotated, as was the presence or absence of frame-of-reference language.

Next, in the predominant directionality step, the coder considered all of the motion gestures produced over the course of the trial. If there was a modal direction to these motion gestures, this was considered the predominant direction of the trial. If there was no modal direction— as happened in the case of two gestures depicting different directions— the coder considered whether one of the gestures was clearer or more effortful than the other and assigned the directionality accordingly. In other cases, the directionality of the trial was considered unclear. Of course, if no motion gestures (or only unclear motion gestures) were present in the trial, no directionality was assigned. Note that the coding was done based on the explanation phase alone, and the coder was not aware of the nature or direction of the event the participant had seen.

Reliability was assessed by having a second coder analyze three randomly selected trials from each session (25% of the data). The second coder, like the primary coder, was not aware of the nature or direction of the event that the participant had seen. The two coders agreed on whether a trial could be assigned a predominant directionality for 96% of trials. The coders assigned the same predominant directionality, out of the eight possible, for 80% of trials, and assigned directions within 45 degrees of each other on 93% of trials.

Geographical Scale Task: All trials were transcribed by a research assistant who was a native speaker of JCH and/or Spanish. Tokens of spatial terms were tallied for each participant using the speech transcriptions. Terms tallied in both this task and the Blocks tasks appear in Table 2.1, below.

Table 2.1: Referential spatial terms tallied in the *Toppling Blocks* and *Geographical Scale* tasks.

JCH term	Spanish term	English gloss
derechu	*derecha*	'right'
biga'	*izquierda*	'left'
atrá	*atrás*	'behind'
frente	*frente*	'in front'
guiá	*norte*	'north'
guete'	*sur*	'south'
	lado este	'east'
	lado oriente	'east'
ladu rindani (gubidxa)	*donde sale el sol*	'where the sun rises'
	oeste	'west'
	poniente	'west'
ladu riaazi (gubidxa)	*donde se mete el sol*	'where the sun sets'

Spatial Vocabulary Comprehension Task: response accuracy was determined

from video-recordings.

2.3 Results

2.3.1 Animals-in-a-Field Task

We performed a number of different analyses of the Animals-in-a-Field task. To

start, for each session, we calculated the proportion of trials that were egocentric,

allocentric, or Other (somewhat surprisingly, allocentric responses anchoring the

response to the barrier were extremely rare and so were collapsed in with other

responses). Because we were unaware at the time of the potential importance in Juchitán

of the Binary/Ternary frame of reference distinction, this task was designed only to elicit

variation along the egocentric/allocentric dimension. We also identified the dominant

FoR for each session, defined as the modal FoR (egocentric, allocentric, or Other) used

on 3 or more trials (following Bohnemeyer 2011). Four sessions (out of 48) did not have

a dominant strategy according to this criterion. Overall, participants adopted an

egocentric- or allocentric-dominant response in 40 out of 48 sessions, much higher than would be expected by chance (binomial test, $p < 0.001$, Figure 2.2). Participants produced more egocentric than allocentric responses ($M_{ego} = .48$ *vs.* $M_{allo} = .30$, paired t-test: $t_{(31)} = 1.83$, $p = .08$), and there were more egocentric- than allocentric-dominant sessions (26 *vs.* 14, $p = 0.08$, binomial test), although this difference was only marginally significant.

More than anything, however, the population was characterized by its markedly mixed FoR strategy. The most common strategy—egocentric—was the dominant response for only approximately half of the trials (26/48). Unlike other populations that have been studied, individuals in this population adopted a variety of response strategies, with considerable variation between individuals. There was also evidence of individual flexibility, to which we return below.

2.3.2 Language Dominance and Language of Instruction

We next looked at the combined effect of language of instruction (the language in which the instructions were delivered to the participant on the non-verbal task; and also the language in which the participant was to respond on the verbal tasks) and language dominance on spatial reasoning (Figure 2.2). Among Balanced Bilinguals, there was no effect of Language of Instruction: they were no more likely to adopt an egocentric strategy in Spanish than in JCH ($M_{SPAN} = 0.48$ vs. $M_{JCH} = 0.50$; paired t-test: $t_{(15)} = 0.12$, $p = 0.91$), nor, conversely, were they any more likely to adopt an allocentric strategy in JCH than in Spanish ($M_{JCH} = 0.38$ vs. $M_{SPAN} = 0.37$; paired t-test: $t_{(15)} = 0.06$, $p = 0.95$).

Similarly, there was no clear evidence of an effect of Language Dominance on preferred FoR. Balanced Bilingual participants were no more likely to adopt an

egocentric strategy than those who were JCH-Dominant ($M_{JD} = 0.49$ vs. $M_{BB} = 0.47$; $t_{(30)}$ = 0.22, $p = 0.83$). While there was a numerical trend towards more allocentric responses by Balanced Bilinguals ($M_{BB} = .38$) than by JCH-Dominant participants ($M_{JD} = .22$), this difference did not reach significance, $t_{(30)} = 1.55, p = .13$). Indeed, while there were numerically fewer allocentric sessions among JCH-Dominants, the distribution of responses did not differ between JCH-Dominants and Balanced Bilinguals in Spanish or JCH (Fisher's Exact Test, p = 0.12).

This pattern of results was confirmed by a mixed-logit model of FoR. We modeled FoR strategy on those trials for which participants used either an egocentric or allocentric strategy, with fixed effects of Language of Instruction (Spanish, JCH) and Language Dominance (BB, JD), and random effects of participants and items. Neither Language Dominance nor Language of Instruction was significantly predictive of egocentric responses (all zs $< .9$, ps > 0.4), and the full model was no better than reduced models without Language of Instruction or Session Language (all $\chi^2_{(1)} < 0.5$, ps $> .49$). There was no evidence, therefore, that either language of instruction or language dominance had a systematic influence on spatial reasoning.

2.3.3 Flexibility between sessions

In addition to looking at the dominant FoR adopted by an individual within a session, we also looked at *flexibility*— that is, the degree to which individuals changed their dominant response between sessions. This analysis is necessarily limited to Balanced Bilinguals, who all completed two sessions. Since responses were classified as one of four possible orientations, we should expect egocentric or allocentric responses in

one out of four sessions by chance alone[3]. By contrast, dominant responses were reliably

repeated by a significant number of participants (8/16; binomial test, p = .037). Among

those who *did* change their dominant FoR between sessions, the change was not related

to the language of instruction: half adopted an egocentric strategy in JCH, while the other

half adopted an allocentric strategy. Therefore, while Balanced Bilinguals as a population

were significantly stable in their responses between sessions, many individual BBs also

showed evidence of between-session flexibility. The adoption of a particular FoR,

moreover, was not significantly influenced by language dominance, nor by language of

instruction.
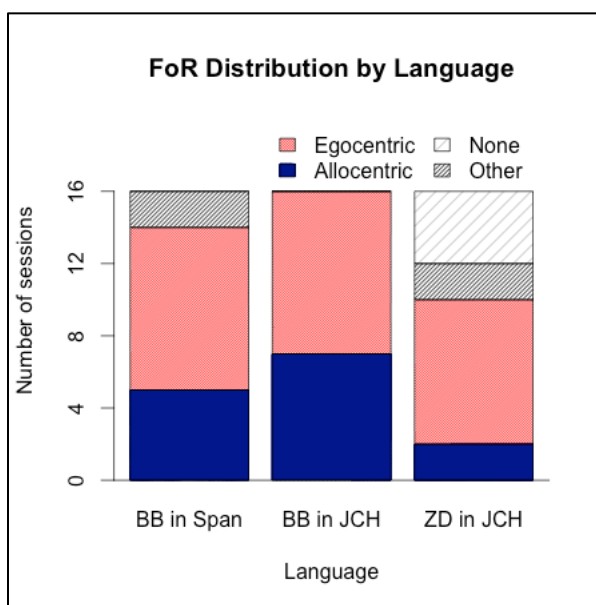
Figure 2.10: Variability in dominant strategy. Participants adopted a variety of dominant responses.

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[3] This is conservative: sessions might lack a dominant response.

2.3.4 Spatial Vocabulary Comprehension Task

Overall accuracy[4] was high (.82) and above chance for all vocabulary types and distances (all ts > 5, ps < 0.001). We first conducted a 2x2 mixed ANOVA, with Vocabulary Type (body-part egocentric, projective egocentric, allocentric) as a within-subjects factor and Language Dominance (JCH-Dominant, Balanced Bilingual) as a between-subjects factor. There was no effect of Language Dominance or interaction between Language Dominance and Vocabulary Type (all Fs < 0.24, ps > .63), but there was a highly significant effect of Vocabulary Type ($F_{(2,60)} = 19.00$, $p < 0.001$, $\eta_p^2 = .39$). Indeed, accuracy was nearly at ceiling for body-part uses of "left" and "right" ($M = .98$), and this was significantly better than accuracy for the projective uses of "left" and "right" ($M = .87$), which in turn was significantly better than for the allocentric uses of the cardinal terms ($M = .69$) (all ts > 2.8, all ps < .01).

To further investigate these differences, we fitted a mixed-effects model to participants' accuracy on trials involving projective egocentric and allocentric uses of terms, with fixed effects of Language Dominance, Language of Instruction, Vocabulary Type (left/right or cardinal directions), and Distance (near or far), and random effects of participants and items. Only three factors had a significant influence on accuracy: Vocabulary Type, Distance, and their interaction. Accuracy was better for egocentric than for allocentric items ($z = 6.2$, $p < 0.001$; compared to reduced model without Vocabulary Type: $\chi^2_{(1)} = 11.8$, $p < 0.001$), and better for near than for far items ($z = 3.6$, $p < 0.001$; $\chi^2_{(1)} = 11.7$, $p < 0.001$). However, these effects were complicated by a significant

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[4] Data from 16 trials (8 from each Language Dominance group) was lost due to experimenter error, excess noise, children running in front of the camera, etc. These were removed before analysis.

interaction between the two factors ($z = 3.6$, $p < 0.001$; $\chi^2_{(1)} = 11.7$, $p < 0.001$). Follow-up

analyses revealed that accuracy on allocentric cardinal terms did not differ between near

and far referents ($M = .69$ vs. $.70$, $t_{(31)} = -0.20$, $p = .84$), while participants were

significantly more accurate on egocentric items for near than far referents ($M = .94$ *vs.*

$.79$), $t_{(31)} = 2.78$, $p = 0.009$ (Figure 2.2). Thus, distance had a selective influence on

participants' comprehension of egocentric uses of terms, but did not affect

comprehension of allocentric terms. By contrast, there was no evidence that either

Language Dominance ($M_{JD} = .77$, $M_{BB} = .79$) or Language of Instruction ($M_{JCH} = .79$,

$M_{SPAN} = .76$) had any influence on accuracy in the Vocabulary task (all $zs < 1.2$, $ps >$

$.23$).
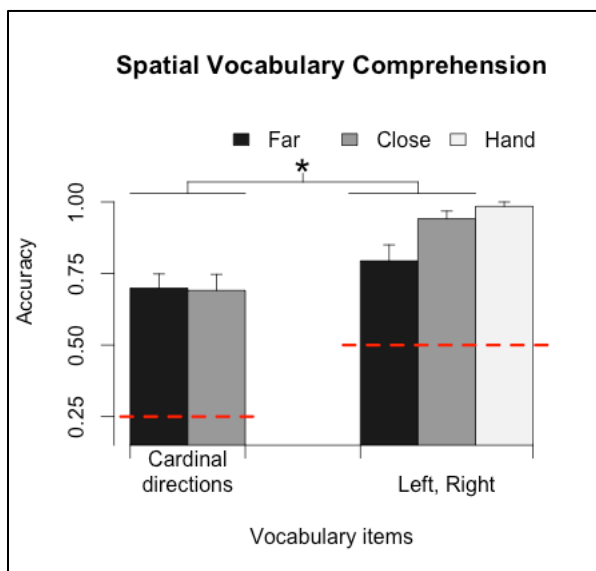
Figure 2.11: Vocabulary accuracy with egocentric terms (left, right) varied by use, while accuracy with the cardinal direction terms did not differ for near and far targets.
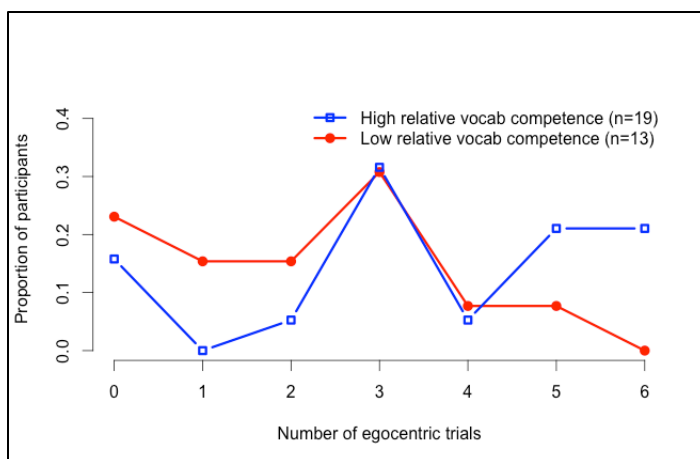
Figure 2.12: Participants with high competence with egocentric vocabulary produced significantly more egocentric responses.

2.3.5 Relations between spatial vocabulary comprehension and Animals task

We next investigated the possibility that participants' performance on the comprehension task would predict their performance on the reasoning task. We used individuals' performance on the Vocabulary task to classify them as high- or low-competence, for both projective egocentric and allocentric uses of terms, using a median split.

We first looked at the relation between vocabulary competence and the adoption of an egocentric strategy on the Animals task. We conducted a 2x2x2 analysis of covariance (ANCOVA) on the proportion of egocentric responses by each participant, with participants' Age as a covariate, and three crossed between-subjects factors: Language Dominance (Balanced Bilingual *vs.* JCH-Dominant), Egocentric Vocabulary Competence (High *vs.* Low), and Allocentric Vocabulary Competence (High *vs.* Low). The only significant effect was a main effect of Egocentric Vocabulary Competence. Participants adopted egocentric strategies significantly more often if they were highly

competent in their use of egocentric vocabulary than if they were not ($M = .59$ vs. $M = .32$, $F_{(1,23)} = 4.3$, $p = .049$, $\eta_p^2 = .16$; Figure 2.4). By contrast, no other effect approached significance (all Fs > .73, ps > .4). This effect remained significant with a nonparametric Wilcoxon test ($W = 63.5$, $p = 0.021$). Indeed, a linear regression found that accuracy for egocentric vocabulary items predicted egocentric responses on Animals ($\beta = 0.60$, $p = 0.04$, $r^2 = .13$, $p < .04$).

A very different pattern emerged when we looked at the influence of vocabulary competence on *allocentric* responses on the Animals task. The adoption of an allocentric strategy on the Animals Task was not related to vocabulary competence, neither for allocentric ($F_{(1,23)} = 1.47$, $p = .24$) nor egocentric uses ($F_{(1,23)} = 0.14$, $p = .71$). There was a privileged relation, therefore, between competence with egocentric uses of vocabulary and adoption of an egocentric strategy.

2.3.6 Toppling Blocks Tasks

First, we sought to determine whether the "watching" versus "doing" condition produced any significant differences in the production of FoR gestures. Because we found no significant differences in these two tasks, we collapsed the data for the subsequent analyses. Secondly, before statistical analysis, trials were removed due to experimenter error (e.g., video-camera failure) or if participants failed to perform the task (e.g., participants did not describe the blocks) ($n = 17$), followed by trials in which participants did not gesture at all ($n = 25$).

2.3.7 Did gesture encode spatial information?

The task reliably elicited motion gestures, resulting in a corpus of more than 1400 gestures (~2.4 gestures/trial). Of those trials that were accompanied by one or more gestures, the gestures almost always exhibited a dominant direction (94.6%). This dominant gesture direction was reliably consistent with either an egocentric or allocentric FoR ($M = 70.0\%$), much more often than would be expected if gesture direction were random, $t_{31} = 11.5$, $p \ll .001$ (chance = 25%). Thus, participants used gesture systematically to express motion information, adopting either an egocentric or allocentric FoR.

By contrast, gestures during motion descriptions were seldom accompanied by *speech* that contained explicit FoR information (e.g. *right, west*; $M = 6.4\%$), $t_{31} = 3.63$, $p \ll .001$. Thus, although gesture reliably expressed FoR information, such information was largely absent from accompanying speech.

We looked next at the strategies used to encode spatial information in these gestures. Most common was the egocentric FoR, used on twice as many trials ($M = 47\%$) as the allocentric ($M = 23\%$), $t_{31} = 2.09$, $p = .045$. Moreover, individuals showed clear preferences for one FoR over the other. Most participants preferred one FoR over the other: While two participants used both frames of reference equally, the remaining twenty-nine had a "dominant" FoR that they used preferentially. This dominant FoR was more often the egocentric ($n = 21$) than the allocentric ($n = 9$, binomial test, $p = .043$). These preferences, moreover, were stark: On trials for which gesture was consistent with an FoR—either ego- or allocentric—participants nearly always deployed their dominant FoR ($M = 89\%$), $t_{31} = 13.3$, $p \ll .001$. Indeed, nearly two-thirds of participants (21/32)

used the same FoR on *every* such trial. And even among those 11 participants who had at least one trial that was consistent with their non-dominant FoR, they used their dominant FoR on a significant majority of trials ($M = 69\%$), $t_{11} = 4.56$, $p = .001$. Gesture expressed motion in systematic ways, therefore, with participants exhibiting clear preferences for one FoR over the other.

2.3.8 Who used which spatial strategies?

Balanced Bilinguals tested in Spanish produced a higher proportion of egocentric gestures ($M=.57$) than when tested in JCH ($M=.46$) and higher still than did JCH-dominant speakers tested in JCH ($M=.40$). However, in a hierarchical mixed-logit model, test language (Spanish vs. JCH) was only marginally predictive of egocentric gesturing ($p = .08$), while the effect of language dominance did not approach significance ($p > .7$). We thus did not find strong evidence that language dominance or operational language drives FoR use.

One clear predictor of FoR use in gesture did emerge, however. At the end of our task battery, we conducted a test of participants' comprehension of egocentric uses of 'left' and 'right' and allocentric uses of cardinal terms. Individuals differed in their mastery of these terms and this proved to be predictive of their gesturing style. Competence with egocentric vocabulary was positively correlated with the use of egocentric motion gestures ($p=.02$) (Figure 2.13). A parallel correlation was found between competence with egocentric vocabulary and performance on a more classic spatial reasoning task, also included in our battery. Overall, our findings suggest that spatial language might play a powerful— but also *selective*— role in shaping FoR use.
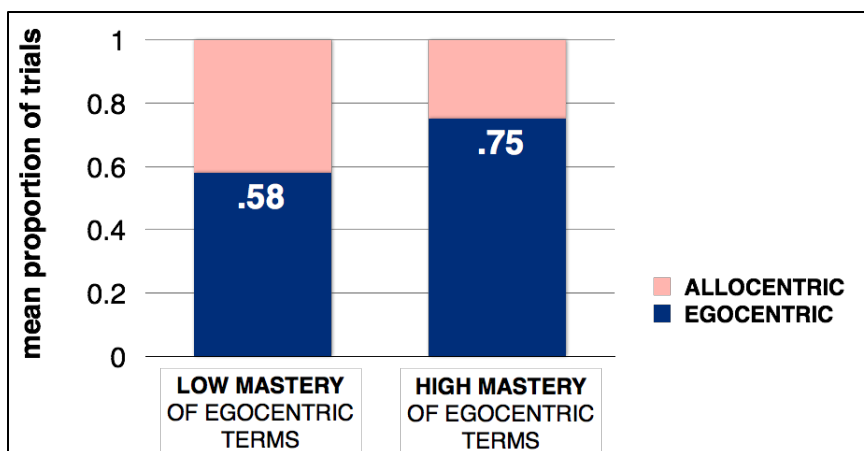
Figure 2.13: Effect of egocentric lexical mastery on FoR choice on *Toppling Blocks* task. Effect significant at p=.02.

2.3.9 Did *scale* predict spatial language use?

We compared the production of overtly spatial lexical items across the Toppling Blocks and Geographical Scale tasks. As mentioned in the previous section, lexical items used in the overt expression of FoR information were largely absent from the Toppling Blocks task. However, when these lexical items were used, there was a difference in which type of lexical item was preferred across groups. BBs speaking in Spanish used 'front' and 'back' almost exclusively. However, both groups, when speaking in JCH, used a mixture of terms designating 'front'/'back,' 'left'/'right,' and cardinal directions (Figure 2.14).
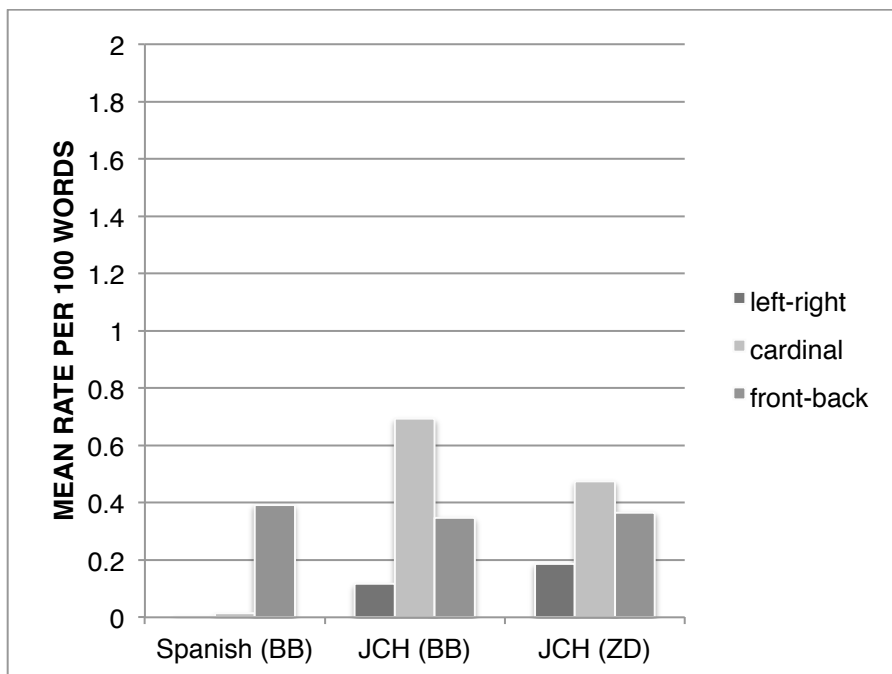
Figure 2.14: Rate (per 100 words) of FoR lexical items on the Blocks tasks.

Overtly spatial lexical items were used with far greater frequency on the

Geographical Scale task than on the Toppling Blocks task across all groups (Figure 2.15).

All groups exhibited a high rate of 'front'/'back' terms. The JCH Dominant group used

far fewer 'left'/'right' terms than the other groups. The contrast in the results across these

two tasks suggests *scale*—large scale versus "tabletop" scale—is a predictor of overt

spatial vocabulary use in this community, and that the presence of gestures depicting

frame of reference does not predict the use of overtly spatial lexical items.
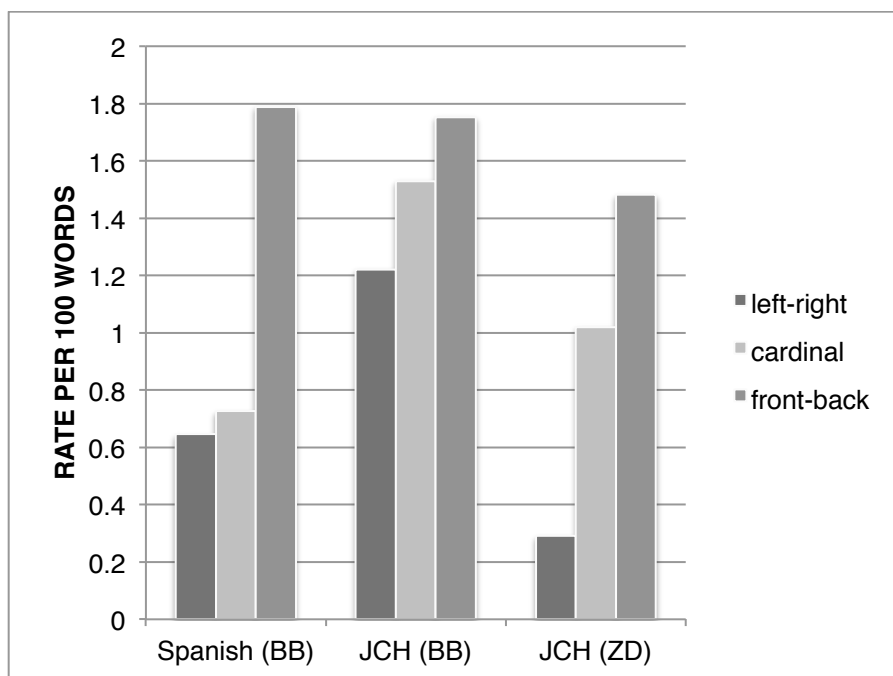
Figure 2.15: Rate (per 100 words) of FoR lexical items on the Geo task.

2.4 Discussion

We investigated spatial cognition, spatial language, and the relationship between the two in a bilingual population of Juchitán, Mexico. Using a non-linguistic task designed to assess preferences for spatial frames of reference, we found evidence for a mixed profile of FoR use. This mixed profile manifested in two ways. First, as within-population variability: considering the population as a whole, there was a preference for egocentric over allocentric responses, but this preferred strategy still only accounted for slightly more than half of the sessions. Second, it manifested as between-session flexibility: even those Balanced Bilingual participants who did show a strong preference for one frame of reference in one session did not necessarily stick to it in the next, with nearly half of participants switching their dominant response between sessions. Using a task designed to elicit both spatial speech and gesture, we found a similarly mixed

profile. However, this mixed profile manifested only as within-population variability and not as between-session variability. Again, as a whole, egocentric gestures were used on nearly twice as many trials as allocentric gestures. But individual participants were quite consistent in their FoR preferences, adopting the same strategy on nearly every trial. The contrast in the rsults of these two tasks suggests that the tasks themselves tap into different aspects of spatial cognition. Such population-level variability, which has been reported only rarely in the literature (but see Pederson 1998; Polian and Bohnemeyer 2011) on spatial FoRs, provided a naturally occurring laboratory in which to investigate the precise role of language in shaping spatial reasoning.

Two of the possible patterns we considered at the outset did not emerge: participants' responses were not predicted by the language in which the task was conducted (*language-specific pattern*), nor were they predicted by the participant's dominant language (*language-dominance pattern*). These results are surprising given current accounts of linguistic relativity, which often appeal to the effects of linguistic structures on non-linguistic reasoning. The pattern that did emerge was more *patchwork*— that is, bilinguals in this community appeared to draw on conceptual distinctions furnished by both languages, building a mixed toolkit of spatial reasoning strategies. How are we to make sense of the overall pattern we observed as well as the individual variation within it? Below we first consider the possibility that bilingualism *per se* may not explain the overall pattern. A comparison with a neighboring community suggests that extra-linguistic influences may outweigh linguistic ones at this zoomed-out level. Next we zoom in on the patchwork to consider the finding that spatial reasoning abilties vary across individuals, not randomly, but in a way predicted by particular

linguistic abilities—a *targeted* influence of linguistic competence. Taken together the results suggest an important influence of language on spatial reasoning, but one that may be more specific than commonly proposed and that co-exists with extra-linguistic influences.

2.4.1 Explaining the overall pattern in Juchitán: The role of extra-linguistic factors

At first blush, the patchwork pattern that we observed, with participants exhibiting a mix of strategies apparently drawn from both linguistic systems, mirrors patterns reported for some bilingual populations in other semantic domains (e.g. Pavlenko, 2002). This might suggest that bilingualism *per se* is a key factor. However, comparison with speakers of the same languages from a town just 15 km away undercuts this explanation. Pérez Báez (2011), who ran a variant of the classic Animals-in-a-Row task with JCH speakers in the town of La Ventosa, found that population to be predominantly allocentric in its spatial reasoning. She reports that 16 out of 19 participants used an allocentric strategy on at least 4/6 trials, and 10 of these used an allocentric strategy on 6/6 trials. Only one person in one trial used an egocentric strategy—a stark contrast with the highly variable and predominantly egocentric responses observed in the current study. But this contrast cannot be accounted for by differences in bilingualism: Pérez Báez reports that her participants were all bilingual in JCH and Spanish, and general levels of bilingualism are almost identical in the two places. Inhabitants of La Ventosa should presumably have access to the same mix of conceptual resources, and yet they exhibited a completely different pattern. This comparison across JCH-Spanish bilingual communities suggests that spatial reasoning is

not reliably predicted solely by a community's linguistic codes. It further suggests that
the mixed profile we see in Juchitán is either not the result of merging conceptual tools
from different langauges, or, if it is, that such a merged system is not an inevitable
outcome for all communities who speak those languages.

Nor is the difference between communities due to a simple urban/rural divide,
since both places are very similar on measures that have been used to distinguish rural
from urban (e.g. Pederson 1998) as can be seen in Table 2.2 (statistics from INEGI
2010).

Table 2.2: Juchitán and La Ventosa do not differ in their level of development or wealth.

	Juchitán	La Ventosa
Households with dirt floor	4.22%	4.86%
Households with a single room	15.92%	12.11%
Households without electricity	0.94%	1.96%
Households without indoor tap water	5.12%	6.82%
Households without sewage	1.29%	3.58%
Households with a refrigerator	80.98%	80.31%
Households with a car	21.44%	21.31%
Households with a computer	20.09%	11.34%
Households with a cell phone	58.67%	50.13%

The overall pattern in Juchitán may instead be driven by extra-linguistic factors. For
example, Polian & Bohnemeyer (2011) have argued that the salience of topographical
features may account for the variation in FoR use they found across three communities of
Tseltal speakers.

Specualtions aside, our result point to several methodological concerns that
should be addressed in studies of linguistic relativity. First, sociolinguistic and cultural
factors appear to play a crucial role in patterns of spatial cognition, and must be
systematically accounted for. Second, the elicitation tasks themselves may tap into
various distinctions of "spatial cognition" and "spatial language" that may have been

heretofor unknown to researchers. The differences that emerged between the Animals and

Blocks tasks, suggest that individuals may be more consistent in gestural practices than in

reasoning tasks. And the difference that emerged in lexical item production across the

Blocks and Geographical Scale tasks point to a distinction in scale as an important

predictor of language use. These are the topics I pursue in the remainder of this

dissertation, in which I seek to contextualize these task results within wider

communicative practices in Juchitán.

2.4.2 Explaining individual variation in Juchitán: The role of specific linguistic abilities

Language alone may not be able to explain the overall pattern of spatial reasoning

strategies in Juchitán, but can it help explain the variation we observed from one

participant to the next? Yes and no. Language dominance and language of task did not

predict spatial reasoning, but competency in specific spatial language *did*. This finding is

consistent with recent developmental findings that suggest that the acquisition of specific

spatial terms is correlated with improved non-linguistic spatial abilities that require the

newly acquired concepts (e.g. Gentner et al. 2013). Indeed, if a word encodes a novel

semantic distinction, merely acquiring it may highlight that particular distinction. Once

acquired, its habitual use may cultivate and accentuate the semantic distinction. And once

mastered, the word itself may serve as a conceptual tool in the moment, even when the

task is not explicitly linguistic. Mastering relational uses of "left" and "right," therefore,

might highlight, entrench, and encapsulate egocentric spatial relations.

While such previous research has found that knowledge of spatial language may

scaffold spatial cognition, the pattern we observed was *targeted,* specific to *egocentric* spatial language and cognition: knowledge of projective uses of egocentric terms predicted egocentric responses in a non-linguistic task, but knowledge of allocentric terms did not predict allocentric responses. What could explain this curious contrast? One possibility is that, in humans, egocentric and allocentric reasoning simply do not require the same degree of scaffolding. It may be that, consistent with findings on the preference for allocentric encoding in non-human primates (Haun et al. 2006), allocentric spatial reasoning emerges spontaneously while egocentric spatial strategies must be scaffolded by various cultural practices. However, such an account fails to explain why speakers of egocentric-preferring languages show diminished ability to use an allocentric FoR when explicitly required to do so (Haun et al. 2011). Even if allocentric reasoning is in some way basic, it appears to benefit from habitual use.

Another possibility is that both egocentric and allocentric spatial reasoning are elaborated and cultivated by various forms of scaffolding, but that this scaffolding need not be strictly linguistic. Indeed, previous work has shown that allocentric responses on tasks similar to the one used here do not require mastery of allocentric vocabulary (Brown and Levinson 2000; Le Guen 2011). In the case of Juchitán, it could be that allocentric reasoning is supported by non-linguistic cultural practices, such as gestural conventions, while egocentric reasoning is largely—or even uniquely—supported by linguistic practices. This possibility will be pursued in Chapter 3, in which I argue that this pattern might be explained by a general preference for the use of Binary frames of reference in Juchitán. The egocentric vocabulary items tested in the Vocabulary Comprehension Task are used exclusively in expressions of the relative FoR, which is

Ternary. In contrast, the cardinal direction terms we tested are used both in the expression of the absolute (Ternary) and geo-centered (Binary) frames of reference. Thus, competence with 'left' and 'right' is directly related to competence using a Ternary FoR in a way that competence with cardinal direction terms is not.

2.5 Conclusions

Where does this leave the relation between language and cognition? Our results help delimit the relation. At the population level, environment and sociocultural factors, not language, seemed to explain differences between the inhabitants of Juchitán and those of nearby La Ventosa. At the individual level, non-linguistic reasoning was flexible and seemingly unaffected by language dominance or language of instruction. It was, however, predicted by competence with specific lexical items, as if acquiring and mastering the associated semantic distinctions shaped non-linguistic reasoning. In the web of influences that shapes spatial reasoning, language may play a powerful but also more selective role than is commonly claimed.

2.6 Acknowledgements

Chapter 2 contains material that appeared as Marghetis, Tyler, Melanie McComsey and Kensy Cooperrider (2014). "Spatial reasoning in bilingual Mexico: Delimiting the influence of language." Proceedings of the Annual Conference of the Cognitive Science Society. Chapter 2 also contains material presented at two conference venues. These presentations are as follows: Cooperrider, Kensy, Melanie McComsey and Tyler Marghetis (2014). "Gesture and Spatial Frames of Reference in Bilingual Mexico."

Conceptual Structure, Discourse, and Language (CSDL), University of California, Santa

Barbara, November 4-6. And: McComsey, Melanie, Kensy Cooperrider and Tyler

Marghetis (2016). "Sources of within-population variability in spatial communication and

reasoning: Evidence from Juchitán, Mexico." Linguistic Society of America Annual

Meeting, Washington, D.C., January 7-10. The dissertation author was an equally

contributing author on these papers and presentations.

CHAPTER 3:

Variability in spatial language use among bilinguals in Juchitán and La Ventosa

3.1 Introduction

In the previous chapter, my co-authors and I investigated the spatial reasoning and gesturing practices of bilinguals in Juchitán. We discovered strong evidence for a mixed conceptual system, in which egocentric and allocentric strategies were used. Moreover, the variability we found did not align in predicted ways with either language dominance of the speakers or with the language used during the task setting. Speakers' preferred strategies for such non-linguistic spatial problem solving tasks and gestural patterns have been found to align with linguistic habits. For example, some of the first results to emerge form the MPI's Cognitive Anthropology Research Group demonstrated a correlation between allocentric language use and allocentric spatial recall strategies for speakers of Tseltal, Longgu, and Arandic, contrasting with the egocentric language use and egocentric spatial recall strategies found among speakers of Dutch and Japanese (Pederson et al. 1998). In a similar vein, the recent Spatial Language and Cognition in Mesoamerica project has organized around the hypothesis that productive meronymy—a Mesoamerican areal feature—drives a bias against egocentric spatial reasoning and the use of egocentric linguistic strategies (Bohnemeyer 2007). In terms of spatial gesture, Talmy's (1985) typology of "satellite-framed" versus "verb-framed" languages has been shown to correlate with differences in narrative style (Slobin 1996b) and this, in turn, to correlate with differences in gestural style (e.g. McNeill and Duncan 2006).

The correlation between allocentric spatial reasoning and allocentric spatial language was an exciting finding for early research in this area because such a phenomenon had not been previously documented. Since then, however, the literature on the topic has reified a particular approach to the study of linguistic relativity that looks for direct correlations among linguistic typology, spatial reasoning strategies, and spatial communication strategies. This approach however, bypasses what might be broadly termed "socio-cultural" variation, failing to account for extra-linguistic factors that might drive individual speakers to choose one frame of reference over another, or cultural factors that may be "smuggled in" under the rubric of one or more of the reified categories. Although it is widely agreed that the theory of linguistic relativity involves three key variables—culture, language, and cognition—the "culture" variable, perhaps due to its messiness, is often ignored or presumed to be accounted for in measures of the other two. In any case, it is typically not possible to manipulate these variables independently in the field, leading to the impression of a neat correlation among the three for a given speech community. The study reported in this chapter, though it follows the tradition of seeking correlates among typology, reasoning and communication, was designed to control for the cultural variable, to the extent possible in a field situation, by testing bilingual speakers of two languages that differ in their putative spatial semantics and expected corresponding spatial communicative strategies. It is important to note that much of the previous research on spatial language and cognition has also been conducted with bilinguals; this bilingualism was just not measured or controlled for.

By classifying speakers according to their relative bilingual proficiency, we can see if there are differences across these groups. And by testing bilinguals in their two

languages, we can see if they perform differently depending on the language they are speaking in a particular moment. Thus, the design accounts for possible effects of language dominance, as well as effects of what I will refer to as "operational" language use[1], which I take to be the language that is being used or that is expected to be used in a specific moment. Furthermore, this study attempts to tease apart some aspects of the oft-ignored socio-cultural dimension by comparing results across two different communities of bilingual speakers of the same two languages. This comparison allows us to hypothesize with more specificity about what kinds of socio-cultural factors correlate with certain styles of spatial speaking and reasoning.

The data for this study come from an urban, bilingual community of speakers of Spanish (Indo-European, Romance) and Juchitán Zapotec (Otomanguean, Zapotecan), from Juchitán, Oaxaca, Mexico. A spatial communication task was conducted with 48 participants in Juchitán in order to investigate the relative roles of semantic typology and bilingualism in frame of reference choice. The spatial communication task, described in more detail below, was a picture-matching task in which one participant describes a photograph to a partner such that the partner can select the correct photograph from an array of similar ones. A second data set collected by Gabriela Pérez Báez (2011) comes from the same spatial communication task completed by 12 participants from the neighboring small town of La Ventosa, where the same two languages are spoken. These data were compared to the Juchitán data in order to investigate whether frame of reference choice is consistent across populations who speak the same languages but may differ in their cultural practices.

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[1] The term classically used here, "online language use," has become too ambiguous of late.

Three hypotheses were considered from the outset: 1) *Typological hypothesis*: If formal structures or semantic categories particular to each linguistic code are driving frame of reference choice, we would expect JCH-dominant and Spanish-dominant participants to pattern as we would expect monolinguals to pattern in each language, with the former preferring allocentric language and latter preferring egocentric. Even stronger evidence in support of this hypothesis would be provided if Balanced Bilinguals patterned in a language-specific way, preferring the egocentric frame in Spanish and the allocentric in JCH. The *MesoSpace hypothesis*, that productive meronymy drives a dispreference for the egocentric frame of reference, may be considered a sub-category of this hypothesis. It posits a specific typological feature as driving FoR choice. 2) *Bilingualism hypothesis*: Evidence from psycholinguistic research on bilingual language and thinking has suggested that bilingualism results in a mixed conceptual system. If bilingualism itself has a stronger influence on frame of reference choice than semantic typology, we would expect balanced bilinguals in Juchitán to exhibit this type of mixing of resources, regardless of the language being used in a given moment. 3) *Cultural practices hypothesis*: If frame of reference choice does not correlate with operational language use or degree of bilingualism, we will need to look to socio-cultural explanations for variation. If substantial differences in frame of reference preferences are noted between Juchitán and La Ventosa, we can conclude that socio-cultural factors are involved, since the populations do not differ in their linguistic profiles. As I will demonstrate in this chapter, evidence for all three hypotheses was borne out in the results.

3.2 Approaches to cross-linguistic comparison

Comparing data between two languages is never a straightforward task because there are many levels at which any two languages may be said to be "the same" or "different." Indeed, one of the primary challenges of research on linguistic relativity has been the development of a convincing framework for controlled cross-linguistic comparison. In his seminal book, Lucy (1992a) reviews two different traditions in developing such a framework. Regional approaches, exemplified by Hoijer's (1954) work on Southwest Native American languages, seek to exploit naturally occurring patterns in the distribution of languages and cultures: "Related languages spoken by divergent cultural groups and diverse languages spoken by similar cultural groups were identified as promising areas for controlled comparison of the relation of language and culture" (Lucy 1992a:85). Typological approaches, meanwhile, seek to categorize languages according to structural similarities, regardless of their genetic relationship. Proposed "structural" features are quite varied, including "similarity in technique of word formation, similarity in word order, or similarity in the semantic structuring of a category such as grammatical number" (Lucy 1992a:88). Many of these categories are based in the tradition of Greenberg's (1966) early proposals for morphosyntactic typological categories. Whorf's own work took a typological approach, focusing on the expression of quantity in noun phrases and tense in the verb phrase in Hopi and English (Lucy 1992a:93). Lucy follows in this vein as well, investigating the relationship to cognition of pluralization and unitization in Yucatec and English (Lucy 1992b).

More recently, scholars working in the emerging field of "semantic typology" have distinguished their approach from work based on morphosyntactic typologies.

Semantic typology, the cross-linguistic study of how languages encode meaning regardless of grammatical categories, has as its precursor the well-known work by Berlin and Kay (1969[1999]) on cross-linguistic variation in color terms. As Lucy points out, however, the development of a convincing framework of comparative semantic categories has been even more problematic than developing the syntactic framework. Levinson and colleagues (2003) have made a recent attempt to define some "primitive" semantic notions for the domain of topological relations, settling on ATTACHMENT as one of the most important in cross-linguistic perspective. They propose three methodological strategies for isolating such semantic primitives: the use of markedness theory to determine primitive oppositions; the use of implicational scales such as those used by Greenberg (1966) and Berlin and Kay (1969[1999]); and the use of "composite category theory" (Kay and McDaniel 1978), which came to replace earlier semantic theory used in the study of color terms (Levinson et al. 2003:509-510). According to composite category theory, basic color terms are actually composite terms with more than one focus. As more terms are added to a system, primary categories develop that have a single focus; and finally, blended categories are derived from those. This theory accounts for semantic change as well as for the disjunctive character of some semantic categories (Levinson et al. 2003:511).

One important claim in the area of semantic typology is that languages have a "semiotic ecology," meaning that "semantic choices made in one subsystem affect those in others" (Evans 2010:508). This idea has been foundational in the domain-centered study of spatial language, which begins by looking for cross-linguistic variation in semantic concepts, but then must grapple with how the semantic concepts might be

related to variation in grammatical encoding. As an example of this approach, the MesoSpace Project has put forth the hypothesis that languages with productive meronymy, a Mesoamerican areal feature, will show a bias against the egocentric FoR. As Pérez Báez explains, "The rationale for such a proposal is…that a language with productive part-naming systems would capitalize on the attention placed on object geometry and be less likely to resort to using an observer's point of view as the origin of an FoR" (2011:947). In their introduction to the group's special issue, O'Meara & Pérez Báez state that research from the ten languages studied by the group supports the hypothesis because "in no case was the relative FoR the preferred FoR type in either orientation or location descriptions" (2011:850). They go on to state that JCH represents a "text-book case" of this correlation due to the extremely low numbers of relative responses in the La Ventosa data, and the highly productive meronym system in JCH (2011:850). In other words, the project found that these ten Mesoamerican languages shared a pattern in linguistic expression—a dispreference for egocentric spatial descriptions—and sought an explanation for it in an areal structural feature. One potential problem with this hypothesis is that it is not clear to what extent Mesoamerican meronyms actually differ structurally from, say, Indo-European prepositions. I review some of their similarities and differences below.

The study reported in this chapter follows a similar approach, however, of first identifying a difference in spatial communication styles across languages, and then searching for an explanation. In Lucy's formulation:

> The majority of studies using the typological approach to date have been concerned with the cognitive implications of typological regularities or 'universals.' It should be possible to reverse this emphasis and use

typological data as a framework for studying the significance of differences. Under this approach, a pattern of commonality across languages serves to ensure that a common domain is involved across the diverse languages; variation in the pattern indicates differing possible linguistic codings of the common semantic/cognitive domain (Lucy 1992a:102).

Although I find some evidence in support of a more specific version of the MesoSpace meronymy hypothesis, I also look beyond morphosyntactic explanations for the variation in my data. The previous discussion has treated "language" and the potential comparative categories therein as a purely referential phenomenon. However, languages may also differ from each other in terms of *how* linguistic features are deployed to accomplish different functions. Lucy distinguishes this area of "functional relativity" as potentially separable from "structural relativity" (1992a:105). Such an approach was first attempted by Hymes (1966), who sought to characterize possible differences across languages in terms of differing distributions of linguistic functions. However, this approach has not been well developed since then, and there is no systematic typology of linguistic functions with potential cognitive significance (Lucy 1992a:114). In this chapter, I propose the contrasting distribution of the indexical functions of spatial terms in Spanish and JCH as a potential category in a functional relativity approach.

Finally, another dimension along which languages may differ from one another is in the "reflexive" dimension, an argument that has been pursued by Silverstein (1979, 1981). Briefly, this dimension has to do with speaker awareness of linguistic structure and function, which he calls "metapragmatic awareness." He argues that linguistic features that are referential, segmentable, and presupposing are those most readily available to metapragmatic awareness; typically these forms end up being referential

lexical items. Because different languages encode different kinds of information in referential lexical items, we can expect cross-linguistic variability in patterns of metapragmatic awareness. In this chapter, I take Silverstein's approach as a starting point, but look to cultural explanations for differences in metapragmatic awareness, namely, ideologies about the "mixing" of linguistic codes. I suggest that such linguistic ideologies may be driving some of the variation seen in spatial communication among speakers of JCH and Spanish.

This discussion has highlighted a number of ways that "language" may be analyzed for the purposes of cross-linguistic comparison. Rather than beginning with any one of these, this paper proceeds in the style of "regional approaches" to linguistic relativity, relying on the natural linguistic variation of a bilingual community to elucidate potential areas of contrast between the two languages. When the data do point to an effect of language on language—both language dominance and operational language use have an effect on frame of reference use—explanations are sought by considering each of the above approaches to comparative linguistic typology. I propose that differences in morphosyntactic categories, functional linguistic categories, and linguistic ideologies combined may account for this effect of language on FoR preferences.

3.3 Spatial Frames of Reference

Frames of reference (FoR) are coordinate systems for describing the location of objects that are separated in space. In the stimulus photos used in the Ball & Chair picture-matching task conducted in this study, an example of which appears in Table 1, below, the chair serves as the Ground Object, and the ball serves as the Figure Object

because it is conceptually movable in relation to the chair. In order to describe this picture, one might say in English, "The chair is facing right and the ball is to the left of the chair;" or " The chair is facing east and the ball is to the west of the chair;" or "The chair is against the wall and the ball is at the chair's back." Each of these constructions exemplifies one or more of the frames of reference that will be used as the analytical categories in this chapter.

Some results from the Ball & Chair picture-matching task as conducted by researchers affiliated with the MesoSpace project have already appeared in print (O'Meara & Pérez Báez 2011). In their publications, the authors rely on a more elaborate typology of frames of reference. However, for my purposes, it was not necessary to use such a detailed etic system because not all these types were well represented in the Juchitán data. In this chapter, then, I rely on a typology consisting of egocentric, absolute, geo-centered, and object-centered. The term "allocentric" is sometimes used to lump the absolute and geo-centered FoRs for stylistic purposes, though not for analytical purposes. The egocentric category includes both the relative ('to the [my] right,' 'behind the chair [from my perspective]') and direct ('in front of me,' 'toward me from the chair') frames of reference. The absolute category consists exclusively of absolute uses of cardinal direction terms ('east of the chair'). The geo-centered category consists of Binary uses of cardinal direction terms ('the chair is facing east'). The object-centered category is identical to that used by MesoSpace researchers, consisting of projected uses of ground axes onto the surrounding space ('toward the foot of the chair,' 'under the chair'). Uses of the other frames proposed by MesoSpace, "geomorphic" and "landmark-based," were negligible in my data and were excluded from the following analysis. A full discussion of

and more background information on FoR typologies may be found in the Introduction of this dissertation. A table of FoR terminology used may be found in the Appendix for reference.

Another key distinction in the following analysis will be that between "Standing information" and "Facing information." Standing information describes the orientation of the Ground object, here, the chair. Facing information describes the relationship of the Figure to the Ground—the ball to the chair. This distinction was first proposed by Pederson et al. (1998) on the basis of a cross-linguistic sample demonstrating that speakers tended to give at least two propositions to describe a Man and Tree photograph, corresponding to these two types (567). The same was found for the current data set, and so the distinction was preserved. Also, the geo-centered FoR occurs only in expressions of standing information, while the absolute FoR occurs only in expressions of facing information, a topic I will return to later.

Table 3.1: Sample descriptions of a Ball & Chair photograph in English. "Facing" information is in bold font and "Standing" information is in normal font. The Object-centered FoR can only be used in the expression of Standing information.

Egocentric/Egocentric	'**The chair is facing to the right** and the ball is to the left of the chair.'	
Geo-Centered/Absolute	'**The chair is facing east** and the ball is to the west of the chair.'	
Object-centered	'The chair is against the wall and the ball is at the chair's back.'	B&C2.11 (Bohnemeyer & Pérez Báez 2008a)

The previous example utterances illustrate that it is not just the mere mention of a term that indicates a particular FoR is being used, but *how* that term is deployed in the

utterance. For example, 'behind' can be deployed in both egocentric uses (e.g. 'behind the chair [from my perspective]') and object-centered uses (e.g. 'behind the chair [at the chair's back]'). Thus, frames of reference must be identified in the context of situated utterances, rather than as isolated lexical items.

Although it appears all languages have resources for deploying any of the main three frames of reference, substantial variation in the parameters for selection of these frames in particular contexts has been reported cross-linguistically. On the basis of the extensive data in their edited volume, for example, Levinson and Wilkins (2006:549) suggest that some factors influencing FoR choice in language might include the scale of the scene being described, whether a static or moving array is described, the distance between the Figure and Ground objects, and whether the information has to do with orientation or relative placement. Many other possible factors may be entertained, but the relevant point here is that these authors couch this variation as something inherent in particular languages. Thus, throughout the spatial frames of reference literature, authors often speak of "absolute languages," or "languages that use the relative frame of reference." This phrasing is problematic because there is as yet no evidence that particular formal typological features predict a profile of spatial speaking and reasoning. There is also no evidence that any alleged preference for a particular spatial FoR predicts the deployment of a given FoR in a given context. As I will demonstrate in this chapter, however, the data from Juchitán do provide some weak evidence for an effect of morphosyntactic typology on FoR choice in the picture-matching task. But the data provide even stronger evidence that other factors can outweigh morphosyntactic factors in driving speakers to choose one frame of reference or another. In addition to arguing

that indexical meanings and linguistic ideologies associated with spatial language can influence how speakers conceptualize those linguistic categories, I posit that topographical differences between Juchitán and La Ventosa may structure spatial practices in a way that influences spatial conceptualization.

3.4 Talking about space in Juchitán

Within Juchitán, the north-south axis is a socially significant one. The southern neighborhoods are associated with Juchitán Zapotec speakers, but are also poorer, with a more rural feel. In the northern neighborhoods, Spanish is more commonly spoken, and residents are wealthier and more cosmopolitan. The north-south axis is also very topographically salient in the city, reinforced by the river, which flows north to south; the winds, which blow cold and fierce from the north or pacific but sultry from the south; and the colonial grid pattern of the city blocks.

JCH and Juchitán Spanish differ in some ways in the specific semantic categories relevant to the present analysis. In order to describe the stimulus photographs, participants needed to specify the orientation of the chair (the ground object), and the position of the ball (the figure object) relative to the chair. The most basic construction for accomplishing these tasks is called the Basic Locative Construction (BLC). In Spanish, this construction consists of the Figure Phrase (FP), the Predicate (P), the Relator (R) and the Ground Phrase (GP).

(1)

FP		**P**			**R**	**GP**	
La	silla	tiene	el	respaldo	hacia	el	lado derecho
DET.F	chair	have.PRES.3SG	DET.M	back	toward	DET.M	side right

The chair has its back toward the right side [SD37&SD38-3.2]

In JCH, the Figure Phrase and Predicate have reversed canonical order and the Relator is not obligatory with a positional verb, but obligatory with the existential verb. Example 2 illustrates the most common construction, using a positional verb, while constructions that omit the Relator appear in Transcript 3.1 (Line 2) and Transcript 3.2 (Line 2), below.

(2)

P	FP	(R)	GP		
n-u-dxii-deche	-ni	neza	ra	ri-ndani ubidxa	
STA-CAUS-give-back	-3I	toward	where	HAB-rise sun	

It is giving its back toward where the sun rises [BB61&BB63-3.2]

Some other morphosyntactic differences apparent at first gloss in these BLCs are: Spanish nouns are classified according to masculine or feminine grammatical gender, while JCH nouns are classified according to human, animal, and inanimate categories. Most Spanish nouns require an article, while the use of the article in JCH is not obligatory and varies with focus. In Spanish, tense is marked with a suffix on the main verb and aspectual distinctions are made with an auxiliary verb or clitic (Zagona 2002:179). In JCH, the six aspects and one tense (future) are marked with a prefix on the main verb. Stative forms, such as the one in Example 2, are indicated by the prefix *na-* or *n-* and function syntactically like adjectives (Pickett 1960:37). These forms were common on the Ball & Chair task because they are often used to describe static states. The Relators and Anchor Phrases in both languages appear quite similar, consisting of a preposition followed by a noun phrase. However, the Relator is obligatory in Spanish, but not in JCH.

The use of different frames of reference in the Basic Locative Construction in both Spanish and JCH involves, firstly, variation in lexical choices in the Ground Phrase. Generally speaking, expressions using an absolute or geo-centered FoR will have a

Ground Phrase that employs a cardinal direction term; expressions using an egocentric

FoR will have a Ground Phrase that employs an egocentric term; and expressions using

an Object-centered FoR will have a Ground Phrase that refers to an object or object part.

Second, the use of the object-centered FoR in JCH involves the use of different types of

Relator terms than are used to express other FoRs. Thus, the lexical and grammatical

resources used for the expression of spatial frames of reference on the Ball & Chair task

included cardinal direction terms in allocentric uses; terms for left, right, front, and back

in egocentric and object-centered uses; designations of object parts; and prepositions.

Here, I discuss the most salient syntactic and semantic differences between Spanish and

JCH for these categories.

Both JCH and Spanish have terms for the four cardinal directions, but these differ

from each other in their semantic transparency and semantic extensions. In Spanish the

terms consist of the nouns *el norte* 'north,' *el sur* 'south,' *el este* or *el oriente* 'east,' and

el oeste or *el poniente* 'west.' In JCH, the terms are *guia'* 'north,' *guete'* 'south,'

neza/ladu rindani gubidxa 'east' (lit. 'the side the sun is born'), and *neza/ladu riaazi*

gubidxa or *neza/ladu rieegu gubidxa* 'west' (lit. 'the side the sun sets'). Formally, the

Spanish terms are all single-morpheme nouns. Their morphological productivity is

limited to adjectival forms. The JCH terms for 'north' and 'south' are also single-

morpheme nouns, and do avail themselves of some limited morphological productivity,

discussed below. The JCH terms for 'sun rises' and 'sun sets' consist of a verb form in

the habitual aspect (indicated by the prefix *ri-*), and the noun meaning 'sun.' This

construction can be nominalized by prefixing either the JCH word *neza*, 'road, toward' or

the Spanish loan *ladu* 'side', giving referring expressions for 'east' and 'west.' Although

these phrases are highly conventionalized ways to refer to the cardinal directions, they retain their semantic transparency, thus providing additional clues to their interpretation that the Spanish terms lack (with the exception of *poniente* 'west').

The JCH terms for 'north' and 'south' have broader semantic extensions than the corresponding Spanish terms. In JCH, the word *guia'* means 'north,' but also 'up and 'upriver;' while the word *guete'* means 'south,' but also 'low,' 'deep,' and 'downriver.' These words can also be made into the prepositions *luguiá'* 'above' and *xaguete'* 'below, under', which combine with a noun phrase to make a prepositional phrase. Similar forms, *luguiaa* and *xaguete'*, are used as referring expressions to designate particular places in the city: the northern/central and southern neighborhoods, respectively. These designations are not based on cartographic calculations, but rather, social divisions. The "lower" end of the city is associated with poorer indigenous Zapotec speakers, while the "upper" end of the city is associated with wealthier Spanish speakers. Thus the terms *luguiaa* and *xaguete'* have important indexical functions, pointing to information about class, ethnicity, and language use. These broader geographic and social meanings are not part of the local semantics of the Spanish terms *norte* and *sur*; however, similar information can be indexed in Spanish by using the words for 'up' *arriba* and 'down' *abajo*. *Arriba* and *abajo* were never used with an absolute or geo-centered function by participants on the picture-matching task. On the other hand, the Spanish term *norte* has a semantic extension that the JCH term *guia'* does not: it can refer specifically to the United States. Thus, Juchitecos may speak of the people who pass through town crowded on the tops of freight trains as traveling to *el norte*. The other cardinal direction terms in

Juchitán Spanish do not seem to have additional extensions beyond their reference to cardinal directions.

Spanish has native terms for 'left' and 'right,' *la izquierda* and *la derecha*, which can be used to refer to left and right body parts, and can also be used projectively at near and far distances (meaning that a speaker or listener's "left" is the Anchor from which a vector is projected onto the Ground object). Spanish also has the prepositional phrases 'in front of' *en frente de* and 'behind' *atrás de* that can be used with projective egocentric functions. JCH has a native term for 'left,' *biga'*, and borrows the Spanish term for 'right' as *derechu*. Cross-linguistic evidence suggests that *biga'* was historically used to refer to left body parts, but not to designate a region projected away from that body part (MacLaury 1989). Indeed, projective uses of 'left' and 'right' in JCH require combination with *neza*, 'road, toward' or with the Spanish loan *ladu* 'side' in order to function egocentrically and not merely referentially. JCH also borrows the Spanish terms for 'in front of' *frente de* and 'behind' *atrá de* with egocentric functions.

The proliferation of Spanish loan terms and constructions in JCH that are specific to the egocentric frame of reference suggests that this FoR itself may be a relatively recent addition to the language; however, it is not necessarily the case that the concept was borrowed from Spanish just because the terms were. It is just as possible that the conceptual category emerged in the population first. Support for this idea comes from the fact that JCH has a native paradigm of deictics that have egocentric functions in the description of spatial relationships (discussed in Chapter 2 in the context of the Geographical Scale task). Thus, it may be that some speakers retain an older system in which these terms function primarily referentially or topologically, whereas other

speakers regularly employ the projective uses of the terms. The proliferation of Spanish

loan terms in this domain is also worth emphasizing as a potential site for the

investigation of metapragmatic awareness and linguistic ideologies. Because speakers

themselves are quite aware of the status of these terms as Spanish loans, their use may be

subject to regimentation by linguistic ideologies about code mixing.

In order to use the object-centered frame of reference, both Spanish and JCH

employ "Relators," a general term used here in order to acknowledge that there remains

some disagreement in the literature as to the categorical status of the JCH terms (and

Otomanguean Relators more broadly). My position is that most of the JCH terms are

prepositions (but see Pérez Báez 2012). The Spanish terms are uncontested in their status

as prepositions (P). Both sets of terms conform to the crosslinguistic generalizations for a

category P identified in Svenonius 2004. He outlines their typical characteristics:

a. Express binary relations between entities (including events)
b. Form a syntactic constituent with a DP complement
c. C-select properties of the complement
d. S-select properties of the complement
e. Project XPs which function as predicate or sentential adjuncts
f. Do not combine with tense or aspect morphology (Svenonius 2004:12)

Both the JCH and Spanish terms conform to these expectations. Illustrative examples of

most are given below. However, there are some key differences in the syntax and

semantics of the terms in the two languages. In this section, I discuss some of these

differences. Another relevant characteristic of Relators concerns their diachronic

development. It is widely accepted that, cross-linguistically, prepositions evolved

morphologically from nouns into prepositions, and semantically from being signs for

objects to signs for spatial relations (Svorou 1986). Hollenbach (1995) combines

evidence from ten Otomanguean languages—one variety each of Cuicatec and Trique and eight varieties of Mixtec—to show how body part terms in these languages evolved diachronically along two paths of syntactic change: Noun → Pronoun → Subordinating Conjunction or Noun → Preposition → Subordinating Conjunction (174).

Lehmann (2002) has made a similar argument for Spanish. He shows that many modern Spanish prepositions developed from an earlier construction involving a semantically empty preposition plus a relational noun. Examples include *face a* → *hacia* 'toward' and *a cabo de* → *cabe* 'beside' (Lehmann 2002:10). Continuing in the process of diachronic change, at least one Spanish preposition, *a* 'to', may be said to have developed into a case marker (Svenonius 2007:26-27). The grammaticalization path from noun to preposition is also the source of some English prepositions, for example *stead* → *instead of* (Svenonius 2007:12).

As in other Zapotecan languages, JCH Relators include a mixture of Body Part Terms (BPTs) (also called meronyms), native prepositions derived diachronically from BPTs, and borrowed prepositions. The syntactic and semantic status of each of these categories is the subject of ongoing debate among Zapotecanists, but here I present evidence in favor of categorizing most JCH Relators as prepositions.

In JCH, some BPTs are nouns that only refer to objects or to parts of objects. Functionally, they may be said to be "referential" or "partitive," meaning they are used to partition objects. They behave syntactically like nouns. Semantically, they encode the notion of THING, and are applied to objects on the basis of object-internal anatomy or functional analogy (Pérez Báez 2010). Other BPTs can function as either nouns or prepositions. When functioning as a preposition, BPTs behave unlike nouns,

syntactically. Semantically, they encode the notion of PLACE (Jackendoff 1983). This function of BPTs may be called the locative function. Examples 3a-c illustrate these three functions for the Body Part Term *ruaa* 'mouth, edge, around.'

(3) a. n-uu gueza   ca **ruaa-be**   **Referential**
       STA-is cigarette DET mouth-3H
       The cigarette is in his mouth

    b. mjm San Diunisiu la   pue **ruaa** nisa-dó'   **Partitive**
       yes NAME   FOC well edge   water-calm
       yes, San Dionisio, well it's on the sea shore

    c. n-uu-ni **ruaa** ti   bolsa   **Locative**
       STA-is-3I around INDF bag
       it is around the edge of a bag

    These examples also show that distinguishing noun phrases from prepositional phrases in JCH is not possible from mere examination of surface forms. However, a number of diagnostics have been developed for Zapotecan languages for distinguishing these two types of constructions (Lillehaugen and Sonneschein 2012). Unlike nouns, prepositions cannot be modified with quantifiers/numbers, plural markers, or determiners. Examples 4a-c show how the BPT *ñee* 'foot,' when functioning as a noun, can be modified in these ways.

(4) a. n-apa-be   chupa ñee-be
       STA-have-3H two   foot-3H
       She has two feet

    b. n-aná   ca ñee-be
       STA-hurt PL foot-3H
       His feet hurt

    c. Na-quichi ñee que
       STA-white foot DET
       That foot is white

Examples 5a-c illustrate that these modifications are not allowed for BPTs functioning as

prepositions.

(5) a. n-uu-ca-ni *chupa ñee-be
         STA-is-PL-3I two foot-3H
         Bad with any meaning; cannot mean *They are on her two feet*

     b. n-uu-ca-ni   *ca ñee-be
         STA-is-PL-3I   PL   foot-3H
         Bad with any meaning; cannot mean *They are on her feet*

     c. n-uu-ca-ni   ñee *ca gunaa ca
         STA-is-PL-3I foot   DET woman DET
         Bad with any meaning; cannot mean *They are on the foot of the woman*

     Also unlike nouns, prepositions are allowed as adjuncts of intransitive verbs.

Example 6a shows that the prepositional phrase *ñee de* 'at the foot of the mat,' is

permitted as an adjunct of the intransitive verb 'sleep.' Example 6b shows that a noun is

not permitted as an adjunct of this verb.

(6) a. ni-si-asi-be   ñee de
         STA-CAUS-sleep-3H foot mat
         She is asleep at the foot of the mat

     b. ni-si-asi-be   *de
         STA-CAUS-sleep-3H mat
         Bad with any meaning; cannot mean *She is asleep on the mat*

     Finally, the categorical selection requirements of certain verbs may help diagnose

the status of BPTs. Following Lillehaugen and Sonneschein (2012:10), categorical

selection (c-selection) is taken as the ability of verbs to require a complement of a certain

grammatical category, and semantic selection (s-selection) is taken as the ability of verbs

to a require a complement of a certain semantic type. Verbs used in the JCH Basic

Locative Construction are of four types: the existential copula; positional, which focus on

the classification of the Figure; locational, which focus on the Figure-Ground

relationship; or motion. Few of the verbs used in such constructions are transitive in JCH,

so it is difficult to test for c-selection, but a few somewhat rare transitive forms emerged

in my pilot study data (collected using the Topological Relations Picture Series

(Bowerman and Pederson 1992)). The locative verbs *rigapi* 'grab onto' and *rusegu* 'stop,

seal' both select for and require a locative complement; usages are illustrated in 7a-b.

(7) a. na-gapi-ni lu doo ca
STA.grab.3I on rope DET
It is attached to the rope

b. nu-segu-ni ruaa boteya ca
STA.seal.3I mouth bottle DET
It is sealing the mouth of the bottle

Examples 8a-b demonstrate, however, that a non BPT noun phrase cannot be selected as

a complement of these verbs. Furthermore, 8c-d show that even BPTs that have

exclusively nominal functions cannot be selected as a complement. These diagnostics

show that BPTs used as prepositions differ syntactically from those that can only function

as nouns such as *guicha* 'hair' and *dyaga* 'ear.'

(8) a. na-gapi-ni *doo ca
STA-grab-3I rope DET
Bad with any meaning; cannot mean *It is attached to the rope*

b. nu-segu-ni *boteya ca
STA-seal-3I bottle DET
Bad with any meaning; cannot mean *It is sealing the mouth of the bottle*

c. na-gapi-ni *guicha-ique'
STA.grab.3I hair-head.1SG
Bad with any meaning; cannot mean *It is attached to my hair*

d. nu-segu-ni *dyaga'
STA-seal-3I ear.1SG
Bad with any meaning; cannot mean *It is sealing my ear*

Positional predicates in JCH s-select for features of the geometry of the Figure. For example, the verb *ruzuhuaa* 'stand' selects for a Figure with upright geometry, while the verb *riguixhe'* 'lie' selects for a figure with flat geometry. Therefore, the utterance in 9a is felicitous for Topological Relations Picture Series image 8, while the utterance in 9b is infelicitous.

(9) a. zu-huaa-ni lu <u>librero</u> ca
STA-stand-3I on.face bookshelf DET
It is standing on the shelf

b. #n-exhe-ni lu <u>librero</u> ca
STA-lie-3I on.face bookshelf DET
It is lying on the shelf
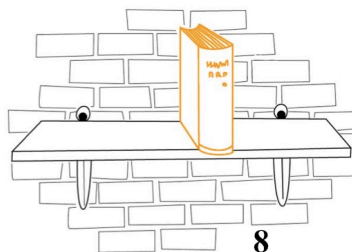
Locational predicates in JCH s-select for features of the relationship between Figure and Ground. For example, the adjective-verb *dxi'ba* 'mounted' selects for a Figure-Ground relationship that is not one of CONTAINMENT. Thus, it cannot occur felicitously with the preposition *ndaani* 'in, inside', which encodes the notion of CONTAINMENT. Thus, 10a can be said of image 34, but 10b would be quite odd to say of image 47.

(10) a. dxi'ba-be ique' ti yoo
mounted-3H on.top.of INDF house
He is mounted on top of a house

b. #dxi'ba-me   ndaani ti   <u>caja</u> huiini'
   mounted-3A inside INDF box little
   He is mounted inside the little box

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Another subset of JCH Relators are non-Body Part Term prepositions. These may be divided into "native terms" and "non-native terms." Native prepositions are derived diachronically from BPTs, but no longer have referential or partitive functions. These include terms such as *xaguete'* 'below,' and *luguiá'* 'above.' Non-native prepositions are usually borrowed from Spanish and likewise have only locative functions. Some examples include *fuera de* 'outside of,' and *atrá*, 'behind.' Native and non-native terms are distinguished syntactically in that the native terms take bound pronouns as objects, while non-native terms take free pronouns as objects (Lillehaugen and Sonneschein 2012:23). The term *frente de* 'in front of' is of note because even though it is a Spanish loan, it takes a bound pronoun as its object and so may be considered a "native" preposition. Examples appear in 11a-c.

(11) a. cá-ca-ni   luguia-ni
          attached-PL-3I above-3I
          They are attached above it

      b. zuhuaa-du   frente-ni
          STA-stand-1.PL.EXCL front-3I
          We are standing in front of it

      c. nuu-me fuera   de laa-ni
          is.3A   outside of PRON-3I
          He is outside of it

Now we turn to the semantics of JCH Relators. Given Jackendoff's (1983) typology of locatives that encode THING or PLACE, some Body Part Terms encode only THING, while others also encode PLACE. Non-BPT prepositions may encode only PLACE, or both THING and PLACE. One way to determine whether a given term encodes the notions of THING and PLACE is to test the felicity of expressions using the term to designate a region projected from an object in non-canonical position. For example, 12a shows that the BPT *xa'na* 'bottom' encodes a location adjacent to or projected from a particular THING, here, the bottom of the chair, whether the chair is in canonical or non-canonical position (Figures 3.1a and 3.1b). However *xa'na'* 'bottom' cannot encode a PLACE under the chair that is adjacent to or projected from some part besides its bottom (Figure 3.1c). In contrast, the non-BPT preposition *xaguete'* 'under,' can be used exactly like the term *xa'na'* 'bottom' to describe a region adjacent to or projected from the chair's bottom in canonical or non-canonical position; and it can designate the PLACE 'under the chair' even when this region is not adjacent to or projected from the chair's bottom (Example 12b).

(12)   a.   nuuni **xa'na** asientu ca
         n-uu-ni   xa'na   asientu   ca
         STA-is-3I   bottom/under   chair   DET
         It is under the chair/at the chair's bottom
         Felicitous for Figures 3.1a and b, but not c.

      b.   nuuni **xaguete'** asientu ca
         n-uu-ni   xaguete'   asientu   ca
         STA-is-3I   bottom/under   chair   DET
         It is under the chair/at the chair's bottom
         Felicitous for figures 3.1a, b, or c.

| (a) B&C-1.2 | (b) B&C-1.6 | (c) B&C-7.6 |
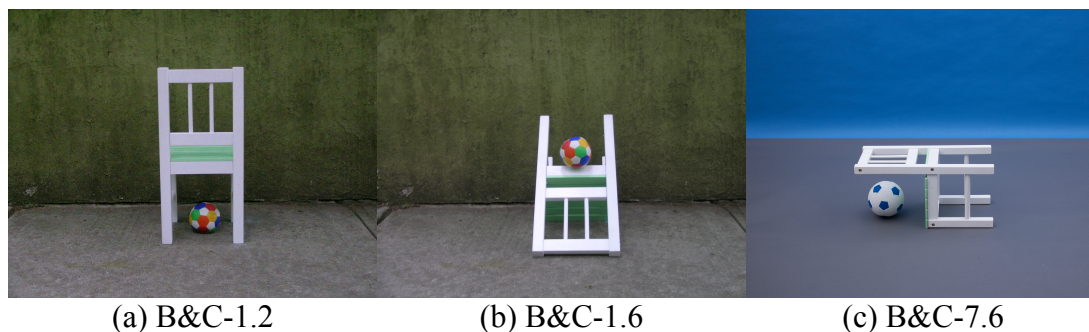
Figure 3.1: Ball & Chair images showing the chair in canonical and non-canonical positions (Bohnemeyer & Pérez Báez 2008a).

An example of a BPT that encodes both THING and PLACE is *deche* 'back.' An example from the current corpus appears in (13), in which the speaker uses the meronym *deche* 'back,' as a preposition in an object-centered utterance. Prepositions in JCH take a noun phrase as a complement, which is the Ground Phrase in the context of this task.

(13)

P		**FP**	**R**	**GP**	
layú	nexhe	-ni	deche	asientu	ca
ground	STA.lie	-3I	back	chair	DET

It is lying on the ground at the back of/behind the chair [ZD21&ZD22-2.11]

Here, *deche* 'back,' both partitions the chair and locates the ball in relation to that partition. Like the Spanish example above, the relator is ambiguous in that it can have both adjacent and projective readings. Without seeing the corresponding photograph, this example is also ambiguous in that in could have either an object-centered or egocentric reading. In an object-centered use, the ball would be near the chair's back but not necessarily behind it from the speaker's perspective; and in an egocentric use, the ball would be obscured by the chair but not necessarily at or near its back. Among JCH meronyms that function as prepositions, *deche* 'back' is unique in having this latter kind of ambiguity. Both usages appeared in my corpus of elicited language on the Ball and Chair task. Terms that encode both THING and PLACE, then, are underspecified in the

dimension of CONTACT, meaning they are ambiguous in their denotation of regions

adjacent to an object or subpart, or regions projected from an object or subpart.

Indeed, the expression of the object-centered FoR is very similar to the expression of

topological relations—those in which the Figure and Ground objects are in contact—in

both JCH and Spanish.

Much less will be said here about Spanish prepositions because I do not purport to

make any argument concerning their grammatical properties. I report only a few relevant

details from the literature. Most descriptive work has suggested that the Spanish category

P be divided into two classes: "simple" and "complex" (e.g. Bosque 1997). These are

also sometimes called "grammatical" and "lexical" (e.g. Delicado Cantero 2013). This

distinction is based on both syntactic and semantic properties. Simple Ps are mono-

morphemic and semantically encode a topological spatial relation between Figure and

Ground. They are said to be more semantically "empty." Complex Ps usually include

more than one morpheme or did historically, s-select for features of the Figure/Ground

relationship, and are more semantically rich (Ursini 2013). While much has been written

on the syntax of Spanish prepositions and on the encoding of PATH of motion in Spanish

prepositions (Acedo-Matellán & Mateu 2008), little has been written specifically on the

semantics of Spanish prepositions used in static spatial descriptions. In this chapter, the

distinction in semantics between the simple and complex types of Spanish prepositions

will be of relevance.

3.5 Methodology

In order to investigate spatial language use among bilinguals in Juchitán, a classic director-matcher task was used. This version, "Ball & Chair," was developed by MesoSpace researchers (Bohnemeyer 2013) and modeled after the MPI Cognitive Anthropology Research Group's "Man & Tree" task (Pederson et al. 1998). As part of the MesoSpace project, Gabriela Pérez Báez conducted the Ball & Chair task with speakers of JCH in the neighboring town of La Ventosa (Pérez Báez 2011). Her data will be compared with the Juchitán data reported here. Picture matching tasks are a useful way to explore the inventory of spatial terminology in a language because they are interactive. Participants must often negotiate ambiguities together, which helps elicit a large range of the spatial language at their disposal.

3.5.1 Participants

Forty-eight participants completed the task, each participating in 24 trials. Their ages ranged from 12-59, and 18 were male. Participants were categorized according to language dominance as Spanish-monolingual (SM, n=2), Spanish-dominant (SD, n=16), Balanced Bilingual (BB, n=16), or JCH-dominant (JD, n=14). Language dominance was determined on the basis of the holistic language use interview discussed in the Introduction of this dissertation. All JD and BB participants were native speakers of JCH; they differed only in their relative command of Spanish. Most JD participants had at least passive competence in Spanish, and some spoke Spanish quite well, having learned it as teenagers or adults. BB participants were fluent Spanish speakers who learned Spanish as young children, usually upon starting school. SD participants were all natives of Juchitán who grew up in JCH-speaking households but, for various reasons, did not acquire JCH

as children. Most had passive competence in JCH, but none would dare speak more than a few token words in public for fear of ridicule. SM participants were not native to Juchitán and had no understanding of JCH; their data were excluded from the following analyses.

SD and JD participants did the task once in their dominant language. Eight primary BB participants did the task once in each language, in sessions separated by several months, with the language order counterbalanced. Eight additional BB participants completed the task once in one language. Each participant completed the task with a partner with whom they habitually speak the task language. These details about the participants are summarized in Table 3.2, below.

3.5.2 Procedure

The task was set up with two identical tables at which the two participants sat, facing the same direction, but separated by a barrier—in this case, a hanging sheet. The task was always conducted in the _corredor_ of the home, a covered, outdoor patio typical of houses in the Isthmus region. Participants sat with their backs to the house, facing the yard or street, and the camera was positioned in front of them. Sessions were recorded with video and auxiliary audio on each participant.

The stimuli consisted of 4 series of 12 photographs each. Each photograph depicts a chair and a soccer ball, in various orientations and relationships to each other. An identical set of each series was presented to each participant, but with the photographs in a different order. A sample stimulus photo may be seen in Table 3.1, above.

Table 3.2: Participants who completed the Ball & Chair Task.

	Primary Participant			JCH Task Partner			Spanish Task Partner		
	ID	Age	Sex	ID	Age	Sex	ID	Age	Sex
JCH Dominant Group	JD17	50s	F	JD18	30s	F			
	JD19	30s	F	BB20	30s	F			
	JD21	50s	F	JD22	30s	F			
	JD23	50s	F	JD24	50s	M			
	JD25	50s	F	JD26	50s	F			
	JD27	40s	M	JD28	40s	M			
Spanish Dominant Group	SD29	30s	F				SD30	10s	M
	SD31	20s	F				SD32	10s	M
	SD33	30s	F				BB34	30s	F
	SD35	20s	M				BB36	40s	F
	SD37	40s	M				SD38	40s	M
	SD39	20s	M				SD40	20s	F
Balanced Bilingual Group	BB41	30s	F	BB42	10s	M	SD67	10s	F
	BB43	30s	M	JD44	30s	F	SD45	10s	F
	BB46	10s	F	JD47	40s	F	SD48	10s	F
	BB49	20s	F	BB50	20s	M	SD51	10s	F
	BB55	40s	M	BB57	40s	F	SM56	40s	F
	BB58	40s	M	JD60	40s	F	SD59	10s	M
	BB61	30s	M	BB63	30s	F	SD62	10s	F
	BB64	50s	F	BB66	10s	M	SM65	50s	M

The participants received oral instructions in the task language from a native speaker of the task language. Participants usually took their cue about which language to use on the task from these instructions and from the possibilities afforded by their partner's competence, but if they asked which language they should speak, they were instructed to speak in the designated task language. The primary participant began in the role of "director." She began by selecting any photo from the first series and describing it to the "matcher" until he was able to locate the matching photo from among his array. The matcher was permitted to ask clarifying questions. The director continued in this manner until the matcher had matched all 12 photographs. The participants switched

roles each time for the remaining 3 series of photos, so that each participant described a total of 24 photographs.

3.5.3 Coding and Analysis

All audio was transcribed using Elan. For each trial, the utterance that was successful in directing the matcher to the correct photograph was coded. "Facing information", or the information pertaining to the orientation of the chair was coded according to FoR, while "Standing information," or that pertaining to the location of the ball relative to the chair, was coded separately according to FoR. Although initially a more detailed coding scheme was used, only four FoR categories emerged with any frequency. Thus, the FoR categories reported here include Absolute (A), Geo-centered (G), Egocentric (E), Object-centered (O), and any combinations of the three that were used together in the same successful utterance. These latter type were coded as Mixed (M) and also coded to specify which frames of reference were included in the mixture. In total, 1,344 trials were coded.

All statistical analyses used a statistical significance threshold of alpha = .05. Statistical analyses were conducted on the basis of the following five measures, which were calculated for each participant, for each session:

1) proportion of trials containing a geo-centered response to describe Facing information;
2) proportion of trials containing an egocentric response to describe Facing information;
3) proportion of trials containing an absolute response to describe Standing information;
4) proportion of trials containing an egocentric response to describe Standing information;

5) proportion of trials containing an object-centered response to describe Standing information.

Object-centered responses used to describe the Facing information of the chair were omitted because they were infrequent, and because the nature of the task is to treat the chair as a Ground object, which precludes use of object-centered strategies. For example, if a participant were to say, by way of describing the orientation of the chair, "The chair is against the wall," this is not truly Facing information, since now the wall is treated as the Ground object, and the chair's location described with reference to that.

For each participant for each session, a "dominant strategy" was determined. The participant's dominant strategy for facing information consisted of the frame of reference they used on more than half of trials that were coded as either Geo-centered or Egocentric, not including any coded as Mixed. The dominant strategy for standing information consisted of the frame of reference used on more than half of trials coded as Absolute, Egocentric or Object-centered, not including any coded as Mixed. One JCH-dominant participant had no dominant strategy for facing information, meaning that half of his trials were geo-centered, and half, egocentric. One Spanish-dominant participant had no dominant strategy for standing information. Half his trials were egocentric, half object-centered, and none absolute.

3.6 Results

3.6.1 Dominant Strategy

The three groups differed in their choice of frame of reference to describe facing information. Overall, more participants adopted an egocentric strategy, although the

prevalence of egocentric participants increased systematically with increasing Spanish dominance (JD = 7/13, BB = 14/24, SD = 12/16), although this difference was only marginally significant at the alpha = .05 level (p = .098, Fisher's Exact Test[2]) (Figure 3.2).

The three groups did not differ significantly in their dominant strategy for describing standing information. All groups overwhelmingly used the object-centered FoR. Only one Balanced Bilingual, one Spanish-dominant, and two JCH-dominant participants used the absolute FoR as their dominant strategy. Only two Spanish-dominants and one JCH-dominant favored the egocentric FoR (Figure 3.3).

By way of illustrating some of the ways that these spatial frames of reference are expressed in JCH and Juchitán Spanish, we can posit a Canonical Response for each language dominance group. For JCH-dominant speakers, the canonical response would use the geo-centered FoR for facing information, and the object-centered FoR for standing information (A/O). For both the balanced bilinguals and the Spanish-dominant speakers, the canonical response would employ the egocentric FoR for facing information and the object-centered FoR for standing information (E/O). Examples of each canonical response for each group follow below.

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[2] Fisher's exact test is used to analyze count data in contingency tables. It measures whether the distribution of responses along one variable (i.e., frame of reference) differs along the other (i.e., language dominance).
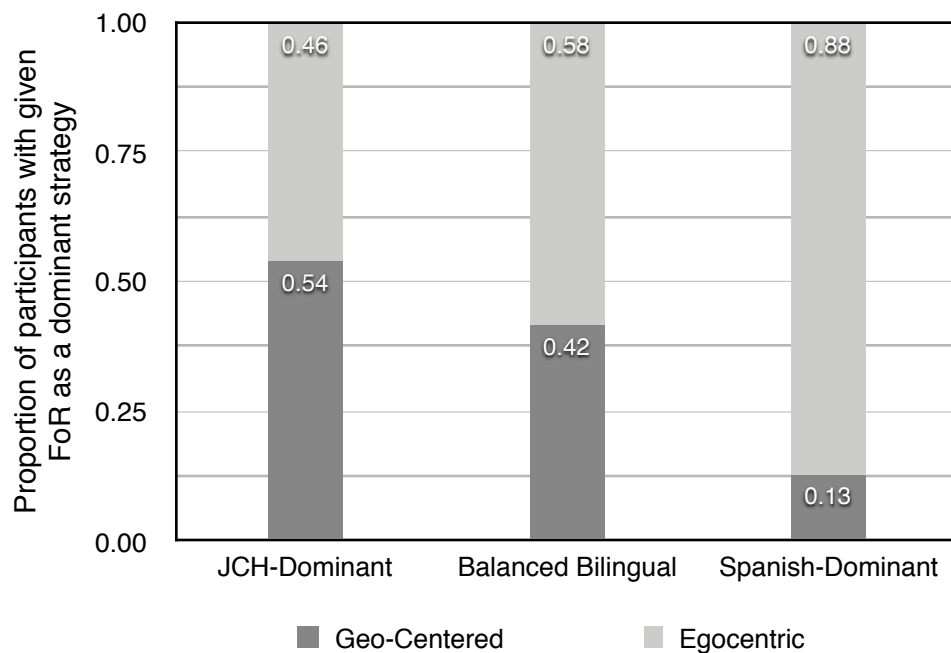
Figure 3.2: Dominant FoR Strategy by Group for Facing Information
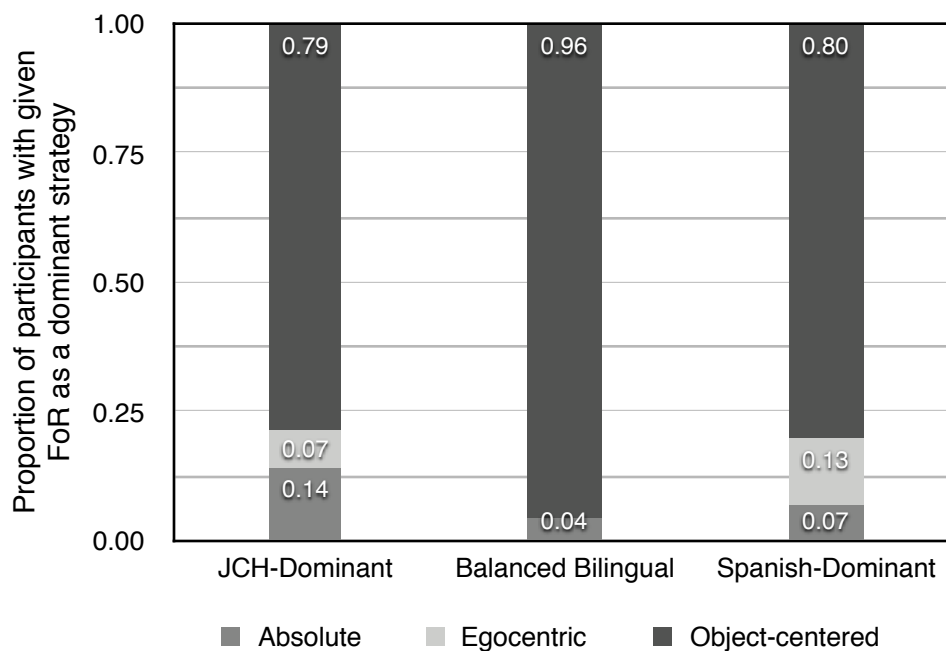
Figure 3.3: Dominant FoR Strategy by Group for Standing Information

In Transcript 3.1, a JCH-dominant speaker expresses geo-centered facing direction using the JCH cardinal direction term, *guete'*, 'south', and expresses the location of the ball using an object-centered strategy that employs the Spanish loan word *atrá*, 'behind.'

Transcript 3.1: A/O response by JCH-dominant in JCH

1. JD27 sti asientu di la, ma zuhuaani la,

s-ti	asientu	di	la	ma	zu-huaa-ni	la
POSS-INDF	chair	DET	FOC	now	STA-stand-3I	FOC

This other chair is standing now,

2. nudxiilúni guete'

n-u-dxii-lú-ni	guete'
STA-CAUS-give-face-3I	south

it is facing south,

3. atrá de laani la,

atrá	de	laa-ni	la
behind	of	PRON-3I	FOC

behind it

4. nexhe ti pelota

n-exhe	ti	pelota
STA-lie	INDF	ball

a ball is lying,
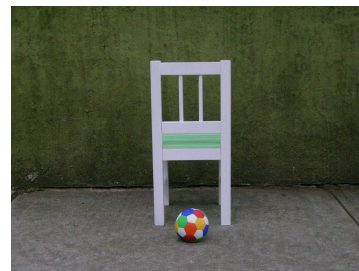
[JD27&JD28-1.7]

In Transcript 3.2, a Balanced Bilingual speaking in JCH expresses the orientation of the chair using an egocentric strategy with terms for 'right' and 'left' (she tries both because her interlocutor is having difficulty finding the matching photograph). JCH uses a Spanish loan for 'right,' and a native term for 'left.' She then describes the position of the ball relative to a part of the chair, namely, its 'feet,' using the word *neza*, 'road, toward,' to specify a region projected from the chair's feet.

Transcript 3.2: E/O response by Balanced Bilingual in JCH

1.	BB57	asientu ca la zuhuaani de ladu la,					
		asientu	ca	la	zu-huaa-ni	de	ladu	la
		chair	DET	FOC	STA-stand-3I	of	side	FOC

The chair is standing to the side,

2.	ra ribi'nu ca nuu ladu derechu la,					
	ra	ri-bi'-nu	ca	n-uu	ladu	derechu	la
	LOC	HAB-sit-1PL.INCL	DET	STA-is	side	right	FOC

where we sit is on the right side,

3.	co', ladu biga'		
	co'	ladu	biga'
	no	side	left

no, the left side,

[BB55&BB57-4.3]

4.	ne nexhe pelota ca		
	ne	n-exhe	pelota	ca
	and	STA-lie	ball	DET

and the ball is lying on the ground,

5.	neza ñeeni ca, entre galahui' de ñeeni ca						
	neza	ñee-ni	ca	entre	galahui'	de	ñee-ni	ca
	road	foot-3I	DET	between	center	of	foot-3I	DET

toward its feet, between the center of its feet

Finally, in Transcript 3.3, a Spanish-dominant participant uses an egocentric FoR to describe the orientation of the chair as 'looking toward the right side.' The Spanish term *atrás*, 'behind,' is used with an object-centered interpretation to describe the ball as being located behind the chair from the object's perspective, rather than from the perspective of the viewer of the photograph.

Transcript 3.3: E/O response by SD in Spanish

1	SD29	la	siguiente la	silla está	viendo	hacia	lado derecho

la   siguiente la   silla está   viendo   hacia   lado derecho
DET.F next   DET.F chair is.PRS.IND look.PROG toward side right
The next one, the chair is looking toward the right side

2   y hay una   pelota atrás   de la   silla
and is   INDF.F ball   behind of DET.F chair
and there is a ball behind the chair

[SD29&SD30-3.11]

3.6.2 Effects of Language Dominance

Pairwise comparisons revealed a significant difference between JD and SD participants on all frame of reference dimensions of this task. This finding was in line with the typological hypothesis, which predicted that some formal properties of each linguistic code drive frame of reference choices in that language. In the expression of facing information, JCH-dominant participants (M = .29) relied more often on a geo-centered strategy than did Spanish-dominant participants (M = .28) (p = .015, Mann-Whitney). Meanwhile, egocentric responses were more prevalent among Spanish-dominant participants (M = .53) than among JCH-dominant participants (M = .23), a significant difference (p = .002, Mann-Whitney). In the expression of standing information, JCH-dominants (M = .18) relied more often on the absolute FoR than did Spanish-dominants (M = .04) (p = .013, Mann-Whitney). Spanish-dominants (M = .4) relied more on the egocentric FoR than did JCH-dominants (M = .18) (p = .002, Mann-

Whitney). There was also a significant difference in proportions of object-centered responses for the two groups, with JCH-dominants (M = .78) relying on it more often than did Spanish-dominants (M = .65) (p = .05, Mann-Whitney). These results are summarized in Figure 3.4.

Pairwise comparisons of JCH-dominant participants with Balanced Bilinguals who did the task in Spanish (BBS); and Spanish-dominant participants with Balanced Bilinguals who did the task in JCH (BBJ) also yielded some significant differences in the direction predicted by the typological hypothesis. In the expression of facing information, BBS participants (M = .47) used significantly higher proportions of egocentric responses than did JD participants (M = .23) (p = .043, Mann-Whitney); but there was no significant difference between the groups in the use of the geo-centered FoR (p = .242). The SD participants (M = .53) relied more often on an egocentric FoR compared to BBJ participants (M = .23) (p = .005, Mann-Whitney); and BBJ participants (M = .27) relied more on the geo-centered FoR compared to SD participants (M = .08) (p = .054, Mann-Whitney). These results are summarized in the "facing information" portions of Figures 3.5 and 3.6.

In the expression of standing information, the JD and BBS groups differed significantly only in absolute responses, with the JD participants (M = .18) relying on it more often than did the BBS participants (M = .05) (p = .03, Mann-Whitney). The two groups did not differ significantly in proportions of egocentric or object-centered responses. However, the SD and BBJ participants differed in their use of all three frames of reference in the expression of standing information. The BBJ participants (M = .15) relied more often on an absolute strategy than the SD participants (M= .04) (p = .049,
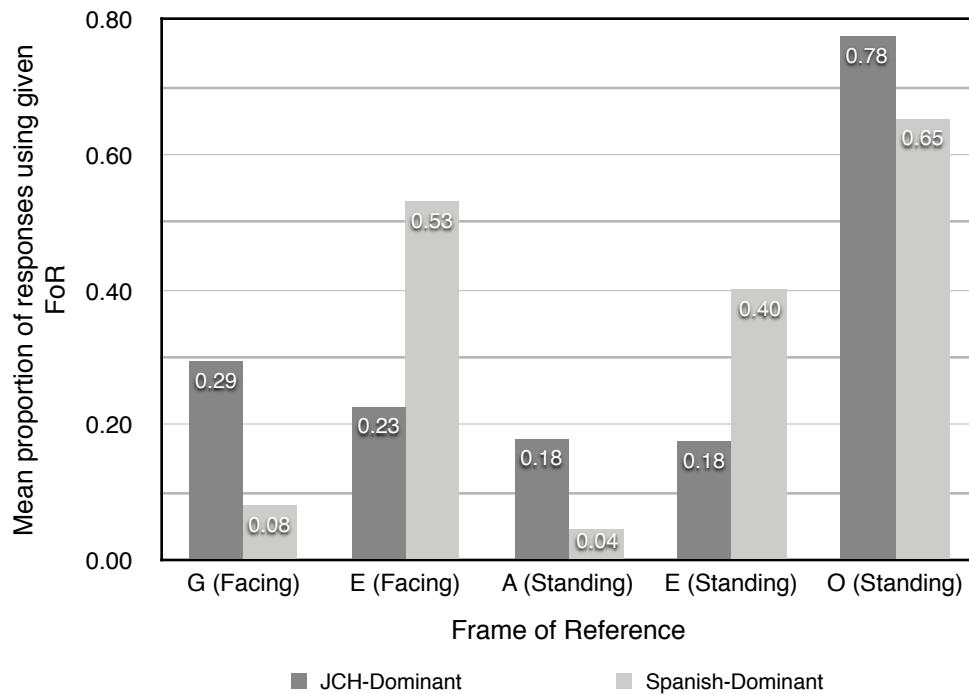
Figure 3.4: Comparison of Frame of Reference Choice Between JCH-Dominant and Spanish-Dominant Groups. G=Geo-centered; E=Egocentric; A=Absolute; O=Object-centered.
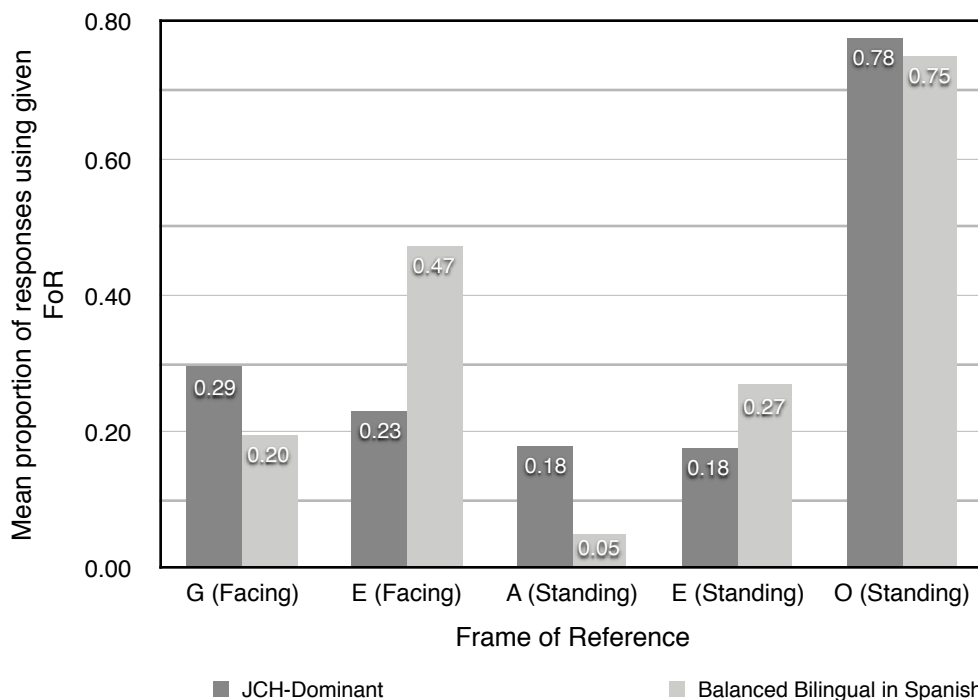
Figure 3.5: Comparison of Frame of Reference Choice Between JCH-Dominants and Balanced Bilinguals Speaking in Spanish. G=Geo-centered; E=Egocentric; A=Absolute; O=Object-centered.
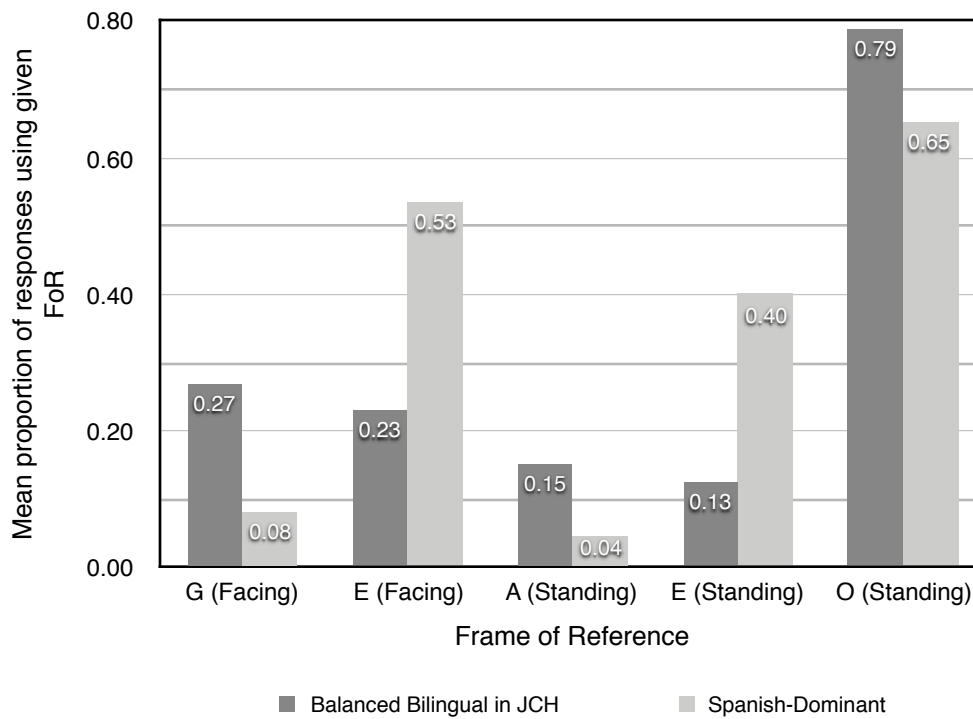
Figure 3.6: Comparison of Frame of Reference Choice Between Spanish-Dominants and Balanced Bilinguals Speaking in JCH. G=Geo-centered; E=Egocentric; A=Absolute; O=Object-centered.

Mann-Whitney); and more often on an object-centered strategy (M = .79) than the SD

participants (M = .65) (p = .038, Mann-Whitney). In turn the SD participants (M = .4)

relied more on the egocentric FoR than the BBJ participants (M = .13) (p = .0006, Mann-

Whitney). These results are summarized in the "standing information" portions of Figures

3.5 and 3.6.

There were no significant differences between the JD and BBJ groups, or between

the SD and BBS groups for either facing or standing information, demonstrating that,

when speaking the same language, the Balanced Bilinguals performed very much like the

unbalanced bilinguals.

3.6.3 Effects of Operational Language

Although only eight participants completed the task in both languages, I

conducted exploratory analyses to investigate the targeted impact of operational language

on individuals' frame of reference use. Each participant was categorized on the basis of

the frame of reference they used predominantly. For the expression of facing information,

there were no significant differences between operational languages in the rate at which

participants adopted one FoR over the other. The mixture of responses could provide

evidence for the bilingualism hypothesis, which predicted that bilingualism itself may

influence frame of reference choice more strongly than typological factors.

In the expression of standing information, however, a systematic pattern emerged

that followed the prediction of the typological hypothesis. Across all sessions, most

participants relied primarily on an object-centered or egocentric FoR. When speaking in

Spanish, most (n=6) participants relied primarily on an egocentric FoR and only 1 relied

on an Object-centered FoR. The pattern reversed in JCH, with not a single participant

relying on an egocentric FoR and most (n=6) relying on an object-centered FoR. Thus,

preference for FoR differed significantly by operational language (p = .005, Fisher's

Exact Test).

3.6.4 Effects of Location of Residence

An additional analysis was performed comparing the data from Juchitán to data

collected in La Ventosa, a town of 4,844 located about 16 kilometers from Juchitán,

where residents are also bilingual speakers of Juchitán Zapotec and Spanish. As part of

the MesoSpace project, Gabriela Pérez Báez conducted the same Ball & Chair task

reported on here, as well as three additional spatial language and reasoning tasks. Her

data, as reported in Pérez Báez 2011, are those used for the following analysis. Pérez

Báez conducted the Ball & Chair task exclusively in JCH with 12 native speakers of JCH

who were all also bilingual in Spanish. Although she does not report relative levels of

bilingual proficiency, she does report that all but two participants were literate in

Spanish, and those same two were the only ones not to have attended school (948). Six of

the La Ventosa participants attended high school, suggesting high Spanish proficiency. It

is likely then, that the two participants with no schooling would be further along the

spectrum toward "JCH-dominant," while the other ten would fall closer to "Balanced

Bilingual." In general, census data show that La Ventosa has levels of bilingualism

comparable to those found in Juchitán. In La Ventosa, 56% of the population speaks an

indigenous language, and 2.6% speaks no Spanish. In Juchitán, 58% of the population

speaks an indigenous language, and 3.6% speaks no Spanish (INEGI 2010). The two

towns are also virtually identical on measures that have been used (e.g. Polian &
Bohnemeyer 2011) to distinguish "urban" from "rural" populations, such as households
with a dirt floor (Juchitán 4.22%/La Ventosa 4.86%), households without indoor tap
water (5.12%/6.82%), households with a refrigerator (80.98%/80.31%), and households
with a car (21.44%/21.31%). Thus, there is no reason to suppose that the La Ventosa
participants have any less exposure to Spanish, or lower levels of Spanish proficiency,
than the Juchitán participants.

Given this, the La Ventosa data are surprising for their homogeneity compared to
the Juchitán data. Pérez Báez reports that 78% of all descriptions of the facing
information of the chair used the geo-centered FoR, while 0% used the relative. For
standing information, a range of strategies was used, but only 3% of responses used the
relative FoR (953). For the present analysis, proportion of geo-centered and egocentric
responses per dyad were calculated, using the raw data reported by Pérez Báez. Frame of
reference categories were collapsed to match the typology used for the Juchitán data; this
consisted of combining her "relative" and "direct" responses into an "egocentric"
category. "Absolute" responses were equivalent in both data sets for standing
information. Expressions of facing information coded by Pérez Báez as "absolute" are
here termed "geo-centered." These proportions by dyad were compared to proportions by
speaker for each of the four Juchitán groups.

The rate at which participants adopted particular frames of reference differed
significantly between La Ventosa and Juchitán across nearly all dimensions. This finding
that lends strong support in favor of the cultural practices hypothesis. In the expression of
facing information, La Ventosa speakers (M = .81) adopted a geo-centered strategy more

often than did Juchitán's JCH-dominants (M = .29) (p = .007, Mann-Whitney), Balanced

Bilinguals speaking in JCH (M = .27) (p = .001, Mann-Whitney), Balanced Bilinguals

speaking in Spanish (M = .2) (p = .005, Mann-Whitney), and Spanish Dominants (M =

.08) (p = .0003, Mann-Whitney). La Ventosa speakers (M = 0) adopted an egocentric

strategy far less often than did Juchitán's JCH-dominants (M = .23) (p = .001, Mann-

Whitney), Balanced Bilinguals speaking in JCH (M= .23) (p = .014, Mann-Whitney),

Balanced Bilinguals speaking in Spanish (M=.47) (p = .0007, Mann-Whitney), and

Spanish Dominants (M = .53) (p = .0002, Mann-Whitney). These results are summarized

in Figure 3.7.

For the expression of standing information, La Ventosa speakers adopted an

absolute strategy more often than did Juchitán's JD participants (M = .18) (p = .023,

Mann-Whitney), BBJ participants (M = .15) (p = .026, Mann-Whitney), BBS

participants (M = .05) (p = .005, Mann-Whitney), and SD participants (M = .04) (p =

.001, Mann-Whitney). La Ventosa speakers (M = .03) adopted an egocentric strategy less

often than did Juchitán's JD participants (M = .18) (p = .005, Mann-Whitney), BBS

participants (M = .27) (p = .002, Mann-Whitney), and SD participants (M = .4) (p =

.0002, Mann-Whitney). Only the comparison with the BBJ participants for egocentric

standing information did not reach significance. The La Ventosa speakers (M = .26)

relied less on the object-centered FoR than did any of the Juchitán participants, by

language-dominance group: JD (M = .78) (p = .0003, Mann-Whitney), BBJ (M = .79) (p

= .0009, Mann-Whitney), BBS (M = .75) (p = .0007, Mann-Whitney), and SD (M = .65)

(p = .005, Mann-Whitney). These results are summarized in Figure 3.8.
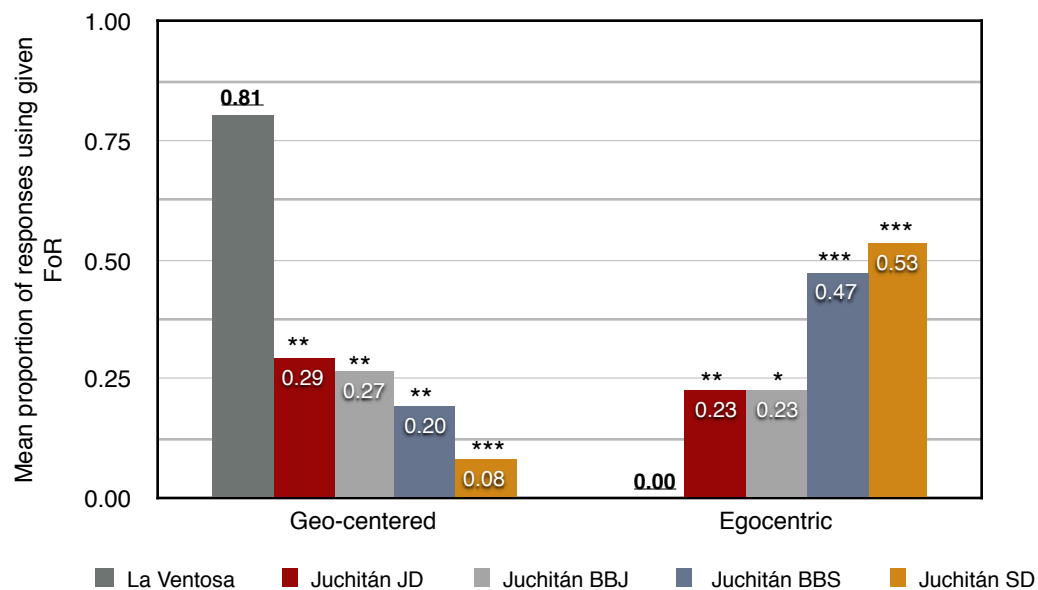
Figure 3.7: Comparison of frame of reference choice between speakers in La Ventosa and groups in Juchitan, facing information.
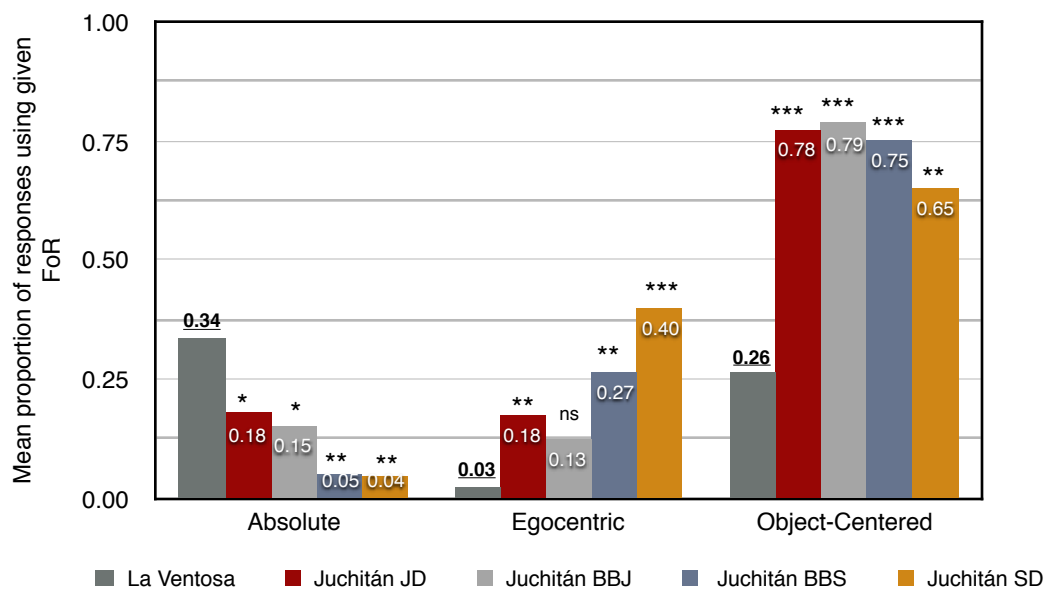
Figure 3.8: Comparison of frame of reference choice between speakers in La Ventosa and groups in Juchitan, standing information.

3.7 Discussion

The present study reports data from a spatial language elicitation task designed to untangle some of the variables that might influence the frame of reference a speaker chooses when communicating spatial relationships. The design took advantage of the natural variability in linguistic repertoires among residents of Juchitán in order to identify possible correlates of variability in spatial frames of reference preferences. The variables investigated included language dominance, operational language use, and town of residence.

The results show that both language dominance and operational language predicted frame of reference choice *in some cases*. Specifically, language dominance predicted frame of reference choice most reliably when the Spanish Dominant group was compared with either of the JCH-speaking groups. When the two JCH-speaking groups were compared, however, language dominance predicted FoR choice only for two of the five variables. Furthermore, there were no significant differences between the groups when compared in the same language, e.g. when Balanced Bilinguals speaking Spanish were compared to Spanish Dominants speaking Spanish. For the Balanced Bilingual group, operational language predicted frame of reference choice reliably for standing information, but not for facing information. First, this suggests that the distinction between standing and facing information is an emically valid one; because they do not pattern identically, they must be encoding distinct types of information from the perspective of one or both of the languages. Second, this finding points to this distinction as a possible clue in the search for formal typological features predictive of FoR choice. It further points to the need for distinctions in the FoR typology that can account for this

difference. Finally, the comparison of the Juchitán data with data from La Ventosa shows that the pattern found in Juchitán does not hold across all communities of speakers of these same two languages. This result suggests that formal typological explanations are insufficient for describing local patterns in frame of reference preferences. In the discussion that follows, I offer some possible interpretations of these patterns in the data, and discuss the implications of this research for theories of semantic typology, bilingual thought, and linguistic relativity.

3.7.1 Variability across populations: Implications for typological approaches

The comparison of data from Juchitán and La Ventosa reveals that two populations that speak the same two languages, are separated by only 16 kilometers, and are virtually identical in statistics for bilingualism and urbaneness, can differ substantially in their styles of communicating spatial information. Participants in La Ventosa overwhelmingly disfavored the egocentric frame of reference, using it not at all to describe the orientation of the chair in the stimulus photographs, and only minimally to describe the relationship of the ball to the chair. The La Ventosa participants overwhelmingly favored the geo-centered FoR for facing information, and slightly favored the absolute, with object-centered being a close second, for standing information. This is in contrast to the Juchitán participants, who favored the egocentric FoR for both facing and standing information. Furthermore, the JCH-Dominant and Balanced Bilingual participants—those who came closest to resembling the La Ventosa participants—were evenly split between egocentric and geo-centered dominant strategies for facing information, and overwhelmingly had the object-centered FoR as a dominant

strategy for standing information. The result, then, is two different Dominant Response types for the two communities of JCH-speakers:

	Facing	**Standing**
Juchitán	Geo-centered/Egocentric	Object-Centered
La Ventosa	Geo-centered	Absolute/Object-Centered

This has implications for approaches to linguistic typology because it suggests that formal typological differences are insufficient to explain variation in communicative styles across populations. If two groups of speakers of the same Mesoamerican language, with the same productive meronym system, rely on different frames of reference on this task, it seems unlikely that meronymy drives FoR preferenes. Perhaps even stranger, all Juchitecos, regardless of language group, used more object-centered responses—the type that employ meronyms—than did the La Ventosa participants (Figure 3.8). More broadly, this comparison illustrates the difficulty in confirming the relevance of correlations discovered between semantic and syntactic phenomena. Without a control, such as another language spoken in what can reasonably be considered the same cultural context, such correlations are of little use.

Instead, a more productive approach to semiotic ecology might focus on the social and cultural conditions that support particular systems of semantic distinction. In the Juchitán versus La Ventosa case, relatively few socio-cultural variables remain as candidates to explain the differences in FoR preferences given the similarity of the two places and populations. The most salient distinctions between Juchitán and La Ventosa may be their relative scale, topography, and the practices afforded thereby. Juchitán, with its dense urban feel and tall buildings, allows few views of the horizon or adjacent countryside, and residents are less likely to travel regularly out of the city since

everything they need is locally available. In contrast, La Ventosa is small enough to afford views of the horizon over the flat, wind-blown grazing land that surrounds it, and residents often traverse this landscape by bus or taxi to conduct business in Juchitán, with some commuting daily.

Another possibility for explaining the differences between Juchitán and La Ventosa is differences in language ideologies. As is the case for many small indigenous communities in Mexico (Sicoli 2005), La Ventosa is undergoing language shift to Spanish more quickly than its larger neighbors. This threat of rapid language shift may have resulted in a more purist or conservative language ideology that effectively prohibits the mixing of concepts perceived as "Spanish" into JCH. The absence of egocentric language use in the La Ventosa data could then be explained by the fact that many of the JCH terms that are used egocentrically are transparent Spanish loans, including 'right' *derechu*, 'in front of' *frente de*, and 'behind' *atrá de*. Further ethnographic research in La Ventosa is needed in order to confirm any of these possible explanations.

At the same time, however, the data comparing language-dominance groups within Juchitán lend some weak support for the hypothesis that formal linguistic features predict selection of frames of reference, and, more specifically, that meronymy may be involved. The JCH-dominant and Spanish-dominant groups in Juchitán differed significantly on all five frame of reference measures, and in the direction expected by the previously described putative semantic typology of their dominant languages. JCH-dominant speakers had higher proportions of allocentric responses compared to Spanish-dominant speakers; while the Spanish-dominant speakers had higher proportions of egocentric responses compared to the JCH-dominant speakers.

One possible explanation for this pattern is that the Spanish-Dominant and JCH-dominant groups actually do differ socio-culturally, despite the fact that they live side by side in the same city and interact with each other on a regular basis. However, evidence for the socio-cultural similarity of the groups can be drawn from comparisons involving the Balanced Bilinguals. The Balanced Bilinguals did not differ significantly on any of the frame of reference measures when compared *by language*. In other words, Balanced Bilinguals speaking in JCH did not differ significantly from JCH-dominants in their frame of reference preferences. And Balanced Bilinguals speaking in Spanish did not differ significantly from Spanish-dominants. However, when compared *across languages*, Balanced Bilinguals did differ significantly on some measures from the other groups. When expressing facing information in Spanish, they relied more upon the egocentric FoR and less upon the absolute FoR compared to to JCH-dominant speakers. And when expressing facing information in JCH, they differed significantly on all measures, in the direction predicted by the putative semantic typology, compared to Spanish-dominants. If socio-cultural differences between JCH-dominants and Spanish-dominants were responsible for their differences in frame of reference preferences, we would observe a pattern in which the Balanced Bilinguals were either always the same or always different from one or the other groups. Indeed, because the Balanced Bilinguals were demographically more similar to the JCH-dominants than to the Spanish-dominants, we might expect them to perform more like JCH-dominants in both languages. Instead, the observed pattern, in which the Balanced Bilinguals' preferences did not differ from those of JCH-dominants when they speak JCH nor from those of the Spanish-dominants when they speak Spanish, suggests that some formal linguistic factor, rather than socio-

cultural or socio-linguistic variation among the groups, is influencing frame of reference choice.

The comparison of Spanish-Dominant and JCH-Dominant groups in Juchitán also provides useful evidence against *convergence* of spatial semantic categories in the two language varieties; for one possibility is that the different patterns observed in Juchitán versus La Ventosa are the result of uneven convergence of the two varieties in contact in different places. However, the trends toward typological matching in the Juchitán data suggest that the relevant typological distinctions are intact, but that speakers in Juchitán are more likely than those in La Ventosa to mix semantic resources from the two systems. In our search, then, for a formal linguistic feature that may affect FoR choice, there is a clue in the data from the balanced bilingual group.

3.7.2 Individual variability: Implications for typological approaches

The Balanced Bilinguals did not differ across sessions in their preferences for facing information FoR, but did differ in their preferences for standing information FoR. In line with the typologically expected pattern, no speaker was more egocentric in JCH than in Spanish, and only one was more object-centered in Spanish than in JCH. Though it is important to note that strategies were overall still mixed and that the differences in proportions of these responses across languages were slight, this finding could be seen as supporting a formal typological hypothesis because it points to differences in the grammatical expression of facing versus standing information as the source of variation. In other words, it seems that the expression of standing information tends toward a more language-specific system than the expression of facing information.

So what are the formal differences in the expression of standing versus facing information in each language? Let us return to the earlier examples provided from the elicited corpus, reproduced here for convenience. Example 17 illustrates the expression of facing information in Spanish, while 18 and 19 illustrate the expression in JCH. Example 18 includes the non-obligatory Relator, while Example 19 excludes it. Examples 20 and 21 illustrate expressions of standing information using the object-centered frame of reference in each language.

(17)

FP³		P		R	GP	
La	silla	tiene	el	respaldo	hacia	el	lado derecho
DET.F	chair	have.PRES.3SG	DET.M	back	toward	DET.M	side right

The chair has its back toward the right side [SD37&SD38-3.2]

(18)

P		FP	(R)	GP	
n-u-dxii-deche	-ni	neza	ra	ri-ndani	ubidxa
STA-CAUS-give-back	-3I	toward	where	HAB-rise	sun

It is giving its back toward where the sun rises [BB61&BB63-3.2]

(19)

P		FP	GP
n-u-dxii-lú	-ni	guete'
STA-CAUS-give-face	-3I	south

It is facing south, [JD27&JD28-1.7]

(20)

FP		P	R		GP	
La	pelota	está	debajo	de	la	sentadera
DET.F	ball	is.PRES.3SG	under	of	DET.F	seat

The ball is under the seat [SD29&SD30-1.12]

(21)

P		FP	R	GP	
layú	nexhe	-ni	deche	asientu	ca
ground	STA.lie	-3I	back	chair	DET

It is lying on the ground at the back of/behind the chair [ZD21&ZD22-2.11]

This side-by-side comparison reveals two initial differences in the expression of facing versus standing information in each language. The first, a morphosyntactic

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³ FP=Figure Phrase; P=Predicate; R=Relator; GP=Ground Phrase

difference, is that the four-constituent construction is obligatory in all the above constructions except in the one expressing facing information in JCH. This is because the Spanish verbs used in such constructions license only a prepositional phrase complement, whereas the JCH verb that was most commonly used, *nudxiilú* 'is facing,' and derivations thereof, licenses either a Noun Phrase (NP) or Prepositional Phrase complement (PP). Other NPs that occurred in my corpus as the complement of *nudxiilú* 'is facing,' included several instances each of *guiá'* 'north' and *frente* 'the front', and one token each of *rindani gubidxa* 'east' and *biga'*, 'left.' 'West' and 'right' did not occur in this construction. On the other hand, all JCH cardinal direction and egocentric terms occurred in the corpus as complements of prepositional phrases.

Evidence that *guete'*, 'south' is functioning as a noun in (19) is provided by substituting a Determiner Phrase (DP), a noun phrase explicitly marked as such with a determiner. Example 22 shows just such a construction from the corpus, in which the DP *pader yoo ca* 'the wall of the house' serves as the complement of *nudxiilú* 'is facing.' Further evidence may be provided by changing the verb type. If we substitute an attested construction using the JCH existential verb *nuu*, such as the Figure Phrase and Predicate in (23), we see that a bare noun such as *guiá'*, 'north' cannot function as its adjunct, whereas a prepositional phrase such as *neza guiá'*, 'toward the north,' can. This latter construction was attested in the corpus, shown in Example 24.

(22)	**FP**			**P**		**FP**	**GP**		
	ti	asientu	di ca	n-u-dxii-lú		-ni	pader	yoo	ca
	INDF	chair	DET DET	STA-CAUS-give-face		-3I	wall	house	DET

This chair, it is facing the wall of the house [BB47&46-3.4]

FP			**P**	
(23)	deche-ni ca	la	n-uu	*guiá'
	back-3I DET	FOC	STA-is	north

Cannot mean: *Its back is toward the north*

FP			**P**	**R**	**GP**
(24)	deche-ni ca	la	n-uu	neza	guiá'
	back-3I DET	FOC	STA-is	toward	north

Its back is toward the north [BB61&BB63-3.3]

This line of reasoning also leads to the conclusion that the Spanish loan *ladu* 'side,' has acquired a locative function in JCH that it does not have in Spanish. The Spanish source term, *lado*, is a referential noun. Example 25 gives a token from the present corpus in which a prepositional phrase using *ladu* occurs as a complement of the existential verb *nuu*.

FP			**P**	**R**	**GP**	
(25)	ra	ri-bi'-nu	ca	n-uu	ladu	derechu la
	where	HAB-sit-1PL.INCL	DET	STA-is	side	right FOC

Where we sit is on the right side, [BB55&BB56-4.3]

Upon closer inspection, we see that these differing syntactic constructions also correspond to different ways of encoding the Ground and the Anchor. In both Spanish and JCH, the relative FoR may be used to express facing information. This construction is clearly of the Ternary type because the Ground is distinct from the Anchor. In Example 17, *el lado derecho* 'the right side' is the Ground Phrase. The Anchor is not explicitly encoded, but is pragmatically inferred as originating with the speaker. An identical phenomenon occurs in JCH, as in Example 25. However, constructions employing cardinal direction terms in the expression of standing information are not Ternary, which is why they are not considered "absolute." This is because the Ground and Anchor are not clearly distinct entities, as difficult as it may be to pin down what they are. Thus,

Example 19 shows a use of a Binary frame of reference employing a calculation based on a cardinal direction. Even JCH and Spanish constructions employing a Relator term in combination with a cardinal direction term are of the Binary type. It was on the basis of these examples that I proposed the "geo-centered" FoR type, on analogy with the object-centered type. The geo-centered FoR occurs only in expressions of facing information. Relational uses of cardinal direction terms, as in the expression of standing information, are true Ternary FoRs and so are called "absolute."

Thus, a possible semantic explanation for the syntactic difference of Example 19 is that this construction s-selects only NPs that encode a Binary spatial relationship. This would account for why *guete'* 'south', *guiá'* 'north' and *frente* 'the front' were widely attested in this construction, while 'east', 'west', 'left', and 'right' were extremely rare or non-existent: terms for 'east' and 'west' are verb phrases, while terms for 'left' and 'right' necessitate the use of a Ternary frame of reference.

The second salient difference is a semantic difference between Relators used in relative and absolute utterances versus those used in object-centered utterances. Examples 17 and 25 illustrate that Relators used in both languages, in constructions using the relative frame of reference to express facing location, encode only PLACE and not THING. The Spanish prepositions used in relative constructions consisted exclusively of "primary" and "secondary" rather than "complex" prepositions. The JCH terms also included only those that function primarily as prepositions rather than nouns and are relatively semantically empty, such as *ra* 'at', *neza* 'toward' and *ladu* 'side.' Examples 26-29 show that this pattern holds in absolute and relative expressions of standing

location in both languages. Note that in example 26, the speaker uses a (semantically

empty) preposition borrowed from Spanish.

(26)

P	**FP**	**R**	**GP**
n-uu	ti balón	para	guete' de laa-ni
STA.is	INDF ball	for	south of PRON-3I

There is a ball to the south of it [ZD23&ZD24-4.9]

(27)

P	**FP**	**R**	**GP**
n-uu	-ni	neza	biga' la,
STA.is	-3I	toward	left FOC

It is toward the left, [BB49&BB50-1.3]

(28)

P	**FP**	**R**	**GP**
tiene	una pelota	por	el lado norte
have.PRES.3SG	INDF.F ball	to	DET.M side north

It has a ball to the north side [BB43&SD45-1.3]

(29)

FP	**P**	**R**	**GP**			
la pelota	está	a	-l	lado izquierda de	la	silla
DET.F ball	is.PRES.3SG	to	-DET.M	side left	of DET.F	chair

The ball is to the left side of the chair [SD31&SD32-2.5]

In contrast, the Relator terms used in object-centered utterances are of more

syntactically and semantically varied types. In JCH, types included body part nominals,

body part locatives, native prepositions, and non-native prepositions. Example 21, above,

shows a usage of the JCH meronym *deche* 'back,' which can encode both THING and

PLACE. Also attested in the corpus were BPTs that encode only THING, such as *xa'na'*

'bottom'; native prepositions such as *xaguete'* 'under', which encodes both THING and

PLACE; and terms borrowed from Spanish and used as PLACE-encoding relators in

JCH, such as *de* 'from.' Spanish prepositions used in the expression of object-centered

frames of reference consisted of all three types, including the semantically richer

complex prepositions. Example 14 illustrates a use of the complex preposition *debajo de*

'under.'

As discussed earlier, PLACE-encoding functions developed diachronically later than THING-encoding functions in JCH, involving both semantic change of native JCH terms and the borrowing of Spanish terms. This suggests that JCH expressions of facing information that require a Relator, which must be exclusively PLACE-encoding (as in Example 20), entered the language later than constructions where the Relator is optional or omitted, as in 18 and 19. In turn, this suggests that projective uses of 'east', 'west', 'left' and 'right' are more recent additions to the language because those forms could not function as complements of verbs such as *nudxiilú* 'is facing' before the development of PLACE-encoding prepositions. Because terms for 'north', 'south' and 'front' can function as complements of *nudxiilú* 'is facing', projective uses of such terms may have a longer history in the language.

The contrasts outlined here point to both syntactic and semantic features of Relators as possible drivers of language-specific patterning in the expression of spatial frames of reference in each language. In JCH, prepositions are obligatory for the expression of Ternary frames of reference. Binary frames of reference employing a cardinal direction term or egocentric term may be expressed either with a preposition or with no Relator at all. And the object-centered frame of reference, also a Binary type, requires the use of a Relator, which may be either a preposition or a nominal BPT. In Spanish, prepositions are obligatory in the expression of all frames of reference. However, those used in the expression of the allocentric and relative frames of reference are of a semantically empty type, while those used to express the object-centered frame of reference are semantically more complex.

The preceding analysis allows for refinement of the MesoSpace hypothesis to take the Binary/Ternary divide into account as possibly correlated with meronymy. Again, that hypothesis posited that languages with productive meronymy will show a bias against the egocentric FoR because, it is claimed, "a language with productive part-naming systems would capitalize on the attention placed on object geometry and be less likely to resort to using an observer's point of view as the origin of an FoR" (Pérez Báez 2011:947). This formulation, however, does not specify which aspects of a grammatical system that includes meronyms would drive such a bias, or why. Returning now to the finding that Balanced Bilinguals in Juchitán differed in their preferences for standing information FoR in line with the typologically expected pattern for each language: I would argue that this pattern may be better understood as a preference Binary FoRs in JCH rather than as a preference for allocentric FoRs. Such a preference may be driven by patterns of speaking in JCH that privilege the use of Body Part Terms over prepositions due to the incomplete permeation of prepositions into JCH grammatical constructions for expressing FoR. Speakers of JCH could communicate perfectly well on the Ball & Chair task, for example, without any uses of prepositions or, consequently, Ternary FoRs. Thus, to the extent that languages with productive meronymy allow speakers to communicate frames of reference without the use of PLACE-encoding prepositions, differing patterns in the habitual use of BPTs versus non-BPT prepositions could be related to differing patterns in preferences for Binary and Ternary frames of reference, respectively. This proposal would explain some of the language-specific patterning found in the Juchitán data, both in the across-group and within-subjects comparisons.

3.7.3 Individual variability: Implications for the psycholinguistics of bilingualism

The across-group comparisons involving the Balanced Bilinguals are consistent with psycholinguistic research on bilingualism that argues that bilinguals are not merely "two monolinguals," but often have semantic concepts that draw from both languages (Pavlenko 2014). The Juchitán Balanced Bilinguals did not pattern exactly like the unbalanced bilinguals in either language. When speaking in JCH, the Balanced Bilinguals differed significantly on all five frame of reference measures relative to the Spanish-dominants, but not to the extent that the JCH-dominants did. When speaking in Spanish, the Balanced Bilinguals differed significantly from the JCH-dominants on only two frame of reference measures, whereas the Spanish-dominants differed significantly from the JCH-dominants on all five measures. Thus, the differences between the BBJ and SD groups were *more pronounced* than those between the BBS and JD groups. In other words, when speaking JCH, the Balanced Bilinguals were similar to JCH-dominant speakers in their frame of reference preferences; however, when speaking in Spanish, the Balanced Bilinguals were less similar to Spanish-dominant speakers in their frame of reference preferences.

The within-subjects comparison of the eight Balanced Bilinguals who completed the task once in each language also paints a picture of a population that mixes both egocentric and allocentric conceptual resources when speaking in either language. The Balanced Bilinguals did not differ in their preferences for facing information FoR across the two languages, using a smattering of egocentric and geo-centered strategies. An examination of the strategies of these eight participants for facing information shows that only one participant switched dominant strategies across sessions, from egocentric in

Spanish to geo-centered in JCH. The other participants maintained the same dominant strategy across sessions or had no dominant strategy in one or more sessions.

Psycholinguistic research on bilingualism and linguistic relativity has sought to understand whether bilingualism results in language-specific or shared conceptual systems. Although the answers to this question have often been conflicting, one consistency that has emerged is that bilinguals are, in any case, different than monolinguals (e.g. Athanasopoulos 2007; Cook, Bassetti, Kasai, Sasaki & Takahashi 2006; Pavlenko 2002a; Stepanova Sachs & Coley 2006; Kousta, Vinson & Vigliocco 2008). These findings are problematic for some research that has been conducted with bilinguals but without accounting for degrees of bilingualism. The data presented here begin to illustrate the range of variation of preferred spatial communication strategies that can emerge in a population when bilingualism is accounted for. In the Juchitán case, we can conclude that the Balanced Bilinguals do not generally exhibit a language-specific system in which one set of concepts is deployed only in JCH and one set only in Spanish.

One of the major differences between the population of Juchitán and the bilingual populations typically studied by psycholinguists has to do with the *type* of bilingualism observed. In all of the studies cited above, the participants were either L2 learners living in a place where their L1 is predominant, or immigrants or students living in a place where their L2 is predominant. In both cases, a change in language is accompanied by a change in cultural milieu or context. Juchitán, in contrast, is a cohesive *bilingual community* that exhibits little diglossia. JCH is spoken in the home and on the streets, but also in realms that in other indigenous communities would be dominated by the colonial language. The selection of JCH or Spanish in a particular communicative context is

primarily driven by individual speaker competence or preference rather than setting. A more detailed description of these patterns of bilingualism in Juchitán may be found in the Introduction to this dissertation.

Juchitán's particular pattern of bilingual language use structures some of the indexical meanings of code selection in Juchitán. For example, the use of Spanish may be particularly indexical of a school setting, so a switch into Spanish by children at play could be used to signal a shift into a "school framework" for play. In other contexts, such as in a bilingual home where the youngest child speaks only Spanish, a switch into Spanish may be used to index the selection of that child as the intended recipient of the speech; this is a common practice in Jordan's home, one of the children profiled in Chapter 5. Indexical and metaphorical meanings associated with linguistic codes in a bilingual community may actually play a large role in how speakers conceptualize semantic distinctions. For example, the terms for 'north' and 'south' in Spanish and JCH carve up the semantic space in the same way. However, as outlined above, they have different metaphorical and indexical possibilities. While the Spanish terms are primarily referential at a local level, the JCH terms have strong indexical associations related to local social geography. In turn, the Spanish term *norte* 'north' has indexical associations at a larger geographical scale that the corresponding JCH term does not have. These distinctions might influence how likely a speaker is to use the terms when thinking of space at a particular scale.

For bilinguals who are part of a larger bilingual community, these indexical meanings are made possible precisely because speakers have a choice of linguistic code within many different contexts. In contrast, for many of the bilinguals who participate in

psycholinguistic experiments, their choice of code depends strictly on the context: Greek exchange students studying in London (e.g. as in Athanasopoulos 2007) may not know any other Greek speakers in London, and may not know any other English speakers in Greece. Furthermore, even when participants are part of a bilingual community, all participants in a given study may not be part of the *same* bilingual community, and so might have a very different set of indexical meanings. This is the case, for example, with Spanish-English bilinguals in the United States who are of Mexican origin, versus Spanish-English bilinguals who are of Puerto Rican origin. Although both groups might be said to speak the same two languages, they do not switch between them in the same ways or with the same meanings. Thus, when speaking of "language-specific" semantic systems, we must also consider the ways in which indexical and metaphorical meanings might be specific to a linguistic code, even in a bilingual setting.

3.7.4 Spatial language use and reasoning strategies: Implications for linguistic relativity

This chapter has focused on effects of language on language in a spatial communication task. But one of the underlying assumptions of the claim that linguistic typology predicts certain kinds of thinking-for-speaking (Slobin 1996) is that patterns in thinking-for-speaking are in turn related to patterns in non-linguistic thinking. The classic non-linguistic spatial memory task used in conjunction with spatial language elicitation tasks, Animals-in-a-Row (Pederson et al. 1998), has demonstrated, for example, that a population's preferred linguistic strategies tend to align with its preferred spatial memory strategies. In this task, participants view a laterally aligned row of three toy animals, and

are asked to memorize the array. The animals are removed and the participant moves to a different table, rotating 180 degrees in the process, and is asked to recreate the array. In an egocentric response, the animals will end up facing the "same" direction from the perspective of the participant (either to his right or left); in an allocentric response, the animals will end up facing the "same" cardinal direction or landmark (say, all to the north or all toward the church).

Pérez Báez's (2011) Animals results from La Ventosa show an overwhelming preference in that population for allocentric responses in the Animals task. She reports that this was the dominant response type for 16 of her 19 bilingual participants, while the other three participants used a unidirectional strategy[4] as their dominant response type. Only one participant, on one trial, out of a total of 114 trials for all participants, used a relative strategy on the task (957). Pérez Báez concludes that "the alignment of FoR preferences in linguistic and non-linguistic tasks observed in the…data is of relevance to the larger debate regarding the influence that linguistic practices may or may not have in cognition" (958). She also points out that La Ventosa exhibits many of the socio-cultural conditions typically assumed to co-occur with or even drive preferences for egocentric linguistic and reasoning practices (Li and Gleitman 2002), such as high levels of literacy, exposure to colonial languages, and a market economy. Yet, La Ventosa speakers persist in their overwhelmingly allocentric speaking and reasoning practices, leading to the impression that these have a causal relationship.

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[4] A "unidirectional strategy" means that the participant always arranged the animals facing the same direction in the test phase, even though the direction was varied in the presentation phase.

Because Juchitán shows more variability than La Ventosa, it lends itself to an analysis of the effects of language on spatial reasoning. In what follows, I compare the results of the Animals-in-a-Field task reported in Chapter 2 to the Ball & Chair data reported in this chapter. Recall that in our Animals population, the most common response type overall was egocentric, but this occurred on only about half of all sessions. Furthermore, for the Balanced Bilinguals, who completed the task once with instructions delivered in JCH and once with instructions delivered in Spanish, there was no effect of language of instruction on FoR strategy. Nor was there an effect of language dominance on FoR strategy, with both groups having a similarly mixed profile. We did find, however, that competence with egocentric vocabulary, as measured by a vocabulary comprehension test, predicted the adoption of an egocentric strategy on the Animals task. The same correlation was not found between allocentric vocabulary and allocentric reasoning strategies. We concluded that there was a privileged relation between competence with egocentric uses of vocabulary and adoption of an egocentric strategy.

There are three important points to make about how the results from the study in Chapter 2 relate to the results reported in this chapter. First, the population of Juchitán has a mixed profile of preferred frames of reference on a spatial reasoning task, with a slight preference for the egocentric over the allocentric frame of reference, which partially aligns with their frame of reference preferences on a communicative linguistic task—the Ball & Chair picture-matching task reported here. On this task, the JCH-Dominant and Balanced Bilingual groups' dominant response types were about evenly split between egocentric and allocentric for facing information (Figure 4). In La Ventosa, the population's preferences on the reasoning and communicative tasks were also

aligned, but with a strong preference for allocentric frames of reference. These findings

suggest that *any* population's spatial reasoning and spatial communication styles will be

aligned, for obvious practical reasons, but not *because of* typological features of the

language. I know of no cases where spatial reasoning and linguistic practices were not

found to align for a particular community, but cases such as this and the few other

reported cases of variability across communities of speakers of the same language(s)

(Pederson 1998; Polian & Bohnemeyer 2011) hint that this is due less to linguistic

structure than to socio-culturally defined norms for interaction.

The characterization of Juchitecos as having a "mixed profile" of FoR use should

not be taken to completely erase the small effects of language on language found in the

Ball & Chair task. Thus the second important point to make is that there is some evidence

for language-specific styles of communicating spatial frames of reference in Juchitán, but

no evidence for language-specific styles of spatial reasoning. Why the disjuncture? One

possibility is that it has to do with the Ternary versus Binary dimension of FoR typology

to which JCH seems particularly sensitive. While the nature of the Ball & Chair task

allowed for that finding to emerge, the nature of the Animals-in-a-field task did not. Like

its predecessors, this task prioritized the dimension of contrast between allocentric and

egocentric FoRs. An area for future research then, must be the development of non-

linguistic spatial reasoning tasks that can tease apart Ternary and Binary reasoning

strategies.

Finally, the results reported in this chapter suggest a possible interpretation of the

finding that competence with egocentric vocabulary items predicts egocentric spatial

reasoning, but the same does not hold for allocentric vocabulary and reasoning. If

speakers of JCH are indeed more sensitive to the Binary/Ternary distinction when communicating frame of reference than to the allocentric/egocentric distinction, then we might expect them to be more sensitive to this distinction for spatial reasoning as well. The egocentric vocabulary items ('left', 'right') tested in the Vocabulary Comprehension Task are used exclusively in expressions of the relative FoR, which is Ternary. In contrast, the cardinal direction terms we tested are used both in the expression of the absolute (Ternary) and geo-centered (Binary) frames of reference. Thus, competence with 'left' and 'right' is directly related to competence using a Ternary FoR in a way that competence with cardinal direction terms is not.

3.8 Conclusions

This chapter began by considering three possible hypotheses for the manifestation of an effect of language on language in this bilingual population. The results paint a more complex picture, however, than can be accounted for by any one of the hypotheses. Instead, we see evidence supporting each one to a certain extent. The semantic typology hypothesis is best supported by evidence that JCH-dominant speakers and Spanish-dominant speakers differ significantly from each other in frame of reference preferences, and that Balanced Bilinguals prefer the object-centered FoR in JCH and the egocentric FoR in Spanish for describing standing information. I hypothesize that in this case, the "language" driving FoR choice is formal in nature. Specifically, I highlight key syntactic and semantic differences in the JCH constructions used to express Binary versus Ternary FoRs that could cause this effect. Speakers may habitually use more Binary FoRs in JCH than in Spanish due to their unmarked nature in JCH.

The bilingualism hypothesis is supported by evidence that balanced bilinguals in Juchitán, and, to a lesser extent, bilinguals with one more strongly dominant language, will have a semantic system that mixes conceptual resources from both languages, independently of operational language. In a cohesive bilingual community like Juchitán, this result is not surprising; inasmuch as language is a social phenomenon, meanings must be shared across the community. I draw particular attention to the social indexical meanings of JCH cardinal direction terms here, to illustrate how consideration of the indexical function of language is as important as of the referential function in understanding language use in a bilingual setting.

Finally, the cultural practices hypothesis is supported by evidence that bilingual speakers of the same languages in Juchitán and La Ventosa nevertheless have very different profiles for spatial reasoning and communication. I propose that one explanation for this difference could be topographical differences in the two places, which would lead to different spatial practices and therefore, perhaps, different ways of thinking and talking about space. I propose that a second explanation for this difference could be differences in how linguistic ideologies regulate the mixing of linguistic codes in Juchitán versus La Ventosa. However, these proposals are speculative, and merely point to the need for a detailed ethnographic comparison of these two places.

This chapter has discussed the results from a study that found an effect of "language" on FoR choice among bilinguals in Juchitán. I have attempted to explain this effect using different interpretations of what aspects, exactly, of "language" may be involved. I have shown that syntactic, semantic, functional, and reflexive linguistic dimensions are all crucial to interpreting these data. Far from constituting a throwaway

"socio-cultural" category, indexical meanings and linguistic ideologies must be

considered as fundamental features of the "language" variable in studies of linguistic

relativity.

CHAPTER 4:

"Common ground" and variability in situated spatial talk in Juchitán

4.1 Introduction

In the preceding chapters, we have seen that one of the most striking characteristics of spatial frame of reference use in Juchitán, in both reasoning and communication, is its heterogeneity. In Chapter 2, my co-authors and I demonstrated that the overall profile of spatial reasoning in Juchitán is quite mixed, and did not pattern according to language dominance or operational language use; instead, individuals showed a preference for either allocentric or egocentric styles depending on their mastery of specific egocentric lexical items. In Chapter 3, I confirmed that a similarly mixed profile of frame of reference use exists among Juchitecos in speech elicited in a communicative task. In this case, however, there were some discernable patterns that aligned with both language dominance and operational language use. This finding prompts the question of why no effect of language dominance or operational language on spatial reasoning was found, while such an effect was found on spatial communication. Chapter 3 also compared data from Juchitán and La Ventosa, showing that the particular profile of FoR use in Juchitán does not hold for all populations of speakers of the same two languages, thus suggesting that sociolinguistic and topographical factors are important variables in FoR preferences in those populations.

In this chapter, I take what Gumperz and Levinson (1996:226) have called an "interpretive" approach to linguistic relativity, considering the ways in which the interpretive expectations of actors, or principles of language use, may vary across

cultures, communities, and speech situations. Here, I take an interactionist approach to linguistic meaning, assuming that meaning arises in relation to situated contexts, and through negotiation by multiple social actors. At the same time, however, I seek to meld such an approach with a domain-centered approach by focusing on the meaning of signs recruited specifically in the service of spatial reference. Naturalistic data from video-recorded interactions in Juchitán will reveal that there is incomplete overlap between the kinds of signs used in habitual spatial speech in Juchitán, and those typically considered definitive members of the "spatial domain" in domain-centered approaches. Furthermore, these data will show that there were rather stark differences between the kind of spatial speech and gesture collected in naturalistic, communicative settings, versus that collected on a task intended to elicit "naturalistic spatial speech and gesture."

Contextual theories of meaning and their accompanying jargons abound in linguistic anthropology, and I might have selected any one of a number of approaches. For its breadth and flexibility, however, I will appeal in this chapter to Herbert Clark's notion of "common ground." In "Communities, Commonalities, and Communication" (1996), Clark argues that language is first and foremost an instrument of communication, rather than of thought as Whorf suggested; and therefore, any influence of language on thought "must be mediated by the way language is used for communication" in the context of specific "communities" (325). In order for speakers and addressees to "coordinate," or to believe that they have understood one another, they must establish commonalities of thought. Commonalities of thought, in turn, serve as "coordination devices" for solving a "coordination problem" (Clark 1996:326).

For example, if person A approaches person B and asks, "Where is the library?" the participants face the coordination problem of settling on the same referent of "the library." The addressee will have to rely on some commonality of thought with the speaker in order to ascertain the intended referent. The commonality of thought the addressee choses will depend upon what she knows about the speaker. If A and B have never met before, but the interaction occurs on a college campus, B will most likely rely on her knowledge of this shared physical context in order to interpret the intended referent as "the library on this campus." In this case, B would be relying on the "joint salience" (1996:327), in Clark's terms, of the shared physical context, and thus use that as a coordination device. In some other scenario, precedent may serve as a coordination device. Suppose A and B do know each other, and had visited a library together in the past. When A asks B about the location of "the library," B may rely on their shared personal history as a coordination device, and thus interpret the intended referent as being the library they had visited together.

Yet another potential coordination device is convention. The "conventional" meaning of an utterance varies according to the shared community membership of the participants. Imagine now that A and B are software developers working on a project together. In the context of this shared community membership, and their mutual knowledge of the other's membership in this community, the term "library" may now be interpreted as referring to a string of digital code located on a hard drive. The notion of convention as a coordination device is especially relevant to the question of linguistic relativity because, as Clark says, "languages," in Whorf's formulation—such as English and Hopi—"are systems of conventions" (1996:336). Importantly, however, conventions

hold only for members of a particular community, and not necessarily for all speakers of a given "language." Furthermore, convention is not the only type of coordination device (Clark 1996:337).

These examples illustrate Clark's claim that the common ground between any two individuals may be divided into communal common ground—"all the knowledge, beliefs, and assumptions they take to be universally held in the communities to which they mutually believe they both belong"—and personal common ground—"all the mutual knowledge, beliefs, and assumptions they have inferred from personal experience with each other" (1996:332). Clark's notion of "community," though similar to "culture," is meant to emphasize the shared *expertise* of individuals who are members of the same community. Communities may exist at many levels, including nationality, place of residence, place of education, occupation, religion, sub-culture, etc.; and these often come in nested sets, such as place of residence at the level of street, neighborhood, city, region, etc. Clark emphasizes, then, that any kind of expertise is not distributed uniformly in a population; but when individuals meet who can identify each other as belonging to some common community, they "use that membership to infer which features they can and cannot take to be common ground" (1996:334).

Coordination, in Clark's sense, occurs not only in the negotiation of the meaning of an utterance, but also in the negotiation of the process by which that meaning will be established (1996:329). In other words, A and B must also reach the mutual belief that they have understood each other sufficiently for the task at hand. Clark calls this mutual belief the "grounding criterion" (1996:330). Until the grounding criterion is reached, B and A may engage in several conversational turns intended to establish whether it has

been reached: "You mean the Central Library?" or "Which library?" I will refer to this process as the "grounding process." Thus, the participants establish a commonality of thought regarding the meaning of the linguistic signs exchanged, and regarding the sufficiency of the mutual understanding that has been achieved between them.

In this chapter, Clark's notion of communal common ground will be useful for understanding how Juchitecos habitually talk about space by relying on shared expertise about local places and social relationships. The notion of personal common ground will likewise be useful for understanding how deixis and gesture rely on joint perceptual experiences when deployed in spatial talk in Juchitán. But a further layer of context also seems vital to the interpretation of spatial talk in Juchitán: "activities." Following Goodwin and Goodwin (1992), this term will be used to designate a level of interactional context that "guides the interpretation of events lodged within them" (97). Crucially, activities are not only used by participants of an interaction as interpretive resources, but are also collaboratively created in the course of interaction. Thus, activities emerge through interaction, but also work to structure interaction. Activities may be considered sources of common ground, in Clark's sense, because they shape the beliefs and assumptions of participants engaged in the activity. One of the elicitation tasks I conducted with my co-authors, the Geographical Scale task, inadvertently brought into relief the extent to which participant's interpretation of activities shapes spatial talk.

4.2 Geographical Scale task

The Geographical Scale ("Geo") task described in Chapter 2 of this dissertation encountered several problems that have so far stymied systematic analysis of the gesture

results. However, I believe that the problems with the task reveal important clues about how elicited data might be analyzed, as well as about the relationship between elicited and natural speech. Like others in the battery, the Geo task elicited a mixed profile of frame of reference use. However, it appears that in some cases, the way in which participants interpreted and negotiated the activity of the task itself resulted in variation in FoR use within individual trials.

My research assistant, Ana, administered the Geo task in JCH and I administered it in Spanish. It consisted of asking participants questions about the locations of several landmarks in Juchitán, and questions about how to arrive at other landmarks (the questions can be seen in full in the Appendix). Of course, in developing the task, I was seeking to elicit examples of speech that would be comparable to some naturalistic scenario I imagined in which Juchitecos discuss the locations of places in their town. But my expectations were contradictory, because, at the same time, I expected a certain degree of decontextualizability in the responses, "as if they were telling someone who didn't know." Thus, one coordination problem that participants faced was that of determining how much and what kind of common ground they shared with their interlocutor, who was at once the Ana that some knew from the neighborhood and a fictional "Ana" who supposedly didn't know such things as how to get from the Cultural Center to the palace. And if she didn't know that, what *did* she know? A second coordination problem emerged regarding the prompt I had given Ana to read on the occasion that the participant didn't say "enough" for a given trial. The prompt, "Say a little more," suggested to participants that they had settled on the wrong interpretation of the activity and/or of who the interlocutor was supposed to be: it suggested that the

grounding criterion for the *process* of establishing meaning had not been met. Rather than saying simply "more" of the same thing, then, many said something quite different from what they had said the first time.

The following example comes from the first trial of Na Norma's Geo task; she is a JCH-dominant bilingual from Yoxho. Ana begins the interaction by reading part of the first task question (Line 1), but then realizes she forgot to read the brief introduction to the task, which is meant to warn participants of what is to come. Rather than read the introduction, though, she improvises. She cuts herself off from the task question, and, in Line 2, explains to Na Norma, "These are some questions about your town, about here, okay?" Na Norma interjects to clarify the partial question Ana had started to pose (Line 3), but Ana redirects the activity away from that question to the meta-activity of explaining the task. In Line 4, she explains to Na Norma that these questions are about "whatever she knows." She then rereads the first prompt in its entirety (Line 5).

Transcript 4.1: Na Norma (N), excerpt from Geo task, *"Whatever you know"* (August 2012).

1. Ana de   ra   n-uu   parque Revolución
          from LOC STA-is park   NAME
          from Revolution park

2.   ndi la   tudxi diidxa de x-quidxi-lu'   de   ra-rí   jna'
          DEM FOC some word of POSS-town-2SG from LOC-PROX right
          these are some questions about your town, about here, okay

3. N   dede ra   n-uu   parque Revolución la?
          until LOC STA-is park   NAME   Q
          all the way where Revolution park is?

4. Ana ya ni ru-nibia'-lu'   jna' chi-naba'   diidxa' lii
          yes 3I HAB-know-2SG right PRES.go-ask.1SG word   2SG
          yes, whatever you know, okay? I am going to ask you questions

Transcript 4.1: Na Norma (N), excerpt from Geo task, *"Whatever you know"* (August 2012), continued.

5.	Ana	¿De ra nuu parque Revolución, paraa ru-zuhaa ca urbano
		from LOC STA-is park NAME where STA-stand PL bus
		ni ri-e Xadani?
		3I HAB-go NAME
		From Revolution Park, where do the buses stop that go to Xadani?

This brief interaction serves to establish the activity at hand, and Na Norma is now faced with the coordination problem of interpreting the question and responding in a way that will align with Ana's expectations. But the nature of the elicitation task renders this coordination problem especially complex. Na Norma does not, in essence, know who her interlocutor really is, since Ana is effectively merely "voicing" a question posed by some other mind in some other time and place, for some unknown purpose. Thus, Na Norma must select a coordination device without quite knowing with whom she is coordinating.

In her next move, Na Norma looks up briefly as if to think, and answers the question by saying, "Along the edge of Revolution park" (Line 6). She ends her utterance with an emphatic, "yes," as if closing the conversation. Ana, who was looking down at her clipboard during Na Norma's response, continues to look down at her clipboard as she begins to hum equivocally: "hmm…say a little more…" She trails off at the end, and makes a quick open-handed "sort of" gesture as she turns to look at Na Norma. She then prompts again, saying, "More or less, like, where?" (Line 8). Just as Ana finishes this utterance, Na Norma begins to readjust herself rather elaborately in her chair. The sequence of still frames in Line 9, below, shows how she grasps her skirts and leans up out of her chair. She scoots the chair a bit closer to Ana, and then resettles, rearranging her apron. Throughout this process she utters, "where?" When she finally sits firmly

again in her seat, she looks up, pauses, and then says, "okay," as if initiating a new

dialogue (Line 10).

Transcript 4.2: Na Norma (N), excerpt from Geo task, *"More or less, like, where?"* (August 2012).

6.	N	ruaa parque s-ti Revolución ca aja'
		edge park POSS-INDF NAME DET yes
		along the edge of the park of the Revolution, yes

7.	An a	mm gu-ni' x-caadxi stale
		HES COMPL-say POSS-some more
		hmm, say a little more…

8.		masomenu: pa ladu?
		more.or.less which way
		more or less, like, where?

9.	N	pa ladu la?
		which way Q
		where?

Transcript 4.2: Na Norma (N), excerpt from Geo task, *"More or less, like, where?"* (August 2012), continued.

10.	Norma	bueno	
		okay	
		okay	

Na Norma's quite literal readjustment in her chair mirrors her readjustment to the discursive task at hand. She has received feedback from her interlocutor suggesting that the grounding criterion has not been met, and pauses to consider how to reattempt the coordination problem.

This interaction exaggerates one coordination problem that actors may regularly face even in natural interaction: that of interpreting the identity of one's interlocutor, of discerning which communities he or she may belong to in the first place. This example also illustrates, however, that "activities" can aid in solving this problem because activities may bring along with them information about the various *roles* a participant may be playing in the context of the activity. Na Norma may not know "who" Ana is supposed to be, and she is also likely uncertain of the purpose of the questions. Although these dual problems occur in natural interaction as well, the task framework imposes additional restrictions on the grounding process itself. In natural interaction, participants engage in the effort of grounding the interaction by relying on established social norms. They prompt one another for more information in ways that are appropriate to the context. But in the task framework, these rules are also unclear, and Na Norma cannot be sure of what she is even "allowed" to ask Ana by way of grounding the interaction.

Now seated squarely in her chair again, Na Norma attempts quite a different type of speech activity. She begins to tell about how the area around the park and the bus stop has changed over the years. The narrative lasts several minutes. I have included only about the first half here, so the reader may see the nature of the activity in which Na Norma is now engaged.

***Ante** la, bizuhuaa, parque nuu- Bueno, carru ni rie Xadani ca la, **bizuhuaani lado cherí', ladu casi, ladu guete', ladu guete' pue**. Ne dede nagasi racá nga nuuni. Intonce carru ni rie Guixhi Ro' la, bizuhuaa la, para chericá' ante. Ante chericá bizuhuaani peru nagasi la, ma guirani tobisi ladu ruzuhuaa. Ne ante neza ra nuuni ca la, gasti di ridoo, gasti. Solamente ca yoo de ra (xxx), (xxx) zacá ca la, ti yoo si de esquina de raricá la, racá ja'a lidxi… ma nuu (xx) ja'a (ratón) nagasi esquina que. Tonce sti squina ndi la, uca lidxi la, ja'a maestra J. ne, ne Na ne Na B. Ante, peru ma después ca, ma bidoo ca yoo ca ne ma ula'quicabe ti farmacia raqué. Despué la, ma gasti', yanna la ma nexhe' ca tienda que raqué esquina ndi que la, pintor. Entonce ni ca cherí di ca la, pues ma nuu bancu, bancu de mani huiini' que, de mani huiini' que. Ne guyuu ti joyeria rarí de… gaxha de yu'du' que cheri'. Checá ca la, pue ma nuu: jma ma cherí ca la, de ti cuadra ca la, pue ma nuu pista agosto racá. **Dxiqué** la, raca vela, raca vela San Vicente, raca vela San Isidru raca nahuiini', raca vela agosto, raca vela San Jacintu.*

'**Before**, it stood… in the park there was… Well, the bus that goes to Xadani, **it stood on this side, like on... on the south side, the south side.** And until now, they were there. And then the busses that go... to Monte Grande, they stood over there. Before, they stood over there, but now, now all of them stand on just one side. And before, where they were, nothing was sold, nothing, just the houses where (there), like this. Just one house on the corner over there um... the house of... now there is um (rat), now lives on that corner. Then on this other corner, she made her house, um, the teacher J. and.. and Mrs.... and Mrs. B. Before, but... but then after that, they sold the houses and now they put a pharmacy there. But now there is nothing, now the stores are there on this corner, the painter's corner ((the corner the hardware store is on)), then the ones toward here. Well now there's the bank, the bank of that little animal, of the little animal ((the logo is a bird)). And there was a jewelry store from here to... near the church, over here. Over here, passing over here, there is... more, more over here, after a block, now August Court is there. **In those days**, they had parties. They had the party of San Vicente, they had the party of

San Isidro, they had small ones, they had the party of August, they had the party of San Jacinto.'

Comparing this portion of Na Norma's response to her first response, we can make some inferences about her interpretation of both her interlocutor's identity and the nature of the activity. In her first response, she answers the question by specifying that the buses stop *ruaa parque* 'along the edge of the park.' This construction uses the JCH Body Part Term *ruaa* 'mouth, edge, along,' which suggests a relation of contact between the park and the bus stop. The implied opposition to "contact" is "separation" in space, and so Na Norma's answer seems designed for an interlocutor who is familiar with the location of the park, but who is not sure whether the buses stop right at it, or a bit away from it. Thus, this disambiguation is also the activity in which she engages.

In her second response, Na Norma begins by talking about where the buses *used* to park, *ante* 'before.' She discusses not only the buses that went to Xadani, but also those that went to Monte Grande, another little town outside of Juchitán. Her narrative continues to describe what the area around the park looked like in the past, including who used to live in the houses surrounding the park, and the businesses that now occupy the old house locations. Thus, this discourse seems designed for an interlocutor interested in the location of the buses not for utilitarian reasons (e.g. someone who needs to get to Xadani by bus), but for aesthetic and historical reasons. Na Norma's use of *ante* 'before' and *dxiqué* 'those days' establish this as a narrative of times past, perhaps for the purpose of educating an interlocutor of a younger generation.

Na Norma's two responses to the prompt differ not only in the coordination devices used, but also in the way space is treated in talk. Perhaps most saliently in the

context of the Geo task that was intended to elicit uses of spatial frames of reference, Na

Norma uses different frames of reference in each response. In her first response, her use

of *ruaa* 'edge' may be considered an instance of the object-centered frame of reference in

speech, and was not accompanied by spatial gesture. In her second response, she used an

absolute frame of reference in both speech and gesture when describing the past location

of the bus stop. This line of her discourse appears in Transcript 4.3, below. She begins by

describing the location with a deictic term, *cherí* 'over here,' and gestures toward the

south with her right arm. She holds her arm in that position and pumps it several times as

she hesitates. Still holding her arm in that position, she specifies that she means *ladu*

guete' 'the south side.' Because the park is located to the north of where she is sitting,

this is an instance of the absolute FoR and not a direct point.

Transcript 4.3: Na Norma, excerpt from Geo task, *"On the south side"* (August 2012).

11.	bi-zuhuaa-ni lado che-rí' ladu casi COMPL-stand-3I side LOC.DIST-PROX side like ladu guete' ladu guete' pue side south side south DM *it stood on this side like on... on the south side,* *yeah, the south side*

     Of course, other aspects of the way Na Norma talks about space also differ

between the two responses, including the amount of detail she gives, the types of place

names given, etc. Many trials from the corpus of Geo data display a similar pattern in

which participants' spatial talk, including frame of reference use, varies throughout the

course of the single trial. Although the Geo task may have not succeeded at its intended

purpose, the results from it point to an important dimension of variation in spatial talk in

Juchitán at the level of interactional context. Because of the ambiguity at several different

levels of the interactional context of the task, participants frequently engaged in

reinterpretations of the task. These reinterpretations led to responses that varied in the use of spatial language. Thus, the findings from the Geo task prompt questions about how spatial talk in Juchitán might vary in different interactional contexts. What kinds of coordination problems are posed in the course of talk about space? What kinds of coordination devices are used in talk about space? How does choice of coordination device vary across contexts?

4.3 Situated spatial talk in Juchitán

In order to understand the patterns of habitual spatial language use in Juchitán, we must consider spatial communication that is situated in locally relevant contexts. In the remainder of this chapter, I will consider several examples of situated spatial talk from video-recorded interactions, looking at how they differ across four dimensions of common ground. First, I will look at instances of spatial talk that appear to rely on communal common ground as the source of coordination devices chosen. These examples will illustrate some of the conventions for talking about space at the level of the wider community of Juchitán. Next, I will consider some instances of spatial talk that rely on various combinations of communal and personal common ground, varying from situations with greater and lesser degrees of common ground. These examples will illustrate how spatial talk varies across contexts that differ in the amounts and types of common ground shared among participants. Next, I will consider how the common ground provided by "activities" might affect spatial reference. Activities, which emerge in the course of interaction, provide a context shared by participants that is crucial to the interpretation of coordination devices. Finally, I will consider how perceptual common

ground combines with local conventions for the interpretation of indexicals used in spatial reference. Deictic terms and direct pointing gestures, some of the most common coordination devices deployed in spatial reference in Juchitán, provide a unique window into the ways in which contextual features may be linguistically encoded. Although the following examples are organized according to the kind of common ground I highlight in my analysis, it is of course the case that participants rely on a variety of common resources in many layers of context to solve the referential coordination problems posed in communication about space.

4.3.1 Conventional solutions

One potential method for isolating "conventional" solutions to spatial coordination problems is to consider instances of spatial talk designed to communicate in non-face-to-face contexts—what we might call "disembodied" contexts. Communication in disembodied contexts will appeal more to aspects of the communal common ground shared with the intended audience, and less to personal, perceptual, or other non-conventional aspects of common ground. The *bocina* announcements that ring over the rooftops of Juchitán represent one such genre of disembodied spatial speech, for contained within their message is information about how and where to find the item or event that is being announced. The coordination problem presented is how to refer to these locations such that the intended audience may find them.

Transcript 4.4 reproduces a portion of Ta Paco's *bocina* announcement that appeared in the Introduction of this dissertation. In these lines, we see several different strategies used for locating the items for sale.

Transcript 4.4: Ta Paco, "*She is at her mother's house*" (January 2012).

1. **ra   lidxi   na.K** za-dxela-tu empanada casi ca-dxuuni' de beela ne de
    LOC POSS.house NAME FUT-find-2PL empanada just CONT-fry   of meat and of
    quesiú
    cheese
    at Mrs. K's house you will find empanadas, just fried, meat and cheese

2. **ra   lidxi   na.C xiiñi   na.D** ra-cá   za-dxela-tu jugu de
    LOC POSS.house NAME POSS.offspring NAME LOC-DEIC FUT-find-2PL juice of
    naranja
    orange
    at the house of Mrs. C, the daughter of Mrs. D, there you will find orange juice

3. n-apa   na.G guchachi guiiña
    STA-have NAME iguana   chile.pepper
    Mrs. G has iguana stew

4. **n-uu-be ra lidxi   jña-be,   ra lidxi   na.T cayejón del**
    STA-is   LOC POSS.house POSS.mother-3H LOC POSS.house NAME alley   of
    Cobre
    Copper
    she is at her mother's house, at the house of Mrs. T, in Del Cobre Alley

In the simplest, a specific house is identified as belonging to the person selling the

particular item. Thus, in Line 1, the listener is told that the empanadas can be found "at

Mrs. K's house." This presumes quite a bit of knowledge on the part of potential buyers,

who will have to know whom Mrs. K is and where her house is located. Another problem

that emerges here is knowing what is meant by "her" house. House ownership is a

complex issue in Juchitán, and houses may considered to "belong" to a person on the

basis of inheritance, purchase, or sometimes marriage, and not necessarily on the basis of

current residence.

In Line 2, we see a slightly more elaborated version of the strategy, in which the

seller is identified as being the "daughter of Mrs. D." Thus, the potential buyers are given

the names of two individuals, a kin term relating them to each other, the implied

information that they can be found in the same house, and that this house belongs to Mrs. C. And in Line 4, we see a similar use of two individuals connected through a kinship relation, with the additional information about a named alley on which their house may be found.

The coordination devices chosen here—people's names associated with house ownership, kinship terms, and street names—give insight into the kinds of communal common ground Ta Paco assumes he shares with his audience—defined here by those within range of the *bocina*'s sound. What do members of the community need to know in order to coordinate with Ta Paco? First, they should agree on how to select which individual should serve as the representative of a particular location; and second, they should agree on the interpretation of kin terms in these contexts. With regards to the former problem, an individual must be selected that will be known among those within range of the announcement, usually within a radius of 5-6 blocks, except when the day is exceptionally windy or still. The preference seems to be to select older people, either men or women, and especially individuals who have a memorable nickname. With regards to the latter problem, the kin terms *xiiñi* 'offspring' and *jnaa* 'mother,' both of which appear in this transcript, can sometimes be ambiguous as to generation.

For example, Maite Pilar, in whose house I lived, was referred to in *bocina* announcements as *xiiñi Ta Guugu*, 'offspring of Ta Guugu,' even though Ta Guugu was her grandfather. However, the property on which she lived belonged to him originally and she had inherited it. Thus, in terms of inheritance, she was, functionally, his daughter, and her location on this property could be derived from this relation of inheritance, indexed through the kin term *xiiñi* 'offspring'. Furthermore, his nickname was well

known among the neighbors. I have used a pseudonym for him that means Mr. Pigeon, but his real nickname name is similarly distinctive. As one of the older individuals in the neighborhood, and one with a distinctive nickname at that, he served as an ideal representative of the location of that particular house. Thus, norms related to naming of individuals, nicknaming, the indexicality of kin terms, and the politics of residing on particular properties reveals just a some of the complex social information that forms that basis of the communal common ground appealed to in _bocina_ announcements in southern Juchitán.

The cultural practice of understanding space and social relationships in tandem in Juchitán is illustrated nicely by habits of speaking about marriage and by some of the practices involved in wedding ceremonies. In Juchitán, when people talk about marriage, they talk about places. Rather than ask _whom_ a woman is married to or is going to marry, people ask _where_ she got married or will get married. What the questioner wants to know is where her in-laws' house is located. In JCH, the term for 'daughter-in-law' consists of two morphemes, the second of which is the word for house (see for example, Transcript 4.4, Line 1, above).

(1) xua-lidx-e'
     POSS.daughter.in.law-POSS.house-1SG
     my daughter-in-law

Because this kin term, like other kin terms in JCH (and like the term for 'house'), is inalienably possessed, it specifies that this person *belongs to* a particular house; and that the house, in turn, belongs to a particular person. The possessive suffix is obligatory. Thus, the form given above, *xualidxe'*, may be glossed as 'daughter-in-law of my house.' In a similar vein, I was once told, when I asked the meaning of the Spanish word

concuño, that it means, "we got married in the same place." The Spanish term refers to the relationship between two individuals who married siblings, and so the gloss I received in Juchitán referred to them as having moved to the same house, or joined the same household.

The morphology and semantics of these terms parallel marriage practices in Juchitán. Traditionally in Juchitán, a woman moves in with her husband's family as part of the first of what will be three different marriage ceremonies. This first ceremony, the "abduction," involves the taking of the woman's virginity under the cover of night without the knowledge of her parents. After this has happened successfully and blood has been collected on a cloth, a group of women who are neighbors of the groom—his "people"—will go to the bride's house to notify her parents of the event. The standard way of putting this is to say that she will now be "staying" in the groom's house. Indeed, under the strict version of the tradition, she is obligated to stay and help her new mother-in-law with housework for at least several months. After notification of the bride's family, an impromptu party will erupt at the groom's house, to be continued to following day. This is the only type of party in Juchitán that is not planned in advance and for which no invitation is sent.

Much is made of the bride's move to her new location, and another wedding-related ceremony that will take place is the "delivery of the chest" to the groom's house. Traditionally, a woman would have kept her possessions in a single chest, and thus the name of the ceremony has been retained; now, this ceremony usually involves the delivery of several large pieces of new wooden furniture and all the bride's belongings. Her (former) neighbors all gather at her parents' house to collect everything, including

the heavy furniture, which is transported on foot in a procession accompanied by a band.

The bride's "people" will be received by the groom's with food and plenty of drink as the

new bride's possessions are delivered to her in her new home.

Communal knowledge of these practices and what they entail is appealed to in yet

another type of disembodied spatial communication in Juchitán: that appearing on party

invitations. Figure 4.1, below, shows an example of an invitation from the civil wedding

of Maite Pilar's cousin, Alma Pilar, to Manolo. It reads:

> 'The couple, Mr. Teodoro QZ and Mrs. Paz XY are participating in the
> matrimony of their children, Alma Pilar and Manolo. And they have the
> honor of inviting you to the civil ceremony that will take place on
> Saturday, the 03 of December of the current year, and you are awaited at
> 15:00 hours in their private residence, located on the alley of P, between
> M street and C street in Yoxho. For your attendance, thanks in advance.
> Heroic City of Juchitán de Zaragoza, Oaxaca, December 2011.'

After the "abduction," the civil wedding is the next wedding ceremony that will take

place, months, or sometimes years later. The civil wedding is a more typical party, unlike

the abduction, in that it is planned far in advance and is much larger. Parties of this type

take place under an awning set up in the street or *callejón*. Under the same awning,

several different women will have a *puesto* 'stand,' meaning they will be receiving guests

and serving those guests food and beer. Minimally, the groom's mother will have a stand

at her son's civil wedding; but the bride's mother usually does as well. Sometimes, one or

more of the godmothers of the bride or groom will also have a stand. Guests may choose

to give their offering of money and beer to whichever woman they wish, choosing based

on who sent them an invitation, whom they know best, whom they might want to invite to

a future party, or whom they owe from a previous party. Guests can also visit more than

one stand at a party by giving more money to another woman and changing seats to sit in her section under the awning.

Wedding parties typically take place near the groom's house, but Alma Pilar's case was different because she was the *xhuncu*, the baby of the family, and was therefore expected to continue to live with her mother and care for her. Alma Pilar and her mother, Na Paz, sold shrimp tortillas out of their home, and worked long days making vast quantities of these and other food items to sell wholesale to women who would take them to sell in the market. Na Paz needed Alma Pilar at home to help with this work, and so Alma Pilar never went to stay with her mother-in-law when she first got married. Instead, her husband Manolo had come to live with her and Na Paz. For recipients of the invitation to this wedding, much of this information was discernable even though not explicitly stated. The fact that the wedding would be held on the bride's *callejón* indicated that she still lived at home. This also indicated that the second day of partying, known as the *lavada de las ollas* 'the washing of the pots,' would also be held in the same location; and that the third day of parting, the *recalentada* 'reheating of the food,' would be held both in the bride's home and at the groom's home. Guests could also discern from this invitation that the bride's mother and the groom's mother would have stands at the first party and at the *lavada*; since the party was being held at the bride's house, this implies that the bride's mother will have a stand. The groom's mother must always have a stand. This would further mean that both mothers would be preparing food in their homes on the mornings of the parties, and so anyone interested in helping to prepare food could plan on doing so.

Los Señores

Sr. ~~Flaviano Baltazar Luis~~
Sra. ~~Hipólita Vicente Martínez~~

Participan en el enlace matrimonial de sus hijos

~~Ana Regina~~ *y* ~~Mariano Santa Ana~~

Y tienen el honor de invitarlos a la ceremonia civil que se llevará acabo el día sábado 03 de diciembre del año en curso, y se les espera a partir de las 15:00 horas en su domicilio particular, ubicado en el callejón ~~de los pescadores s/n~~ *entre* ~~Melchor Ocampo y Constitución, de la 7a sección~~

Por su asistencia las gracias anticipadas.

H. ciudad de Juchitán de Zaragoza, Oaxaca
diciembre 2011

Figure 4.1: Alma Pilar and Manolo's wedding invitation.

Party invitations and *bocina* announcements have in common that they are some of the few sites of every-day literacy in Juchitán. *Bocina* announcements must be written and delivered on paper to the announcer, who will translate the written text into a spoken announcement. And invitations are considered official only when delivered in written form. Notably, the written forms occur primarily in Spanish, even though their lives begin and often end with JCH speech. Because many households in Juchitán include

members who are unable to read or who understand little Spanish, school-aged children are often recruited for writing *bocina* announcements or the reading of invitations. Announcements may be dictated to children in JCH, which they will render into written Spanish. In turn, this Spanish document will be translated back into JCH when rendered as an announcement over the loudspeaker. Similarly, invitations, which are often written in a quite elaborate formal register of Spanish, may be "read" aloud in JCH by a literate member of the household for the benefit of the others.

Because *bocina* announcements and invitations are written, portable forms, they are expected to circulate in a wider community, perhaps encompassing all of Juchitán, or, at the very least all of Yoxho. On this basis, we might conclude that the coordination devices they employ for accomplishing spatial reference depend upon aspects of common ground most widely shared at the communal level. These aspects of common ground include, minimally, complex knowledge about local social relations, marriage practices, patterns of inheritance, personal names, and street names.

4.3.2 Solutions in face-to-face interaction

Of course, in most instances of face-to-face interaction, participants rely on more than one type of common ground. In this section, I present some examples that illustrate how speakers in Juchitán solve the coordination problem of spatial reference through the use of coordination devices that rely on aspects of both communal and personal common ground. These examples will illustrate some ways in which spatial reference varies according to the common ground shared by participants.

The use of landmarks as coordination devices in spatial talk is quite common in Juchitán, but landmarks seem especially susceptible to variation on the basis of personal common ground. While some landmarks in the city are quite salient at the community level, such as the main church or the market, other landmarks may be invoked on the basis of shared experiences in those locations. This first example, recorded in my field notes, occurred among members of the family of Guie' Xhuuba', one of the children who will feature in Chapter 5. On this evening, Guie' Xhuuba' was attending her first day of after-school tutoring at a locale in the center of town. I was at Guie' Xhuuba's house, and witnessed her father, Cornelio, explain to her older sister, Katia (age 14), where to go to drop off the pencil case that Guie' Xhuuba' had forgotten at home. Katia was not familiar with the tutoring location, which was about a half mile west of their house. Cornelio was sitting on a couch in their living room, facing east. He turned around in his seat and held his arm out to the west, and said to Katia in Spanish, *Vas a ir todo derecho* 'you are going to go all the way straight.' Katia pouted a little and said, "But how many blocks?" Cornelio scowled angrily and sighed. Then he shouted, "It's right next to the place that you buy all your clothes!" Katia rolled her eyes, stuck a large comb into her ponytail, and left with the pencil case. Once she had left, Cornelio complained to me that she "doesn't listen" and "doesn't understand."

In this interaction, three different coordination devices were proposed, but only the last one was successful. The first coordination device proposed by Cornelio consisted of a combination of a direct pointing gesture and speech describing a path following the trajectory of the gesture. Based on Katia's response, she found this device ambiguous as to the distance she should travel along the path; she proposed another coordination

device: the number of city blocks she should travel. Cornelio rejected this as a possible solution by not providing a number of city blocks. Instead, he moved away from the search for common ground with his interlocutor along the route to the location, instead searching for common ground at the destination. Here, he relies on shared personal experience with Katia, namely, knowledge of her shopping habits. "The place that you buy all your clothes" apparently succeeds as a coordination device, as Katia signals her belief that she has understood by walking out the door. In this example, a close family relationship between the interlocutors facilitated the use of a coordination device that relied on personal common ground, and efficiently brought an extended grounding process to close.

One extremely prevalent type of spatial reference in Juchitán occurs in the context of directing taxi or moto-taxi drivers. For the purposes of selecting a coordination device for directing a taxi, there are three types of taxi drivers: those who know you and know where you live; those who don't know where you live but are JCH speakers, usually from Yoxho; those who don't know where you live and are Spanish speakers, usually from Cubi. I observed Maite Pilar, in whose house I lived, direct taxis to our house on many occasions and noted the following patterns. For drivers whom she knew, she said nothing. She simply entered the taxi and sat down. For the other types of drivers, she regularly used two methods. The most common was to say, simply, _Colón_, the name of the street that ran north/south along one side of our block. As the driver approached our alleyway, which was in the middle of the block, she would say, _ndaani cayejón ca_, 'inside this alley,' or _cayejón ca_ 'this alley,' and gesture with her whole arm toward the alley. The driver would have to turn to look at her or look in the mirror, and sometimes asked for

confirmation of where he was to go. The turn is a right turn into the alley, but there is also another alley to the left. Upon turning into the alley, the inside of the block opens up, with all the houses facing inward along the alley. The alley splits in two directions. This split would sometimes cause trouble for the drivers, who would then ask which way to go, or where to stop. Maite Pilar, in every instance that I saw, navigated this hitch exclusively through gesture and not speech. She would simply point to the area in front of our house, which was visible from the fork in the alley. This method could be used with any driver who did not know the location of her house.

The other method she often used was to say, upon entering the taxi in the center, *ra ridoo benda ca* 'where they sell fish.' One of the corners of our block was the well-known location of the early morning pop-up fish market. The drivers would head toward that corner, and then, just before arriving there, she would instruct them in the same way as above to go into the alley. This method, however, was reserved for JCH speakers from Yoxho because many of the Spanish speakers from Cubi refused to drive so deep into Yoxho, claiming they feared for their safety. The use of the street name gave no information about how far south along *Colón* the taxi would need to travel, so unwitting Cubi drivers could be coaxed to go just a little further. The use of the fish corner, in contrast, indicated a specific location within Yoxho, and some drivers would immediately relieve themselves of passengers going so far south.

One day, I was riding in a moto taxi with Maite Pilar's husband, Javier Senior, heading from the center to our house. He had used the single street method, but had picked the north/south street that borders the other side of our block. Like Maite Pilar, he indicated that the driver turn into the alley by saying *cayejón ca* 'this alley,' but didn't

point. The driver headed into the alley, and when he got to the fork and slowed his engine

as if to hesitate, Javier Senior said *guete'* 'south.' The driver immediately revved his

engine and headed south. Javier Senior repeated this exact same method in a taxi that I

rode in with him two days later. These were the only instances I witnessed in which a

cardinal direction term was used to give directions to a taxi driver. These examples

illustrate that the most common coordination devices used in directing taxi drivers

include grid street names, prominent landmarks, cardinal direction terms, and pointing

gestures. However, there is some slight variation in how these are deployed depending on

the common ground shared between passenger and driver. The use of street names seems

to be the most conventional strategy; but here we also see a case where a particular

landmark is regularly *avoided* in interactions with individuals perceived to hold certain

opinions of the neighborhood associated with the landmark.

The next example features an extended dialogue including many instances of

spatial reference. Ta Cidro, who goes around town selling large bottles of water for

household use, has stopped to chat in the street with two of his clients, an older married

couple I call Ta M and Na T. Ta M makes hammocks, and so works at home, and Na T is

selling juice on their stoop these days. Ta Cidro was the only person I met in Juchitán

who was a fluent trilingual speaker of JCH, Huave, and Spanish. Huave is a linguistic

isolate, unrelated to JCH, spoken in several towns surrounding Juchitán. Ta Cidro's

father is a JCH speaker from Juchitán, while his mother is a Huave speaker whose family

comes from San Mateo del Mar, a Huave village located on the *Laguna Superior*, to the

south of Juchitán (Figure 4.2). Because he has spent time living in both places, he is a bit

of an outsider compared to other JCH speakers in Juchitán, and his background is

unknown to Ta M and Na T. Thus, the participants in this interaction share membership in the community of Juchitán, but only Ta Cidro is an expert in the social and physical geography of San Mateo del Mar.

Transcript 4.5: Ta Cidro (C) chats in the street with Ta M (M) and Na T (T), *"My father is the one from where Mr. Pablo Toní comes from"* (February 2012).

1. T xhoz-o'　　　nga de　ra-rí
   POSS.father-2SG FOC from LOC-PROX
   your father is the one from here?

2. C xhoz-e'　　nga de　ra-rí　　laa
   father-1SG FOC from LOC-PROX PRON
   my father, he is the one from here

3. **xhoz-e'　　　　nga ra　z-eeda Ta　　Pablo Toní　ca**
   POSS.father-1SG FOC LOC Z-come NAME NAME NAME DET
   my father is the one from where Mr. Pablo Toní comes from

4. **este Marco Toní, Pablo Toní　ca　nga**
   HES NAME　NAME NAME　NAME DET FOC
   um, Marco Toní, he is from Pablo Toní

5. bi'chi　　　　　bixhoz-e'
   POSS.man's.brother POSS.father-1SG
   bi'chi　　　　　bi-xhoz-e'　　　nga
   POSS.man's.brother POSS.father-1SG FOC
   my father's brother, that's my father's brother

In Line 1, Na T asks whether Ta Cidro's father is from "here," meaning Juchitán. Ta Cidro confirms that his father's side is the one from "here." In this case, the scope of *rarí*, 'here,' is determined by previous discourse in which a contrast was made between the Zapotec side of Ta Cidro's family and the Huave side of his family. In Line 3, Ta Cidro offers some more specific information about which part of town his father is from.

But, rather than specify a neighborhood or section, he explains, "My father is the one that comes from where Mr. Pablo Toní comes from." This utterance is accompanied by a pointing gesture toward the west (Ta Cidro is looking and pointing pretty much west in the Line 3 frame, though in the Line 2 frame, for example, he is turned a little toward the north). Apparently unsure of the success of this coordination device, however, Ta Cidro refers to a second individual in Line 4, "Marco Toní." He seems to judge that this name will ring more of a bell for his interlocutors, who can then use it to discern the location of Pablo Toní's home. This utterance is also accompanied by a gesture, in the same direction, but with the arm slightly lowered and less rigid, suggesting greater proximity. He then mentions that Pablo Toní is his father's brother (Line 5).
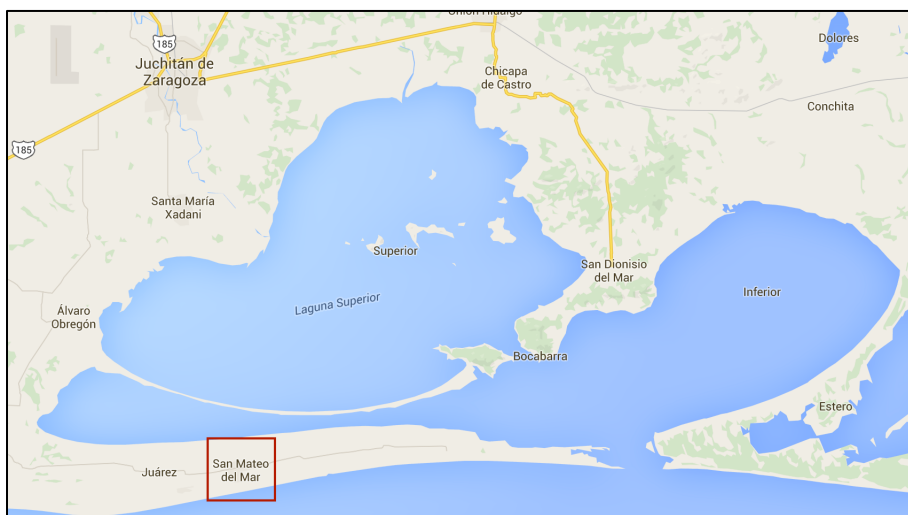
Figure 4.2: San Mateo del Mar is located due south of Juchitán, past the *Laguna Superior*.

His interlocutors signal their understanding by continuing the conversation without pressing for more information: Na T asks about his mother's side of the family (Line 6). This time, Ta Cidro references a particular place, noting that this is the side of his family that comes from San Mateo del Mar, a Huave village to the south. Ta Cidro

points to the south here by wrapping his right arm around his head to point over his left

shoulder (Lines 7-8).

Transcript 4.6: Ta Cidro (C) chats in the street with Ta M (M) and Na T (T), *"My mother's side is the one whose family is from San Mateo del Mar"* (February 2012).

6. T   ne ca ra-cá   la, ma   j-neza   jñou'
        and PL LOC-DEIC FOC COMPL POSS-road
        POSS.mother.2SG
        ca   nga familia-lu
        DET FOC family-2SG
        and the ones from over there, they are your family
        on your mother's side?

7. C   **eso j-neza   jñaa   ga nga familia**
        that POSS-road POSS.mother.1SG DET FOC family
        de San Mateo del Mar
        of NAME
        that's right, my mother's side is the one whose
        family is from San Mateo del Mar
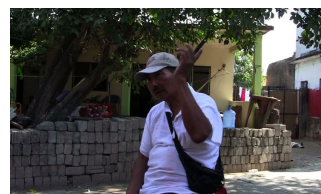
8.   ca   nga n-apa'   familia sti   neza jñaa
        DET FOC STA-have.1SG family POSS road
        POSS.mother.1SG
        that's where I have family on my mother's side
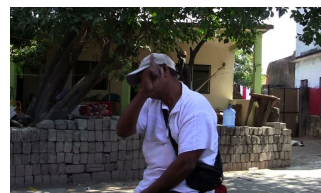
9. M   **paraa n-uu ca Sule ga**
        where STA-is DET NAME DET
        where the Azules are

10. C   aja' co', co' **che-rí**   n-uu   ca
        yes no   no LOC.DIST-PROX STA-is DET
        yes, no, no, they are over here

11. M   co', parte   nga
        no seperate FOC
        no, that's different

12.	C	aparte	ca	nga
		separate	PL	FOC

those are different

This segment of the interaction illustrates nicely how the process of establishing the meaning of the coordination devices must itself be coordinated by participants. After Ta Cidro has explained that his mother's family comes from San Mateo to the south, Ta M attempts to confirm his understanding of this reference by asking whether Ta Cidro's family lives near another family, the Azules (Line 9). Ta Cidro begins to say yes, hesitates, and then corrects Ta M, saying that the Azules are actually *cherí* 'over here,' pointing toward the north (Line 10). This usage of *cherí* is a good illustration of how the proximal deictic term can combine with the distal prefix to indicate that the location is "toward here from there," i.e. from some location that has been discursively established as "far," the referent in question is "here." The Azules family, therefore, is likely live within Juchitán. But Ta M does not seem to believe that Ta Cidro has understood who the Azules are, and tells him that the ones he is pointing to are "different," i.e. not whom he meant (Line 11). Ta Cidro acknowledges that he was mistaken, and that the Azules are "different" (Line 12). At this point, the participants seem satisfied that they have established a commonality of thought regarding the meaning of the linguistic signs exchanged, and regarding the sufficiency of the mutual understanding that has been achieved between them; the topic of conversation switches to the new highway that will be built in Huave territory.

These instances of spatial reference embedded in the larger activity of locating Ta Cidro's family illustrate a variety of coordination devices used in spatial reference in Juchitán, especially the use of personal names and direct pointing. However, there is variation in how Ta Cidro deploys these devices, which seems related to the common ground he believes he shares with his interlocutors. In the first segment of the conversation, Ta Cidro relies exclusively on personal names, direct pointing, and kinship terms to reference the location of his father's house. Because this house is within Juchitán, and he and his interlocutors can be assumed to share similar knowledge about the social geography of Juchitán, these devices are sufficient. But when discussing his family from San Mateo del Mar, Ta Cidro elects to use just the place name and a direct point toward the south, without specifying any particular location within San Mateo. When Ta M attempts to discuss families of San Mateo, this results in a series of negotiations indicating that the participants do not share common ground relevant to this topic. Thus, the selection of coordination devices varies throughout the course of the interaction, as the conversation wends from areas of shared common ground to areas of less shared common ground.

4.3.3 Activities

The following examples provide evidence that, in some cases, a shift in activity is both signaled by and accompanied by a shift in the type of coordination device used for spatial reference. The term "activity" may refer to a the larger context of the discourse, such as "directing a taxi" versus "engaging in an elicitation task." But it may also refer to smaller scale activities that occur within the larger discourse, such as "doing agreement"

or "heckling" a speaker (Goodwin and Goodwin 1992). The two transcripts that follow exemplify different discursive activities—giving walking directions and telling a narrative—and yet employ quite similar coordination devices for spatial reference throughout. However, both examples illustrate a similar pattern of a change in *perspective* during the course of the narrative, as evidenced through gesture, which appears to correlate with a shift in within-discourse activity.

The first example comes from Guie' Xhuuba'. I was at her house visiting with her mother, Na Mona. I had come to ask Mona for directions to her *comadre*'s house, Guie' Xhuuba's godmother, whom I wanted to interview. As Mona began to tell me how to get there, Guie' Xhuuba', who was in her bedroom doing homework, began to shout directions from her bedroom. I shouted back at her that I couldn't hear her, and that she should come tell me in the kitchen. As Guie' Xhuuba' made her way to the kitchen, Mona looked at me with wide eyes and said, "That girl would go there alone if I let her, and she would find it, too!" Guie' Xhuuba' bounded into the kitchen and I was able to record her performance. She was 6 years and 5 months old at the time of this recording.

Transcript 4.7: Guie' Xhuuba' *"There is an alley like this, like a snake"* (March 2013); LH=left hand; RH=right hand.
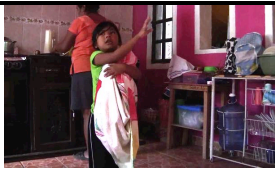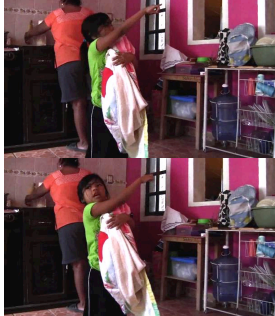
1.	ah mi el la casa de mi madrina *uh my the the house of my godmother*	*LH pulls at the blanket she is holding. LH joins RH to hug the blanket close as she rocks side to side.*	
2.	pasas un callejón *you pass through an alley*	*RH points to her right side and then begins to move in a circle to point up and then straight in front of her (west).*	

Transcript 4.7: Guie' Xhuuba' *"There is an alley like this, like a snake"* (March 2013); LH=left hand; RH=right hand, continued.

3.	ahí donde está *there where there is*	*RH moves back to the right and traces a straight line to her left (from north to south).*	
4.	ahí donde se paran los mototaksi *there where the moto-taxis park*	*RH drops to reach straight in front of her and a little to her left. The hand comes to point straight in front of her (west).*	
5.	no por allá *not over there*	*RH and head shake briefly; RH arches over to point up and to her left (south).*	
6.	es por aquí *it's over here*	*RH moves right in front of her face, points down and begins to trace a path, eastward toward her body.*	
7.	(a)traviesas *you cross*	*RH continues to trace the path, which turns abruptly to the south; her head and body then also turn south.*	
8.	y ahí *and there,*	*RH flips up and palm faces west.*	

Transcript 4.7: Guie' Xhuuba' *"There is an alley like this, like a snake"* (March 2013); LH=left hand; RH=right hand, continued.

9.	hay un callejón así como serpiente *there is an alley like this, like a snake*	*Open RH continues to indicate the space on her left side, toward the west; moves RH side to side at the wrist.*
10.	ahí está el un, un *there, there is the, a, a…*	*RH changes to pointing shape; arm is stiffened and raised slightly upward, pointing west.*
11.	ahí donde se para el mototaksi *there where the moto-taxis park*	*RH continues to hold westward point but slowly drops down.*
12.	ahí es la casa (de) mi madrina *there is my godmother's house*	*RH jumps a bit south and head turns to follow; head turns back to look at interlocutor while RH position holds.*

This instance of spatial talk differs from the previous ones we have seen perhaps most saliently in the embodied viewpoint with which it begins. The notion of "viewpoint" in gesture has been discussed by McNeill (1992), who has described the difference between what he calls "character" versus "observer" viewpoint. In the former type, the gesture used conveys the sense that the narrator envisions herself inside the narrated scene; while in the latter type, the gesture conveys the sense that the narrator is observing the narrated scene at a distance. McNeill also notes that each type of gesture perspective tends to co-occur with certain kinds of linguistic constructions. For example, in the kinds of motion event descriptions he studied, character viewpoint gestures tended to occur with transitive verbs, and observer viewpoint gestures tended to occur with stative verbs

(1992:119). When applied to route descriptions, such as Guie' Xhuuba's, "viewpoint" and spatial frame of reference do not affect one another directly, since either viewpoint may occur with any FoR. However, as this example will show, changes in viewpoint are sometimes accompanied by changes in FoR. A further dimension of variation in gesture types seen here will be between static and dynamic gestures.

Guie' Xhuuba' begins by narrating a walking route that she clearly has experience navigating. This is in spite of the fact that she is ostensibly telling *me* how to get to her godmother's house. The embodied nature, or "character viewpoint," of the direction giving is made apparent through her use of verbs of motion such as *pasas* 'you pass' (Line 2) and through her dynamic gestures that trace a walking path though space (frames in Lines 2-3). In this stretch of talk, Guie' Xhuuba' uses a direct frame of reference, as her pointing gestures, and, indeed, her entire body, are rotated to align directly with the directions in which she envisions herself walking.

In Line 4, Guie' Xhuuba' changes her strategy. Now, she has "arrived" in her narrative at a salient landmark, *donde se paran los mototaksi*, 'where the moto-taxis park' (Line 4), and she pauses in the telling of the route to engage in a different activity— disambiguating this moto-taxi stop from another one. This stop is indeed a well-known location because it is the moto-taxi stop that is closest to the market and so one of the busiest, but there is another busy market stop further south. Holding her westward point that indicates the direction of the relevant stop, Guie' Xhuuba' rotates it ever so slightly right to point directly at me, her interlocutor, and makes a "no" gesture by briefly shaking this open hand along with her head (Line 5, first frame). Then she points directly at the

southern taxi stop (Line 5, second frame). These gestures are accompanied by the speech,

no por allá 'not over there' (Line 5).

5. <u>no por allá</u>   *RH and head shake briefly; RH*
     not over there   *arches over to point up and to*
                               her left (south).

This brief departure from the narrative shifts out of the character viewpoint of the preceding talk. This shift is evidenced by a shift from dynamic gestures depicting motion with arm and body, to gestures that do not depict motion and are performed primarily with the hand and arm. Furthermore, she shifts momentarily from using direct FoR gestures to point toward geographical features, to engaging her interlocutor with a pointing "no" gesture. This gesture suggests that the utterance is intended as a way of *grounding* the interaction—of ensuring that her interlocutor has understood. She then shifts back to a direct FoR point when she points south. Thus, the contrasting nature of the grounding activity from the narrative activity is both signaled and brought about by a shift in viewpoint, as evidenced by gesture.

The next segment of talk begins yet another activity within the narrative, and is accompanied by an even more dramatic change in speech and gesture. In Lines 6-9, Guie' Xhuuba' backtracks a bit, as it were, apparently unconvinced that her interlocutor has understood where the relevant moto-taxi stop is located. She now explains how to arrive

there in more detail. She begins this mini-narrative in Line 6, saying *es por aquí* 'it's

here,' and pointing with a downward-finger to a spot just in front of her body.

6. *es por aquí*   *RH moves right in front of her*
    it's over here   *face, points down and begins to*
                                trace a path, eastward toward
                                her body.

This utterance forms a contrasting couplet with the previous utterance; the deictic

terms *allá* and *aquí* are placed in opposition to each other in brief utterances with parallel

structure. And the gesture types are also clearly different. The direct point of Line 5 is

contrasted with a pointing gesture that clearly does not use the direct frame of reference.

Instead, this gesture is the starting point of what will be a dynamic gesture depicting a

route and using an absolute frame of reference. Guie' Xhuuba' begins to trace a path with

her finger: the path first travels a bit east, toward her body, and then turns abruptly south

(Line 7 still frame). This dynamic gesture is accompanied by a motion verb in speech,

atraviesas 'you cross' (Line 7).

7. (a)traviesas   *RH continues to trace the path,*
    you cross   *which turns abruptly to the south;*
                                her head and body then also turn
                                south.

The series of gestures indicating this path uses an absolute frame of reference because the

path is construed with reference to Ground objects as they emerge in gesture space, and

does not use Guie' Xhuuba's body as the Ground object. Furthermore, this series of

gestures takes an observer rather than character viewpoint, depicting a kind of little map in gesture space, rather than an embodied route.

Again, having "arrived" in the narrative at the next salient landmark, an alley, she shifts to a static gesture. She turns to face forward again and holds her open palm to the west; she says, *y ahí, hay un callejón así como serpiente* 'and there, there is an alley like this, like a snake' (Lines 8-9). Note that this static gesture co-occurs with the stative verb *hay* 'there is,' in contrast to the motion gesture of the previous utterance. As she says, "like a snake," Guie' Xhuuba' quickly wiggles her outstretched arm from side to side, giving an iconic representation of the shape of the alley.

8. y ahí
    and there,

    RH flips up and palm faces west.

9. hay un callejón así como serpiente
    there is an alley like this, like a snake

    RH continues to indicate the space on her left side, toward the west; moves arm side to side.
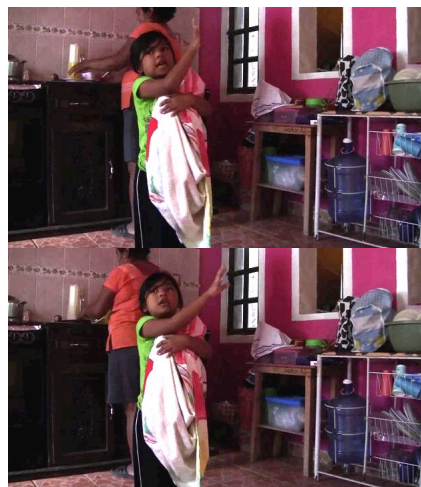
Thus, as in the example above, "arrival" within the narrative seems to constitute an activity distinct from the "journey" segments. These two kinds of activities are set apart through differences in the verbs used in speech, and through differences in perspective, frame of reference, and dynamism in gesture.

In the final segment of the narrative, Guie' Xhuuba' locates the moto-taxi stop with reference to the *callejón* by stretching her arm into a stiff point and pointing in gesture space just beyond the *callejón* (Line 10 still frame). This gesture is accompanied

by some disfluency in speech as she attempts to explain what will be found there. It is difficult to disambiguate the direct and relative frames of reference in this gesture because she turns her body to face west, in the direction of the point. In the next segment, however, Guie' Xhuuba' locates her godmother's house with reference to the moto-taxi stop. She continues to hold her right arm in a westward direction and with a pointing hand shape as she overcomes her disfluency and names the location as *ahí donde se para el mototaksi* 'there where the moto-taxis stop' (Line 11). Throughout the gesture held in Lines 10-11, Guie' Xhuuba's head is turned in the direction of the point, and her eye gaze alternates between looking at her interlocutor and looking in the direction of her point.

11.	ahí donde se para el mototaksi *there where the moto-taxis park*	*RH continues to hold westward point but slowly drops down.*	

In the next line, she reaches the culmination of the narrative. As she says *ahí* 'there,' she lifts her pointing arm slightly up, rotates it with her whole torso toward the south, and replants her downward-pointing hand shape (Line 12a). She also turns her head in the direction of this gesture, momentarily losing the potential for eye contact with her interlocutor. She continues to hold her arm in this location, now stretched slightly across her body toward the south, as she turns her head back to her interlocutor and completes the utterance: *es la casa mi madrina* 'is my godmother's house' (Line 12b). At the end of this utterance, coinciding with the word *la*, she drops her pointing arm back to hugging her blanket and turns to face the camera (Line 12c).

12. a. <u>ahí</u>
there

RH jumps a bit south and head turns to follow;

b. <u>es</u>
is

head turns back to look at interlocutor while RH position holds.

c. <u>la casa mi madrina</u>
the house of my godmother

RH drops down to hug blanket and body rotates toward camera.

The frame of reference used in this segment of the narrative differs from the prior predominance of the direct frame of reference. Here, Guie' Xhuuba' employs the absolute frame of reference, locating her godmother's house to the south of the moto-taxi stand in gesture space. Although she turns to look in this direction, her godmother's house is not actually located to the south of Guie' Xhuuba's house. The godmother's house is toward the west, as is the moto-taxi stand. However, her house is located on the next street south of the moto-taxi corner. Thus, Guie' Xhuuba's southward point is meant to indicate a direction from the Ground object—the taxi stand—and not from the current place of speaking. This sequence of gesture is also characterized by its static rather than dynamic nature, aligning with the use of the stative verb <u>es</u> 'is.' These characteristics combine to set this final utterance apart as an activity—that of finally locating the

godmother's house—and to draw attention to the salience of this activity, which is, presumably the most important part of the narrative.

In May of 2012, Jordan broke his collarbone. In order to get a cast, he would have to go to the neighboring town of Salina Cruz, so he and Maite Pilar boarded a bus and made the trip to Salina Cruz. When they returned, Maite Pilar told me about the trip. She complained that Jordan talked the whole way and wouldn't let her rest on the bus. He talked all day long, she sighed, asking about where they were going, if they were taking a moto-taxi, if they were taking a bus, if the bridge was going to break, if God is inside the hearts of people. She said on the way back she fell asleep and he finally stopped talking, but then, when they crossed the bridge into Juchitán, he woke her up to say that they were almost home. She told me she was surprised that he is smart enough to know they were almost home; she said, *¡Sabe!* 'He knows things!' She told me to ask him when I saw him where he had gone; "You'll see," she said. And so, of course, I asked him to tell me where he had gone. Maite Pilar was there when I recorded Jordan telling me about his trip, and when he was done and had run off to play, she reiterated some of what he had said. She was especially impressed that he knew they had "made a turn" (Line 4), and explained to me that he was right. "You know how the road turns like that and you kind of come back the way you came?" she asked me, pointing the same way that Jordan had pointed. "That's what he's saying," she said. Here is what Jordan said (age 5 years, 8 months):

Transcript 4.8: Jordan (J) tells Melanie (MM) about his trip to Salina Cruz, *"And then we took a turn"* (May 2012).

1.	J	por ahí *over there*	*J points northeast with his right hand and begins to sweep it toward his left.*
2.		por la bodega *near the Wal-Mart*	
3.		ahí fue el autobus **dereeeecho** derecho *from there the bus went straight straight*	*J sweeps his hand in a semi-circle and then raises it high above his head.*
4.		pasó el puente y nos dimos una vuelta y *it passed the bridge and we took a turn and*	*J brings his right hand down to eye level and swoops it to over his left shoulder. He raises his arm upward and inscribes a counter-clockwise circle in the air.*
5.		¡zun! se fue dereeecho derecho *zoom! it went straight straight*	*J stretches his arm up, straightens his torso, and lifts his chin. He bends his arm back behind his head and spreads his fingers wide as he extends the [e] sound.*
6.		regresando la- lavaron la ventana *on the way back they washed the window*	*J wipes his hand in front of his face two times.*
7.		y después nos fuimos *and then we headed*	*Both hands grab his t-shirt and pull the shirt down over his knees.*

Transcript 4.8: Jordan (J) tells Melanie (MM) about his trip to Salina Cruz, *"And then we took a turn"* (May 2012), continued.

8.	<u>y despúes zuzuzu</u> *and then vroom*	*J looks to his right, pulls his t-shirt up and then back over his knees with both hands.*	
9.	<u>cuando nos bajamos</u> *when we got off*	*J rocks back and lifts his hand to place them on his knees.*	
10.	<u>del autobus</u> *the bus*	*J rocks forward and looks up and rocks back again.*	
11.	<u>m'm, nos agarramos</u> *um, we grabbed…*	*J plays with his shirt and looks straight ahead.*	
12.	<u>nos quedamos por un ratito en el mercado</u> *we stayed for a little while in the market*	*J looks to the right and leans forward. He hits the bench next to him with his right hand.*	
13.	<u>nos agarramos un urbano</u> *we grabbed a city bus*	*J pulls his shirt back down over his knees and rocks back.*	
14.	<u>ahí en el mercado</u> *there in the market*	*J rocks back and tilts his head to his left.*	
15.	<u>nos quedamos un ratito en el mercado</u> *we stayed a little while in the market*	*J rocks back and forth as he pulls at his shirt and looks off to the right.*	

Transcript 4.8: Jordan (J) tells Melanie (MM) about his trip to Salina Cruz, *"And then we took a turn"* (May 2012), continued.

16.	<u>compró mi mamá uno</u> <u>pepino para comer comí</u> *my mom bought one cucumber to eat and I ate*	*J rocks back and then forward, burbs, and looks up and smiles.*	
17.	<u>y después ja'a</u> *and after um*	*J looks off to his right.*	
18.	<u>nos **fuiiiimos** en un moto</u> *we headed off in a moto-taxi*	*J swings his right hand behind him to the south and then brings it quickly to resting as he looks off to the right.*	
19.	<u>moto</u> *moto-taxi*	*J looks forward again but tilts head to the right.*	
20.	<u>no</u> *no*	*J shakes his head.*	
21. MM	<u>dónde agarraste moto no entran en el centro</u> *where did you get a moto-taxi? They can't go into the center*		
22. J	<u>sí pero en la- donde se</u> <u>fueron por ahí</u> que **derechiiito** *yes but in the- around the place where they left from, straight from there*	*J looks quizzically ahead, lifts his right hand with a grasping shape, and wiggles his fingers. J flattens his hand shape and begins to stretch arm out in a winding path. Stretches arm straight out with flat hand shape; cocks head to left shoulder; squints eyes and nose and shows teeth while saying the [i]*	

Transcript 4.8: Jordan (J) tells Melanie (MM) about his trip to Salina Cruz, *"And then we took a turn"* (May 2012), continued.

23.	hay un caminito ahí hay *there's a little road, there* *are some there*	*sound.* *J raises his hand* *straight up and* *makes a "placing"* *gesture with closed* *fingers; then drops* *RH to his knees.*	

Like Guie' Xhuuba's narrative above, Jordan's narrative shows evidence of taking an embodied perspective; this is less surprising here, however, since the purpose of this discourse is to tell about an actual embodied experience he had recently, in contrast to Guie' Xhuuba's goal of directing me to her godmother's house. Jordan's narrative begins with talk that is specifically spatial in nature, setting up the locations in which his narrative will commence. He then transitions to a more traditional narrative about his experiences along the trip; for example, he ate a cucumber in the market (Line 17) and he noticed that they washed the window of the bus on the way home (Line 6). This segment of the narrative, from Line 6 to Line 21, is not explicitly spatial in nature, and is not accompanied by spatial gestures. In the final portion of his narrative, his interlocutor poses a question that results in a short segment of spatial talk and gesture. Thus, broadly, this narrative may be divided into the three distinct activities of setting the spatial scene, telling the story of the trip to Salina Cruz, and addressing a question posed by the interlocutor. Each of these activities is characterized by differences in the use of spatial gestures.

Jordan's opening series of gestures use the direct frame of reference. He begins by indicating the static location of the starting point of the journey through combination of deixis (*por ahí* 'over there' (Line 1)), direct pointing (Line 1), and reference (*por la bodega* 'by the Wal-Mart' (Line 2)). His initial point is a bit off from the actual location

of the Wal-Mart; he points toward the northeast rather than toward the northwest. However, this is quickly corrected as he begins to narrate the dynamic start of the journey from that point. His arm begins to trace the path of the highway as it leaves town toward the northwest, and he reaches his arm high above his head to indicate the extension of this path (Line 3, still frame). His accompanying speech includes a motion verb and one instance of the frequent use of sound symbolism in this narrative: *ahí fue el autobus, dereeeecho derecho* 'from there the bus went straight, straight' (Line 4). Here, the vowel lengthening is used to index duration or distance on the term *derecho* 'straight,' giving it a spatial sense.
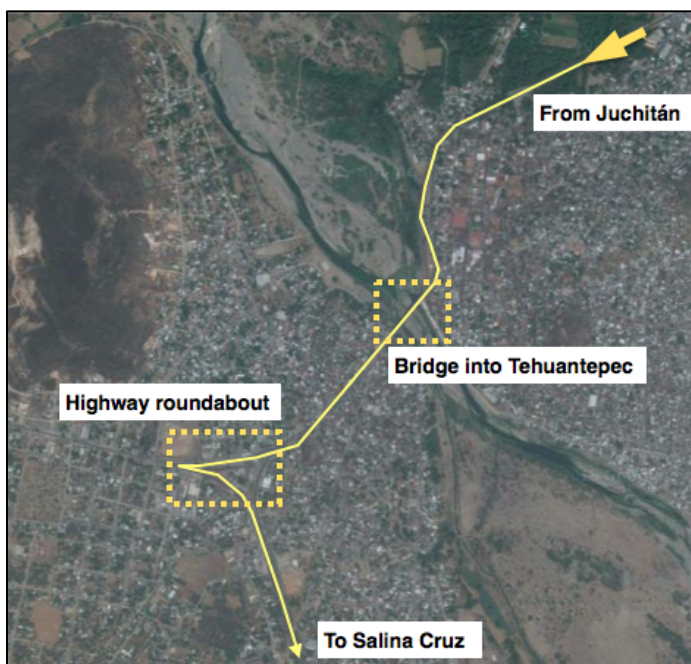
Figure 4.3: The road from Juchitán to Salina Cruz passes through Tehuantepec. It crosses a bridge, turns round a roundabout, and then heads south.

Next, Jordan indicates two salient landmarks: the bridge that crosses the Tehuantepec River as one enters the town of Tehuantepec, and the highway roundabout that would

swing the bus in a loop and then southward, toward Salina Cruz (Figure 4.3). This is the

portion of the narrative his mother had commented on.

Here, Jordan's utterance, *pasó el puente* 'it passed the bridge' (Line 4a) is

accompanied by a gesture in which he swoops his right hand in front of his body and then

around his head to point over his left shoulder, toward the south. He then brings his right

arm up over his head, directing a pointing finger to the northwest, and inscribes a

counter-clockwise circle in the air with this finger as he utters, *y nos dimos una vuelta*

'and we took a turn' (Line 4b). Part of this gesture is cut out of the camera frame, but the

motion of his arm is apparent and his finger shape is visible for an instant as it dips down

to inscribe the circle.

| 4. | a. | pasó el puente *it passed the bridge* | *J brings his right hand down to eye level and swoops it to over his left shoulder…* | |
| | b. | y nos dimos una vuelta y *and we took a turn and* | *…He raises his arm upward and inscribes a counter-clockwise circle in the air.* | |

The frame of reference used in these gestures is not entirely obvious, but may be a

mixture of the direct and absolute. Jordan faces to the northwest throughout the majority

of his narrative, and most of his pointing gestures aim in that direction. This would be

consistent with the vector of the highway as it leaves Juchitán, and is the general

direction of Tehuantepec. However, as the map in Figure 4.3 shows, the highway turns

south just before the bridge into Tehuantepec, heads southwest across the bridge, and then straight south again after the *vuelta* 'turn' around the roundabout. Thus, Jordan's sweeping southward gesture as he talks about crossing the bridge may be an absolute reference to the direction in which the bus began to head. What is notable here, however, is that in no case does he turn to point toward Salina Cruz directly, which would be to the southwest. Thus, his "direct" gestures are direct in the sense that they follow the direct trajectory of the *route* Jordan navigated, rather than directly locating individual landmarks. In the context of gestures taking a character viewpoint, then, the direct FoR is realized in a slightly different way than when the viewpoint is that of an observer.

In the next line, Jordan continues to hold his arm and body in the same northwest orientation as he describes the long, straight trajectory that the bus now took. As he says *¡Zun!* 'Zoom!' he extends his extended arm just a bit further, lengthens his torso, and lifts his chin upward (Line 5a). He then bends his arm backward as the elbow, letting his hand flop behind his head. As he utters, *Se fue dereeecho derecho* 'It went straight straight' his palm spreads open with the extended vowel sound of *dereeeecho* 'straight' and then flops again with the second *derecho* 'straight' (Line 5b). The combination of the upward gesture and lengthened vowel sound give the sense of the indefinite extension of this part of the journey. This utterance parallels the utterance in Line 3, which also involved a nearly-vertical pointing gesture and sound symbolism associated with the word *derecho* 'straight.' Thus, the stretch of discourse from Line 3 to Line 5 is unified in its embodied perspective, the use of dynamic gestures, and the use of the direct and/or absolute frames of reference. These characteristics set it apart as an activity within the narrative, distinct

from the initial static locating of the bus stop, and distinct from what is to follow. This activity might be characterized as narrating the "journey" portion of the story.

5. a. <u>¡zun!</u>
        zoom!

        J stretches his arm up, straightens his torso, and lifts his chin…

    b. <u>se fue</u>
        <u>dereeecho</u>
        <u>derecho</u>
        it went
        straight
        straight

        …He bends his arm back behind his head and spreads his fingers wide as he extends the [e] sound.

The remainder of the narrative from Line 6 through Line 21 does not appear to contain any spatial gestures. In this part of the narrative, Jordan tells some other details of the journey, beginning with the washing of the window (Line 6). He includes a few more lines indicating the length of the journey, but these are not accompanied by gesture except for his fiddling with his t-shirt, which is present throughout the narrative. In Line 9, he tells of getting off the bus and then of the time spent in the market (Lines 12 and 15) and the cucumber that he ate (Line 16). Despite mentioning that they "grabbed a city bus" (Line 13), he does not say where they went on this bus and does not produce any spatial gestures. In Line 18, he does describe a motion event, saying, <u>*Nos fuiiiimos en un moto*</u> 'we headed off in a moto-taxi.' This utterance contains a verb of motion and sound symbolism suggesting distance. It is also accompanied by a gesture in which Jordan allows his right arm to swing like a pendulum behind his body and then forward again.

However, it is not clear if the gesture is meant to indicate a direction, or merely to give a sense of the motion conveyed in this utterance.

In Line 20, Jordan interrupts himself to say, "no," as if he is about to make a repair. But before he can make the repair, I interject with a question about where he got the moto-taxi since moto-taxis are not allowed in the central part of Salina Cruz, as in Juchitán. Here, the activity shifts again, and this shift is quite apparent in Jordan's speech, gesture, gaze, and posture. Whereas he had been looking into the distance and fidgeting around during the previous part of the narrative, he now sits up straight, turns to face me, and makes eye contact with me. His tone is also different: rather than meandering in the casual voice of the previous segment, he speaks firmly and authoritatively.

Jordan raises his hand up with splayed fingers and cocks his head to the side. He begins to explain, *Sí, pero en la…donde* 'yes, but in the…where' (Line 22a), conjuring the idea that his hand shape is meant to indicate a location. He twiddles his fingers as he hesitates. He flattened his hand and begins to trace a wobbly path forward as he explains this location: *donde se fueron por ahí que*, which might be glossed as 'the place where they left from' (Line 22b). The use of the JCH determiner *que* in clause-final position parallels some JCH locative constructions and constitutes this clause as a cohesive locative construction from which is calculated the point of departure. He may be referring to the bus station or some other transportation depot. Finally, from there, he says, it's *derechiiito* 'just a little ahead' (Line 22c). The token *derechiiito* is accompanied by an outstretched pointing gesture and a facial expression of squinted eyes and wrinkled nose; along with the use of the diminutive and the sound symbolism, this token effectively conveys a sense of delicate precision, as through a narrow passage.

22. a. <u>sí pero en la-</u>
         <u>donde</u>
         yes but in the-
         where

         J looks quizzically
         ahead, lifts his right
         hand with a
         grasping shape,
         and wiggles his
         fingers.

     b. <u>se fueron por</u>
         <u>ahí</u> que
         ((the place))
         they left from

         J flattens his hand
         and begins to
         stretch his arm out
         in a winding path.

     c. <u>derechiiito</u>
         just a little
         ahead ((from
         there))

         Stretches arm
         straight out with
         flat hand shape;
         cocks head to left
         shoulder; squints
         eyes and nose and
         shows teeth while
         saying the [i]
         sound.
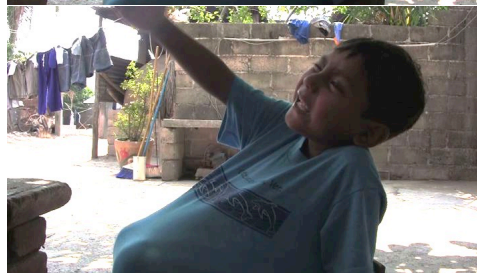
Finally, in the final line of this segment of the narrative, Jordan uses a Ternary frame of reference to show where the moto-taxis are located; though whether absolute or relative I do not know because I am not familiar with the place he is describing. However, we can see evidence within the gesture of a gesture-internal Ground object. After stretching his arm forward to describe the "*derechiiito*" path, Jordan relaxes his arm and shifts it slightly to his left by reaching across his body. There, he "places" the location where there are moto-taxis using a closed-finger hand shape, saying *hay un caminito ahí hay* 'there's a little road, there are some there' (Line 23). It is with reference to the "*derechiiito*" path that the *caminito* 'little road' is located.

23.	<u>hay un caminito</u> <u>ahí hay</u> *there's a little road, there are some there*	*J raises his hand straight up and makes a "placing" gesture with closed fingers; then drops RH to his knees.*	

As with Guie' Xhuuba's narrative, above, the culminating line of Jordan's narrative switches to a Ternary frame of reference, suggesting that the precision offered by this type of gesture makes it appropriate for the most salient part of the narrative. McNeill describes a similar phenomenon whereby the portion of a narrative most important to the speaker is accompanied by the most complex iconic gestures (1992:126).

These examples from children in Juchitán illustrate several parallels between the children's referential spatial practices and the adult practices described thus far in this chapter. Like the adults, these children primarily use the direct frame of reference to orient their spatial gestures, accurately pointing to locations both within and quite distant from their homes in Juchitán. But in addition to relying on the direct frame of reference, we also see some examples of Ternary frames of reference in gesture. These gestures are essential to accomplishing reference in the narratives because they give key information about location and direction not given in speech. In terms of speech, the children employ Spanish deictic terms and no shortage of landmarks, relying on a variety of well-known (to locals) or discursively negotiated landmarks. In contrast to the adults, however, the children use fewer place names and no cardinal direction terms.

This discussion has highlighted the ways in which *activities* function as sources of common ground throughout the course of talk about space. Activities are distinguished from one another in the course of the narrative through shifts in perspective, dynamism,

level of detail, and spatial frame of reference, which are indicated with both gesture and speech. Thus, the activities are discursively constructed, but also provide context crucial to the interpretation of the coordination devices deployed for accomplishing spatial reference. One recurrent example we saw of this was the contrast between "journey" and "arrival" activities within the narrative. These contrasting activity frameworks facilitated interpretation of descriptions of static location during the "arrival" descriptions.

4.3.4 Indexical solutions

Indexicals are a special type of coordination device because their interpretation depends upon a specific kind of shared perceptual and discursive common ground among actors. Hanks (1996) has argued that Yucatec Maya deictics provide an especially interesting window onto how habitual practices may become sedimented in grammar; he shows that their syntax and morphology may "be traced to routine patterns of speaking which involve habitual bodily and conceptual orientations" (1996:237). Thus speaking "contexts" are based on habitual experience, are socially produced, and may vary in systematic ways across cultures. Haviland (1996), meanwhile, discusses the ways in which indexical "transpositions" expose differences in what he calls "projections" and the relations between them (1996:317). Projections are those elements of context brought into being or focus through the particular use of an indexical sign. While some projections are available to the senses in the "here-and-now," others are conceptual entities located in other times and places. The shared knowledge and traditions of actors—their common ground in the jargon of this chapter—constrain or allow projection "from given signs to specific 'values' or entities" (Haviland 1996:280-282).

In the examples that follow, I will examine some instances in which the coordination problem of spatial reference is solved with the use of indexical coordination devices, including JCH deictic terms, and indexical gestures. Along the classic spectrum from pure indexicals to referential indexicals, the coordination devices discussed here will be of the referential indexical type, with both presupposing and creative relationships to context (Silverstein 1995[1976]). I will show how perceptual, but also personal and communal common ground, are relied upon for coordination in these interactions.

As Table 4.1, below, illustrates, JCH deictic expressions can consist of strings of up to six morphemes. The first term must be either the unmarked locative *ra-* or the distal locative *che-*. This latter term gives the sense of 'other side,' as of a boundary crossed, or of movement from one location to another. The next term in the sequence must be one of the three possible locative deictic terms. The combinations *ra-rí* 'here,' *ra-cá* 'there' and *ra-qué* 'over there,' apparently differ from one another along the dimension of proximity to the speaker versus to the hearer versus to some other entity. Distance is also a likely dimension of distinction, but not the predominant one. These terms may also differ from one another along a dimension of perceptual access, with the distal term, *-qué*, designating a region beyond perceptual access in some cases. In addition to these two obligatory morphemes, up to two additional deictic terms, either *–cá* or *–qué*, may be suffixed. Any combination of these morphemes is possible, resulting in constructions such as *ra-ri-ca-cá* or *che-ri-ca-qué*. These forms are attested in my data; some other logically possible forms, such as *ra-que-qué que* are not attested. The precise semantic contrasts achieved through such extended suffixing remain opaque to me. However, some

potential contrasts will be teased apart for the examples of locative deictic terms that appear in this chapter.

Table 4.1: JCH locative deictics. V* indicates rising tone.

Locative	Deictic	(Deictic)	(Deictic)	(Adverb)	(Determiner)
(r)a LOC	-rí* PROX	-cá* DEIC	-cá* DEIC	-pe' EXACTLY	ca DET
che- LOC.DIST	-cá* DEIC	-qué* DEIC	-qué* DEIC	-si JUST	que DET
	-qué* DEIC				

In addition to the deictic suffixes, adverbial suffixes may also be added. The two examples given here, "exactly" and "just," are the same adverbial suffixes used with verbs. Thus, a construction such as *ra-cá-si* has the sense of 'just there.' Finally, these entire constructions may be modified with a determiner. These determiners—the putative source of the deictic morphemes—are the same forms used for indicating definiteness for any noun phrase, including demonstrative pronouns. The determiners are phonologically distinguishable from the deictics on the basis of tone and stress. The deictic terms all have rising tone and stress falls on the final syllable of the construction. The determiners (and adverbs) have mid tone and are unstressed.

The first example involves the family members of Blanca, one of the little girls who will be discussed in Chapter 5. Blanca lives with her grandmother, Na Lavinia, and several other extended family members. On this occasion, La Lavinia's son Valentín, who drives a moto-taxi and does not live with her, had stopped his moto-taxi at her house to get a drink of water. His grandmother, Na Lavinia's mother, Na Ramona, happened to be visiting also, and the two began to chat about a blockade the moto-taxi drivers had

staged in order to protest against regular taxi drivers, who want the moto-taxis out of the city. The taxi/moto-taxi war is an ongoing saga in the Isthmus region. In any case, he explained that there was a blockade on the highway, and that a friend of his who goes by Sweet Potato had gone to check it out (Line 1). Na Lavinia, who is off-camera in the video, interrupts to ask for details about the location of the blockade (Line 2). Valentín and Na Ramona answer at the same time; he points north with his head and says, "At the highway" (Line 3). Na Ramona points with a limp arm and open hand to the north, saying "all the way over here" (Line 4). Na Lavinia still isn't sure if she understands, however, and asks, "This one?" Because she is off camera, I do not know how she gestured; my guess is that she pointed south to the highway that leaves Juchitán and heads to the beach towns because her house, where this interaction takes place, is located just off this highway. Valentín and Na Ramona answer again, but this time, both sound annoyed. Valentín says "That one!" and points to the north (Line 6). He bends his arm at the elbow and extends his pointing finger up at a 90-degree angle, then brings it down again to his side (Line 6, still frame). Na Ramona also points to the north again, this time with a firmer arm and more precise pointing hand-shape, saying, "That one, daughter!" (Line 7).

Transcript 4.9: Valentín (V), Na Ramona (R) and Na Lavinia (L) chat in the yard (May 2013).

1. V tonce ora que la, zee Gu
       then   time DET FOC Z-go sweet.potato
       and so then, Sweet Potato went

2. L guná
       which
       where?

3. V [carretera ca] *((points quickly with head))*
       highway DET
       at the border

Transcript 4.9: Valentín (V), Na Ramona (R) and Na Lavinia (L) chat in the yard (May 2013), continued.

4. R [de ra-ri-cá]
       until LOC-LOC-DEIC
       all the way over here

5. L ndi'
       DEM
       this one?

6. V ndi' ca
       DEM DET
       that one!

7. R ndi' ca amá:
       DEM DET mother
       that one, daughter!

This example begins to illustrate the productive nature of JCH deictic terms and their use in the construction of oppositions based on distance, perspective, and other factors. In Line 3, Valentín uses *ca* as a determiner following the noun *carretera* 'highway.' This usage of *ca* is unmarked as it is the usual way of indicating definiteness. Na Ramona's response, however, uses a complex locative deictic construction that combines the unmarked locative *ra*, the proximal locative *–ri*, and the unmarked deictic *–cá*. She also prefaces this with the term *de*, borrowed from Spanish *desde* 'since.' JCH *de* has both the sense of 'since' and 'until,' and can be used both temporally and spatially. This gives the complete utterance *de raricá* with the sense 'all the way over here' (Line

4). Na Ramona combines the use of this JCH deictic term with a pointing gesture, a sort of sweeping, upward point toward the north, where the highway in question is located. It is possible that Na Lavinia did not see this gesture because she is engaged with preparing food, and had been treating Valentín as the primary speaker she was attending to.

Whatever the reason, the coordination devices used here—"the highway," a deictic term, and a pointing gesture—are as yet unsuccessful in grounding the negotiation of the location of the blockade, and Na Lavinia continues the grounding process, asking if the highway in question is *ndi'* 'this' (Line 5). The proximal demonstrative pronoun *ndi'* contrasts with the distal form *nga* 'that;' but in this context, *nga* cannot be used to correct Na Lavinia because it would have the sense of actually confirming the referent of *ndi'* as the intended referent. It would suggest a structure such as, "This one?" "Yes, that one." Instead, Valentín corrects his mother with the same demonstrative pronoun *ndi'*, now modified with the determiner *ca* (Line 6). The sense conveyed here is that the intended referent is not *that ndi'*, but this *other ndi'*. Na Ramona uses the same construction, overlapping just slightly with Valentín (Line 7), and both point toward the north.

These uses of deictic terms and pointing gestures to establish the referent of the term "the highway" illuminate several features of the common ground participants must share in this situation in order to coordinate meaning. First, several contrasting pairs of devices suggest a conceptualization of local space in this moment that relies on a contrast between two highways. In this conceptualization, one highway is considered "here" or near the place of speaking, and is projected through Na Lavinia's use of *ndi'* 'this' (Line 6) as well as through an implied contrast with Na Ramona's *de raricá* 'all the way over here' (Line 4). The other highway is considered "there," or far from the place of

speaking, and is projected through the use of this latter utterance, as well as through the tokens of *ndi' ca* spoken by both Valentín and Na Ramona.

Aside from this mere near/far contrast, a more specific directional contrast between the highways is established through the use of pointing gestures. If the further highway is construed as located toward the north, the closer highway is construed in contrast as the southern highway. These broad designations of north and south are merely prototypical regions in which the respective highways may be located. Because the highways meander around various parts of Juchitán, one could, in theory, point directly to specific areas of either highway that would be in quite other directions. Figure 4.4, below, shows that the "northern" highway heads northeast to La Ventosa and southwest to Tehuantepec before heading north to Oaxaca. The "southern" highway heads due south to the beaches, and east to Unión Hidalgo. Portions of this latter highway are, indeed, north of Na Lavinia's house, indicated on the map, but this highway seems to be construed in the above interaction as the "southern" highway.


Figure 4.4: The two main highways in Juchitán.

Though Na Ramona's and Valentín's pointing gestures do index some element of the preexisting "northern-ness" of the highway where the blockade is located, it is the broader conceptualization of the highways' contrasting locations that is brought into existence through the use of these coordination devices.

As the interaction continues, Valentín and Ramona attempt to specify the location of the blockade with more precision. Valentín begins to specify a place name, but hesitates thinking of the name, at which point Na Ramona interrupts him to ask if he's trying to think of "north Cheguiigu" (Line 9). After she finishes her utterance, he repeats "north Cheguiigu," this time overlapping with Na Lavinia, who asks if he means "where we go out over here" (Line 10), meaning leave Juchitán via the highway.

Transcript 4.10: Valentín (V), Na Ramona (R) and Na Lavinia (L), continued (May 2013).

8.	V	ja'a: delante ne [chegui-] [cheguiigu guiá'] HES ahead with NAME NAME north *um, up ahead at Cheg… north Cheguiigu*
9.	R	[cheguiigu guiá la] NAME north Q *north Cheguiigu?*
10.	L	[paraa ri-re-du che-rí] where HAB-exit-1PL.EXCL LOC.DIST-PROX *where we go out over here*

Although Valentín's utterance involves the usage of a cardinal direction term, it is a marginal usage since it is part of the place name in this case. Based on this place name, I was able to mark an approximate location of the blockade on the map in Figure 4.4. Cheguiigu is the area west of the river (from *deche* 'back, behind' and *guiigu* 'river'), and the highway passes along its northern edge. This segment of the interaction illustrates a pattern in Juchitán in which preference is given to the use of deictic terms and direct

pointing in spatial talk, but in which the use of referential place names may serve as a second strategy should the grounding criterion not be met.

The next example illustrates how indexical coordination devices may project entities construed on the basis of social knowledge and socio-geographical designations. As discussed previously in this chapter, many instances of spatial referential practice in Juchitán depend upon communal common ground regarding social relationships, personal names, marriage practices, and property ownership. This common ground may be relied upon for coordinating both referential and indexical signs. For example, one typical way of referring to an individual is to point directly to where he lives. But how is this calculation made? In the first example, Blanca, age 6, tells a little story, the long and the short of which is that a little boy she knows was "shitting on the hillside" behind her house. Blanca and her family were enjoying the afternoon at home, and her great grandmother Na Ramona had stopped to visit. Her "cousin" Elio (actually her brother, but the children were not privy to this information) was also visiting for the afternoon and the two children had been flitting about the yard. Na Ramona was seated in a chair and Blanca stopped to play with her hair while Elio swung around on her chair. The three engaged silently in these activities for several minutes until Blanca broke the silence with her story, directed initially to Elio.

Transcript 4.11: Blanca (B), Elio (E), and Na Ramona (R), *"He was shitting over there"* (August 2013).

1. B→E ca-xuuna' Abrán ra-ri-cá
       CONT-shit NAME LOC-PROX-DEIC
       ja'?
       right
       Abrán was shitting over there,
       huh?

2.   ra   barranca que
          LOC hill   DET
          on that hill

3. R→B tu   Abrán?
          who NAME
          who Abrán?

4. B→R ombre huiini' ra-rí
          man   little LOC-PROX
          che-rí
          LOC.DIST-PROX
          a little boy here, over here
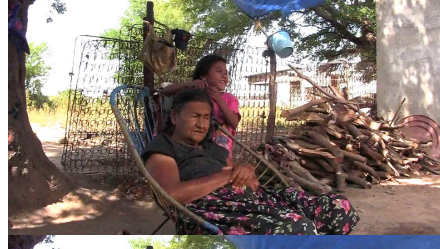
5.   ca-xuuna' barranca ndi'   ca
          PROG-shit hill   DEM DET
          he was shitting on that hillside

In this short narrative, Blanca refers to both a place—"the hillside"—and a

person—"a little boy"—through the use of various referential indexical signs. First, she

locates the scene of the central event of the narrative by looking in the direction in which

it occurred. As her heads lifts, her eyes open wide in the direction of the event; she

quickly turns to Elio as she utters a tag question, *ja'?* (Line 1). She then indicates the

same place with a backward flip of her hand in that direction, while referring to it by

name, *barranca que* 'on that hill' (Line 2). This construction employs the distal

determiner *que*, which suggests both the physical distance of the location as well as its

being the site of a past event. This statement is uttered with what I call "duck lips," a

facial expression accompanied by deeper voice quality and used to signal the narrator's

stance of surprise or awe toward the events described in her speech. By now, Elio has

waltzed off camera, but he does not respond audibly to her account. Na Ramona,

however, turns her head slightly toward Blanca and asks for more information about the

hero of the story (Line 3). Blanca responds, *ombre huiini' rarí cherí* 'a little boy here,

over here,' and points roughly northeast, in the direction of the camera (Line 4). The

juxtaposition of the two deictic terms *rarí* and *cherí* is of interest here for the way in

which they contrast. The use of *rarí* 'here,' may be taken to suggest that the little boy

lives "around here," i.e. is a close neighbor. The use of *cherí* 'over here,' locates the

boy's house with more specificity relative to Blanca's own house. The term gives the

sense of crossing some boundary, and so suggests that the boy lives on the other side of

the dirt road in front of Blanca's house, in the direction of her point. These two deictic

terms project two different types of socially construed spaces, then: one at the level of the

neighborhood, and one at the level of individual houses as bounded entities. Her pointing

gesture serves to further disambiguate his house from other nearby houses. Here, we see

the priority given to location of residence, or spatial designations, as an aspect of

individual identity. In the final line of the interaction, Blanca reiterates her story for her great-grandmother, and points again to the hill where it took place, this time using her chin (Line 5). This form of direct pointing, whether using limbs, chins, or other body parts, is the preferred type of spatial gesture in naturalistic spatial referential practice in Juchitán.

The type of transposed pointing that Haviland has observed in both Australia (1993) and Chiapas (2005) is uncommon in Juchitán. The following interaction, taken from my notes, illustrates that transposed pointing is not only rare, but, if done "accidentally," may actually be corrected in the course of interaction. One day I had gone to get tacos with Maite Pilar in the far north of town, all the way where the highway to Oaxaca heads out of Juchitán. She began to tell me a story about a woman she met who had dark spots all over her face. Maite Pilar reportedly told the woman, "If I had that face, no way I wouldn't get it fixed, and you have money, why don't you go to the dermatologist?" The woman told Maite Pilar that she was right, and that she would go to the dermatologist. Maite Pilar, who had had a mole removed several years earlier, recommended that the woman go to that doctor. The woman asked where the doctor was. In her telling of the story to me, Maite Pilar said, "So I told her it was by the hospital." This utterance was accompanied by a northward pointing gesture. Immediately, however, Maite Pilar said to me, "Oh no, we were at home then, it is right over there," and she pointed south now, toward the hospital. Her first gesture during this story-telling to me would have been of the "transposed" type because it matched the direction she would have pointed from home, since the hospital is to the north of our house. However, upon realizing that she was actually north of the hospital at the time of narrating the story, she

corrected her gesture to a southward, direct pointing gesture (Figure 4.5). This example

further illustrates the extreme preference for the direct frame of reference in naturalistic

spatial gesture Juchitán, as well as metapragmatic awareness on the part of this speaker of

the relationship between spatial gesture, narrative space, and narrated space. That Maite

Pilar felt the need to explain her error to me and explain her "corrected" gesture suggests

that the kinds of conventions that would allow a pointing gesture to project a transposed

space are not taken for granted in Juchitán.
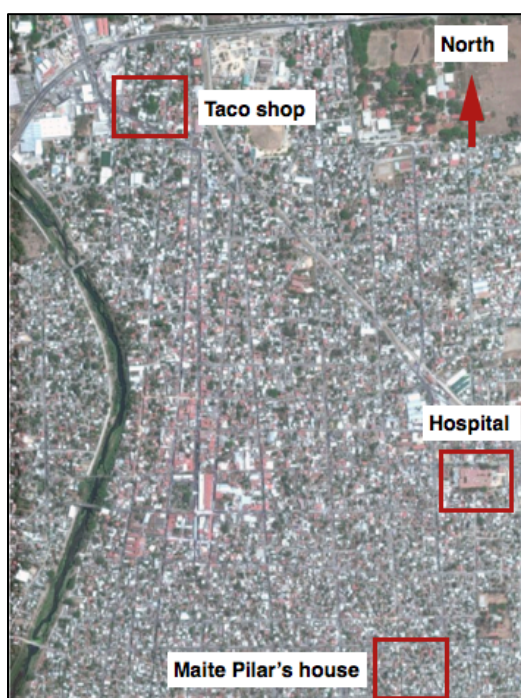
Figure 4.5: From Maite Pilar's house, the hospital is to the north; from the taco shop, the hospital is southeast.

These examples have illustrated some of the conventional ways in which

indexical signs are taken as relating to their context in Juchitán. As coordination devices,

deictic terms and indexical gestures rely on common ground in the perceptible context—

for example, for determining the vector of a pointing gesture. At the same time however,

community-wide conventions for the conceptualization of geographical and social spaces

are also crucial sources of common ground. Furthermore, discursive context serves as an important source of context for the interpretation of deictic terms, which often rely on contrasts and oppositions that emerge in the course of an interaction.

4.4 Concluding remarks

This chapter has suggested one way in which an "interpretive" approach to linguistic relativity may be combined with a domain-centered approach. Rather than beginning with a set of terms or concepts assumed to belong to a domain, say, of "space," one might begin with a corpus of naturalistic examples of spatial reference, and from there, determining the coordination devices most often deployed in spatial reference. In Juchitán, it seems "spatial language" is a relevant domain, relied upon for the coordination problems of picking out both geographical and social referents. However, in the naturalistic examples discussed in this chapter, we have seen that this domain includes few cardinal direction or left/right terms. Instead, the predominant resources included place and landmark names, personal names, deictic terms, and direct pointing gestures. These resources differ from what was elicited from most participants on the Geographical Scale task. On that task, participants rarely used personal names or lesser-known landmarks, and they displayed a greater variety of frames of reference in gesture. They also used some cardinal direction and left/right terms, which were quite infrequent in natural spatial talk.

The cataloguing of a locally defined semantic domain is just the starting point of this unified approach. For if the meaning of the coordination devices employed in spatial reference is dependent on multiple layers of context, one might also begin to catalogue

the varieties of contexts in which spatial reference occurs, and on which it depends for its successful interpretation. A combined interpretive and domain-centered approach would prompt question such as: In what kinds of activities does language from a particular domain occur? Does language in that domain vary across activities? What is the relationship between sign and context within that semantic domain? What kinds of common ground are relied upon in solving domain-related coordination problems, and how do these vary across contexts?

In this chapter, I have proposed several phenomena that seem to relate to variability in the coordination of spatial reference in Juchitán. At the level of coordination devices that rely largely on conventional aspects of common ground, variation in knowledge of about local social relations, marriage practices, patterns of inheritance, personal names, and street names is related to how spatial reference may be coordinated. In cases where personal common ground is relied upon for the interpretation of coordination devices, the extent of actors' personal experience with each other can affect the types of landmarks proposed as coordination devices. This was the case with Maite Pilar's differing strategies for directing taxis as well as Cornelio's strategy for directing Katia to Guie' Xhuuba's tutoring location. In the case of Ta Cidro's coordination of reference to his family homes, the differing familiarity of his interlocutors with Juchitán versus San Mateo del Mar social spaces affected referential as well as grounding practices. Within extended stretches of spatial discourse, we saw further variation associated with different activities undertaken within a narrative. "Journey" versus "arrival" portions of spatial narratives were often set apart from one another through contrasting uses of frame of reference, gestural perspective, and gestural dynamism.

Finally, I have also discussed some of the ways in which the structure of JCH deictic terms as deployed contrastively in discourse, as well as conventions surrounding deictic pointing, demonstrate the local character of habits of accomplishing spatial reference through indexical coordination devices in Juchitán.

This chapter began with a discussion of some of the difficulties encountered with an elicitation task intended to elicit "naturalistic" examples of spatial referential practice from Juchitecos. The source of the problem was traced to the difficulty participants faced in determining the kind of common ground they can assume they share with their interlocutor—the interviewer—and the kind of grounding processes they may engage in within the ambiguous framework of the task. Despite its apparent "failure," however, the results of this task point to the potential for the use of elicitation tasks for the detection of variable patterns of interaction across contexts, which may then be used to detect population-level patterns of contextualized meaning making. Such a possibility is explored in the next chapter.

CHAPTER 5:

Conceptualizing context: "Portable" signs, language shift, and cultural change in

Juchitán

5.1 Introduction

In the previous chapter, I illustrated that natural talk about space in Juchitán is quite different from the kinds of talk and gesture elicited in semi-experimental settings. However, this does not necessarily entail that the variation revealed in such semi-experimental tasks is not of interest. It remains the case that variation *was* documented in the semi-experimental tasks conducted in this study, where little within-population variation of this sort has been documented in other populations. So the question remains: if not to differences in spatial communication within the population of Juchitán, to what is this variation attributable? In the previous chapter, I suggested that one source of variation in talk about space and ways of conceptualizing space through gesture may be related to differences in the context in which such talk occurs. I examined variation in spatial talk at several different levels of context, including the kind of common ground shared with an interlocutor and the discursive activities performed throughout a narrative.

In this chapter, I pursue further the hypothesis that elicitation tasks may be used for the detection of variable patterns of interaction across contexts, which may then be used to detect population-level patterns of meaning making. I demonstrate that for the four children who are the focus of this chapter, the use of the relative frame of reference on elicitation tasks corresponded with the use of more "distanced" types of symbolic gestures (Werner and Kaplan 1963), while the use of the absolute frame of reference

occurred with more action-like gestures. Furthermore, the children relied on different genres of speech in their approaches to the interactive context posed by the tasks. For example, Guie' Xhuuba' seemed to treat the task within a "school" framework, while Ruzaani' treated it as an opportunity for story telling, transforming the task trials into "tellable" events (Labov 1972). These patterns suggest that variability in frame of reference use on the elicitation tasks may index other kinds of differences among the children, not obviously related to spatial conceptualization, at first blush. I argue that the children's creation of different types of "model worlds" (Streeck 2009) in gesture and speech is related to differences in their lived experiences. The hypothesis I propose is that cultural changes specifically related to the mobility of bodies and the "portability" of language (Haviland 2013) are driving conceptual change in Juchitán, which manifests both as language shift from JCH to Spanish, but also as conceptual shift independent of code. Variation in the use of "spatial frames of reference," then, is potentially indicative of different ways of conceptualizing language in relation to context, and self in relation to world.

5.2 Four children and their families

The data in this chapter are part of a corpus of long-term ethnographic and elicitation work conducted with four children. The methods employed involved participant-observation and video recording of natural interactions and daily activities as they unfolded in the homes of the children, as well as use of elicitation tasks as conducted with adults. However, these task were conducted for their ethnographic interest, as the sample size was too small for statistical analysis. The focus of this portion of the research

was on the children themselves, but a substantial amount of material was also collected on their caregivers, siblings, and others who lived in or visited the homes. The total corpus of audio and video data collected with these families includes over 146 hours of recordings. Although I met the children at various stages in their development, the data in this study focus primarily on each child's fifth and sixth years of life. Ethnographic work was conducted with each child for at least one year, and up to two years. Although I have known one of the children, Jordan, since he was under two years old, recorded data from that time of his life is not used in this chapter. In what follows in this section, I give a brief description of each child's family life, place of residence, level of bilingualism, and other relevant details. This discussion will reveal that the children's lives differ in several ways, including along a dimension of what may be broadly termed "class," but includes phenomena such as household architecture, patterns of movement in the environment, and styles of play. The children also differ in the kinds of schools they attend, in religious practices, in their use of Spanish and JCH, and in their participation in other kinds of community institutions. These ethnographic details will serve as key background information for interpreting the differences in the speaking and gestural practices of the children analyzed in this chapter.

5.2.1 Jordan

Jordan is the child I have known the longest and with whom I have the closest relationship. I met him on my first field visit to Juchitán, in the summer of 2008, when he was on the verge of his second birthday. Throughout my dissertation field research, I lived in his family's home, in the second-story apartment above their living quarters.

Jordan lives in the heart of what I will call Yoxho, the southern neighborhood of Juchitán

that is most closely identified with Zapotec identity and language. The neighborhood's

reputation is based on its history as a hotbed of political action. "Zapotec" institutions

such as the JCH language radio stations and a community library in which JCH language

courses and community events are held contribute to the neighborhood's identity. The

infamous "fish corner," an intersection in which a daily fish market pops up in the hours

before dawn, is considered to be one of the cultural institutions of Yoxho and to be

representative of its "traditional" economy that relies on the fruits of the sea and on the

hard labor of fishermen and women. Yoxho is also the epicenter of the system of social

exchange and Catholic piety that coheres in Juchitán's infamous party scene. Jordan's

parents were devout partygoers, if more laissez-faire regarding other Catholic traditions.

Jordan's home is located in the interior of the block that the fish corner is on,

along a *callejón* 'alley,' that runs crosswise through the block. One's *callejón* is an

important marker of local identity in Juchitán because people who share a *callejón* are

considered "neighbors," which, like any kin relation, entails certain social obligations.

Fishing is a lucrative business in Juchitán, and so in this part of town can be found a

mixture of wealthy and extremely poor families. The homes of the wealthy can be

identified by their size, their state of completion, the style of architecture, and the

newness and quality of materials used for construction. Jordan's family was among the

wealthiest of his *callejón*, but not because of any involvement in the fishing economy.

Jordan's father, Javier Senior, worked for Coca-Cola, one of only a handful of

corporations present in Juchitán, delivering soda by truck throughout the Isthmus region.

The work is brutal because it involves lifting heavy boxes in the scorching heat, and the

hours are long. Jordan Senior was required to report to work seven days a week, between 4 and 5 in the morning, depending on the season, and would regularly arrive home after dark. However, the job is considered prestigious because it requires a high school education and because the salary is good by local standards, predictable, and comes with benefits such as health insurance for the family.

Jordan's family had built a house that was quite fancy by neighborhood standards. It was two stories; the bottom story consisted of a combined kitchen and living room area entered from one outside door, and a set of two bedrooms entered from a different outside door. Each bedroom contained a bed, and the living area contained carved wooden furniture, including a large dining room table and chair set, a couch and settee set, and an entertainment center with a television. The indoor kitchen was a separate room with tile counters, a built-in stove, sink, and refrigerator, much like any North American kitchen. With the exception of the television and refrigerator, these elements of the home were extremely rare in Juchitán, and set Jordan's house apart as particularly modern. Most houses in the neighborhood had only outdoor kitchens, no furniture except for plastic tables and chairs, and hammocks rather than beds.

But Jordan's family also had all of these more typical elements, and tended to use them more than the modern amenities. They complained that the beds were too hot to sleep in, preferring hammocks instead. Jordan's mother, Maite Pilar, preferred to cook in her outdoor kitchen because cooking indoors filled the house with smoke and foul smells. Indeed, the running water and gas tank had never even been hooked up in the indoor kitchen, so it was hardly functional. Maite Pilar took water from the cement water tank typical of outdoor kitchens in Juchitán, and used the outdoor cement washbasin instead of

the indoor sink. She had a second, old, rickety stove outside to which the gas tank was attached. Many outdoor kitchens in Juchitán also feature stone hearths for cooking over wood, a metal grill for cooking over coal, and a clay oven. Maite Pilar kept a hearth and a grill at her grandfather's house next door, and used her aunt's oven, also next door. Thus, despite owning a modern style house and modern home furnishings, Jordan's family practiced a way of living out of doors that was comparable to their poorer neighbors who lived in less modern houses.

Maite Pilar did not need to work outside the home as a result of her husband's income. However, one might say she had made a living out of inheriting property from her relatives. Jordan's family was a bit non-traditional in that they had settled on property belonging to his mother's side of the family rather than his father's side. The property on which they lived belonged originally to Ta Guugu, Maite Pilar's paternal grandfather. The original house, Ta Guugu's, was of the traditional style, consisting of a single, large, rectangular room with an outdoor porch, or *corredor*, of equal proportions. It had the distinctive red tile roof that is iconic of such houses; in Juchitán, a house *de teja* 'of tiles' refers to these kinds of traditional houses and all the associated characteristics. A small thatched roof next to the home served as the outdoor kitchen when Ta Guugu's wife was alive, and was sometimes still used by Maite Pilar when hosting parties that required outdoor cooking.

Ta Guugu had partitioned his property between his two sons. Ta Ponce, Maite Pilar's father, was given a plot to the north of Ta Guugu's house, right alongside the house. Ta Teo was given a plot to the east, just in front of Ta Guugu's house. The third brother, Jordan Senior, was mentally impaired and an alcoholic; he never married and

continued to live in the original house with his father until his death. Each brother built a small house upon getting married; Ta Teo passed away in 2004, but his widow and children continued to live in that house. Ta Ponce, however, was abandoned by his wife when his children were quite young; he was left to raise them alone and resolved to give them each a piece of property. Thus, when Maite Pilar got married, he gave his house to her. When Maite Pilar's brother got married, another partition was made to the south of Ta Guugu's house, and he was given a plot there on which he built a tiny cement house. Because Ta Ponce made his living selling hammocks in tourist towns, he was often on the road and claimed he didn't need a house. When he returned from a trip, he hung his hammock in Ta Guugu's house.

Over time, and through an extremely elaborate and contentious process I cannot describe here, Maite Pilar came to acquire not only Ta Guugu's house, but also her brother's, and also a patch of land that happened to be under Ta Teo's widow's clay oven, which nobody realized had never been officially deeded to him. As a result of this inheritance, however, Maite Pilar was obligated to care for her aging relatives, whom she fed twice daily, transported to doctor's appointments, and enrolled in government programs in an attempt to get more resources for them. In 2009, she paid for the burial of her grandmother; in 2011, she paid for the burial of her uncle, Jordan Senior; in 2012; she paid for the burial of her father, Ta Ponce. Ta Guugu, nearing 90 at the time of this writing, refuses to be buried.

Thus, Jordan was raised on a property consisting of several different households of individuals from different generations. He could move freely among these households because they opened into a common dirt yard with no partitions. Furthermore, because

many of the most utilized areas of the houses in Yoxho are located outside of the main

building, the divide between public and private spaces is nebulous and easily

reinterpreted by children. Jordan's older relatives next door often spent their days making

hammocks in the yard or on their porches, and he could spontaneously enter those spaces

to interact with them. And Ta Teo's widow, Na Paz, worked out of her home selling

shrimp tortillas. Her kitchen area and large clay oven were located outdoors in her yard,

and Jordan spent much time at her house interacting with her, her various children and

grandchildren who came to help her or buy from her, and the clients who came to sit and

talk while she worked. There were dozens of neighborhood children, of all ages, who

lived within sight of Jordan's house, and these were his playmates; they played primarily

in the *callejón* in front of his house, in the neighbor's houses, and in the narrow spaces

lade yoo 'between houses' that made ideal secret worlds for children's play (Figure 5.1).

Jordan was spoken to almost exclusively in Spanish by his immediate and

extended family members, and by his neighbors in the *callejón*. This represented a

significant change in practice on the part of the community in just a short amount of time.

Jordan's brother, Javier Junior, for example, was just four years older and a fluent

bilingual. He had been raised speaking exclusively JCH at home, and had learned

Spanish upon starting school. Among his age-mates at school and in the *callejón*, he

largely communicated in JCH. Maite Pilar explained to me that the experience of not

knowing Spanish upon starting school was traumatic for Javier Junior, and that is why

she made the decision to speak only Spanish to Jordan. But of course, Jordan was

surrounded by JCH at home and in the neighborhood; although he rarely uttered entire

clauses in JCH, he understood it quite well and could pepper his speech with borrowed

lexical items, common expressions or sayings, and swear words. He also spoke a dialect of Spanish that sounded distinctively from Yoxho in its prosody and some of its non-standard features.

5.2.2 Ruzaani'

Ruzaani' also lives in the heart of Yoxho, about five blocks south of Jordan and the "fish corner." Her pseudonym, which means 'brilliant' in JCH, is not a common name, but her real name is one of the most common JCH names given to little girls in Juchitán. When I introduced her to Jordan for the first time, they compared notes on how many girls with her name each of them went to school with. Ruzaani' attends one of the bilingual schools in Juchitán, and is also the only balanced bilingual child in this study; however, these two phenomena are not necessarily related. Ruzaani's mother, Na Purísima, was likely the youngest non-Spanish speaker I met in Juchitán. She was in her 30s, and though she understood Spanish quite well, I never heard her speak any. Ruzaani's father, Calvino Senior, worked as a fisherman and so was away or sleeping during most of the daylight hours. I met him only once, and though he did speak to me in Spanish, he clearly struggled with the language. Ruzaani' had one sibling, a brother, Calvino Junior, who was five years older and also a fluent bilingual. Thus, Ruzaani' and her family spoke almost exclusively in JCH while at home, and she was raised speaking JCH.

Na Purísima explained to me that she sent Ruzaani' to the bilingual school because she thought it would be a less traumatic environment for learning Spanish than the typical Spanish-only school. However, the "bilingual" schools in Juchitán do not

actually provide JCH-medium instruction. Instead, they consider themselves bilingual in that they offer lessons *about* JCH, or, in some cases, instruction in JCH literacy, which are designed for second language learners rather than for fluent speakers. The literacy materials consist of poetry, literature, songs and other "cultural artifacts" rather than materials featuring regular instructional content. Although I did not observe Ruzaani' in school, she told me that she only had one child in her class who spoke JCH "like her." Thus, she had acquired Spanish in school, spoke Spanish with most of her friends, and was quite fluent in both languages.

Ruzaani' was extremely charismatic, or *tremenda* 'tremendous,' as her family said. She regularly took control of social interactions with the neighborhood children, and could engage in lively verbal sparring with adults. She was often alone at home, and took care of herself and of the house chores with the weary competence of a practiced homemaker. One day, I came to visit her and she was alone, washing her school uniform by hand in the washbasin. She greeted me by sighing that the chores never end, day after day. When I introduced her to Maite Pilar, the latter exclaimed that she talked "like an adult;" and when she participated in elicitation tasks with my research assistant Ana, the latter could scarcely keep a straight face because she "liked how she talked." One interaction featuring Ruzaani's charisma and Ana dissolving into giggles is featured in this chapter. Ruzaani' was also very independent. She traveled unaccompanied to locations several blocks away, including to my house. One time, I witnessed her aunt send her alone in a moto-taxi with a tub of corn to take to the mill about 6 blocks away. She knew how to collect the dough as it came out of the mill, and how to count her change.

Ruzaani's house was situated just off one of the main north-south roads, down a short _callejón_. The house and its _corredor_ were small, but there was a large, covered patio next to it in which the kitchen and bathroom had been built. Even though they were under a cement roof, they were in the "outdoor" style. The house itself was an older style house with a tile roof, but part of the _corredor_ had been walled in to make an additional bedroom, and this room had a cement roof. Ruzaani's father slept in this bedroom during the day, after a long night of fishing. The main part of the house contained several new wooden armoires and an antique wooden chest. Nearly every married woman has a chest of some sort for storing her clothing because it is one of the traditional wedding gifts a family gives to their daughter upon her marriage. Ruzaani's house did not have a bed or any other non-traditional furniture, but it did contain a small television. The house also contained a large Catholic altar that was well maintained with the photos of deceased relatives, fresh flowers, and burning candles. Most Catholic families in Juchitán keep an altar of some sort in the house, but the size of the altar and care put into maintaining it vary among households. Of the four families, Ruzaani's was the most dedicated to these sorts of Catholic practices, though her parents attended few parties. The outdoor area at Ruzaani's house consisted of a large, enclosed yard. Her mother grew several kinds of trees, flowers and medicinal plants to sell. The three houses bordering Ruzaani's were full of children; these were her playmates with whom she played either in her own yard or in the street in front of their houses (Figure 5.2).

5.2.3 Blanca

Blanca lives in the extreme south of the city, at the edge of the urban landscape as

it begins to fade into the surrounding farmland. Born in July of 2007, she is the youngest of the children in this study. Her family members called her either Blanca or *Chapulín* 'grasshopper,' affectionate nicknames befitting the baby of the family. Her full given name, Maria Mercedes, was especially beautiful, but rarely used except by her mother. She was shy around new people and reserved in the company of adults, but she played energetically with her cousins, who were mostly boys. Blanca's family was different from the others because they had converted from Catholicism. Her grandparents had been avid partygoers in the past, but now attended an Evangelical church near their house and did not participate in the party system.

Perhaps the most salient feature of Blanca's home and family life was its fluidity, likely the result of their financially precarious existence. When I met her, she lived with her grandparents, her ten-year-old sister Suelita, her teenage brother Arlo, and her teenage uncle Flaco. Her mother, Serafina, who had never married, lived in Oaxaca at the time and periodically sent money for her children's food and clothing. Blanca's grandmother, Na Lavinia, could not work outside the home due to advanced diabetes, but she was kept extremely busy at home caring for her charges. Her husband, Ta Venturo Senior, drove a moto-taxi, as did Flaco; Arlo collected garbage with a horse cart; these three sources of income were the primary ones on which the family survived.

Na Lavinia's youngest daughter, Delfina, also lived with her when I first met the family. Delfina had a son, Dario, who was the result of a sexual assault she suffered as a teenager. This situation had made it hard for her to find a husband, but when I met her, she had recently married a Huave man from a village outside of Juchitán. She had just given birth to their daughter, a baby girl named Ema, but they could not yet afford to

move out of their respective parents' homes. Delfina's husband was a fisherman, and although he did not visit her often, he occasionally sent fish to eat. This was another helpful resource for the family.

Dario was only two years older than Blanca and the two were devoted playmates. Suelita, nearly four years older than Blanca, occasionally played with them as well, but she was quickly outgrowing their more childish ways. Blanca also spent quite a bit of time with the baby, Ema, entertaining her as she lay in a chair or hammock, or as she was held by Delfina or Na Lavinia. Several of Blanca's other cousins visited the house quite frequently as well. In some cases, they rode their bikes over just to play, and in other cases, their parents dropped them off to be watched by Na Lavinia while they did errands. The most frequent visitors were Enzo and Elio. Enzo was a year younger than Blanca and the youngest son of Na Lavinia's son Valentín. Elio was actually Blanca's full brother, but this fact was unknown to the children of the family. He had been raised by and was considered the son of Na Lavinia's son Venturo Junior; he was one year older than Blanca.

With the exception of Ema, all of these children spoke and were spoken to almost exclusively in JCH. Blanca and her cousins all spoke JCH among themselves. Indeed, the younger children, such as Blanca and Enzo, who had not yet been to school, spoke very little Spanish, and Na Lavinia did not speak or understand any Spanish. The only Spanish in the household was addressed to Ema, who was being raised as a Spanish speaker because, Delfina explained, her father did not speak JCH. As far as I could tell, he did not speak to her in Huave, and only Na Lavinia spoke to her in JCH. When the children addressed Ema in Spanish, they often used "baby talk" that involved more sounds and

actions than identifiable Spanish words. Others of Blanca's cousins, however, were exclusively Spanish speakers. These included the children of Na Lavinia's son Solomon, Lily and Chepe. About a year after I met Blanca's family, Delfina and her children and her husband were awarded a plot of land right next door to Solomon in a government-subsidized neighborhood on the outskirts of town, and left Na Lavinia's house to live there. This move was difficult for Blanca, who lost her playmates, but also for Dario, who now had to speak Spanish at home with his stepfather and with his new playmates, Lily and Chepe. Around the time that Delfina moved away, Blanca's mother, Serafina, returned to Juchitán and to Na Lavinia's house. Blanca had started school and Na Lavinia's health was failing, and so she had come to help and work locally. Ostensibly, she worked selling _botanas_ at parties, traveling to nearby towns and sometimes spending one or two nights away. The work was of a dubious nature, but the family did not comment on it and was grateful for the additional income. Blanca had not spent much time with her mother before, but eventually warmed up to her and began to call her _amá_ 'mom,' a term she had previously reserved for Na Lavinia.

Another of Na Lavinia's children, her daughter Simona, lived in the northern neighborhood of Cubi and had raised her children as Spanish speakers. Simona's youngest daughter, Guie' Xhuuba', is another one of the children featured in this study, and is discussed below. Although Simona frequently visited her mother in Yoxho, she rarely took the children. She claimed that Guie' Xhuuba' did not get along with Blanca. I witnessed the two girls interact on only a handful of occasions; while they only fought once, they did tend to ignore each other and did not seek one another out as playmates. Overall, Blanca interacted with an extremely large number of different individuals on a

daily basis. One or another of her relatives was usually visiting, and there were many of them.

Blanca's house was situated on a large lot that blended into the dirt road on one side and into an overgrown vacant lot on the other, which was jokingly referred to by the family as the *monte* 'wilderness.' The house was quite small and consisted of little more than cement blocks with a partial cement roof reinforced with tin. The windows and doors were covered with tarps only, so the house could not be locked up, necessitating that someone always be home to guard it. They had no furniture except for hammocks, a small wooden table with chairs, an armoire, and a television. Washing, cooking, bathing and socializing spaces were all arranged in the yard, not inside the house. The bathroom and washbasin were permanent structures, though the washbasin had no roof except for a trellis covered in vines. This did not actually protect from a hard rain, so the washbasin could not be used when it was raining. The family had no stove and no permanent cooking area when I first met them, cooking with charcoal or wood in various areas of the yard. Later, when Ta Venturo Senior hurt his leg and could no longer drive the moto-taxi, he built a small clay stove in the yard so that Na Lavinia could make tortillas for the family and thus save some money. Eating was likewise a portable affair, and the little table was set up somewhere different for nearly every meal, depending on the weather, the shade, or where the cooking had taken place. The family ate in shifts of two or three, partly because there was not enough room for everyone at the table, and partly because the men came home to eat at various times during the workday.

The yard was a constantly changing and evolving space. The family had begun planting some trees and plants that the men tended to carefully, and the children adapted

various piles of trash or scrap metal (brought home by Arlo) to their games. One day, they had built a palm playhouse in the yard; another day, Flaco's parked moto-taxi served as a jungle gym. They often played in the road or in the *monte* area, out of sight of the house (Figure 5.3). There were two areas of the yard that were shady, and the family set up for the day in one or the other. Only the house was protected from rain and wind, however, and so some days, all activities occurred in the house. Water was scarce in this part of town, running freely from the tap at night, but often shutting off during the day. The family did not have one of the concrete water tanks typical of most houses in Juchitán, let alone an electric pump that could override the low daytime water pressure (Jordan's and Guie' Xhuuba's families had pumps). Instead, Na Lavinia used various plastic containers, arranged around the yard, to store water. The filling, covering, and guarding of these water containers was a major daily affair.

5.2.4 Guie' Xhuuba'

Guie' Xhuuba', meaning Isthmus Jasmine, or the *Plumeria* flower, is the pseudonym I have given to the little girl who lives in the northern part of the city. Her real name, also a JCH compound noun, is similarly symbolic of a kind of Zapotec nationalist pride, and is very uncommon as a name. Her parents, Na Simona, or Na Mona for short, and her father, Ta Cornelio, always spoke to each other in JCH, but Guie' Xhuuba' did not speak JCH and understood very little. Indeed, Guie' Xhuuba' herself could not pronounce her name with JCH phonology, which sometimes resulted in teasing by her cousins. Her parents alternated between using phonology that sounds more Spanish or more Zapotec, while her extended family and friends usually avoided the issue

by just calling her Guie'. Her only sibling, her sister Katia, who is ten years older, did not speak JCH either but understood it very well. I occasionally witnessed Na Mona speak to Katia in JCH, for example, when she did not want Guie' Xhuuba' to understand what she was saying. Na Mona also issued directives to Katia in JCH, but to Guie' Xhuuba' always in Spanish.

Ta Cornelio was one of the most cosmopolitan and highly educated of the participants in my field research. He had earned a degree in architecture, and then decided not to become an architect; so he earned another degree in accounting. Although he now made his living as an accountant, he still identified with his background in a creative field and enjoyed displaying his knowledge of architecture, technology, and the arts. He owned a computer and video camera equipment, and made a hobby of filming at special events and then making elaborately edited movies to sell or give to the family. He and his father, Ta Paco, the _bocina_ announcer, both enjoyed translating popular songs into JCH and then making recordings of themselves singing them. He had taught Guie' Xhuuba' to sing at least one of these—a Beatles song—which she was able to perform in JCH from memory. Such a performance was the first recording I ever made of Guie' Xhuuba', at Cornelio's insistence. Because Cornelio worked only from about 8am to 4pm and did not work or get drunk on weekends, he was at home much more often than most fathers I observed, and had a strong influence on his daughters. Cornelio and Simona participated in the party system of Juchitán, but usually attended parties in Cubi, which are a bit fancier than parties in Yoxho. They claimed that parties in Yoxho could be dangerous due to fighting; however, they did attend all parties hosted by Cornelio's mother.

Guie' Xhuuba's house is in the northern part of town I call Cubi. It is well north of the market on a quiet residential street shaded by almond trees and lined with the walls and gates of houses hidden from view. Theirs is the smallest house on the block, with only one story, but it was designed by a professional architect and has luxurious features such as wooden interior doors and indoor bathroom and kitchen—both with running water extracted from the city's stubborn pipes with an electric pump. The design and furnishings of the house were much like a North American house; once inside the front door, the various rooms opened up from inside the house, rather than via outside doors. The house was full of modern furniture, including couches in the living room, a huge television and stereo system, and a large wooden dining table. Guie' Xhuuba' and Katia even shared a private bedroom, which contained a bed, dressers full of their clothing, and buckets of toys and stuffed animals. Cornelio and Simona did not have a bedroom, however, and slept like other Juchitecos in hammocks in the living room or back patio of the house.

The outdoor spaces included an enclosed back patio paved with bricks, and a tiny front garden, occupying the sliver of space between the front door of the house and the front gate that blocks it from the street. This gate was kept locked even if the front door was open for ventilation, and Guie' Xhuuba' was not allowed out on the sidewalk or street alone. Unlike the other children, she was never sent to run errands—not even to the little convenience store across the street. Her primary play spaces, then, were indoors and on the back patio, where she engaged in activities that mostly involved store-bought toys, print materials, or electronics. Because few visitors entered the house, she either played alone or engaged her sister or mother in her activities (Figure 5.4). Guie' Xhuuba'

attended several hours of tutoring after school, as well as dance lessons in preparation for her sixth birthday, and so she had little time to play, in any case.

Figure 5.1: Jordan (center) and some children from the neighborhood play *lade yoo* 'between the houses.'

Figure 5.2: Ruzaani' (far left, squatting) and her neighbors play in her yard, making "food" to sell.

Figure 5.3: Blanca, Elio, and Dario throw rocks at birds in the vacant lot behind Na Lavinia's house.

Figure 5.4: Guie' Xhuuba' plays with dolls and watches TV in her living room.

5.3 Children's task results

The children in this study completed both the Animals-in-a-Field and the

Toppling blocks tasks that the adults completed in the study reported in Chapter 2 of this

dissertation. Although the sample size of children was very small, I conducted these tasks

in order to be able to examine the data qualitatively. In this section, I provide evidence

that the children were engaging with the task itself in different ways, and that this

difference might account for the differences in frame of reference preferences observed in

their responses.

The methods for administering, coding, and analyzing the children's tasks were

nearly identical to those reported for the adults in Chapter 2. However, the children

completed the tasks only once: Jordan and Guie' Xhuuba' completed the tasks in Spanish, while Ruzaani' and Blanca completed the tasks in JCH. My research assistant Ana took on the role of interviewer for the JCH tasks, while I acted as assistant, setting up the materials and running the camera. For the Spanish-language tasks, I took the role of interviewer. Ana acted as assistant for Guie' Xhuuba's session, and my collaborator, Tyler Marghetis, acted as assistant for Jordan's session. All the children were highly familiar with me and with the camera by the time I ran the tasks with them, and Jordan was highly familiar with Tyler. However, the three girls had not met Ana before their respective task sessions.

The children were all over age 6 when they completed the tasks; their exact ages appear in table 5.1, below. Although the 8-month gap between Blanca and Ruzaani' is substantial, these two girls actually patterned the most similarly to each other on the tasks, while Jordan and Guie' Xhuuba' were more comparable to one another. Furthermore, research on the acquisition of the speech-gesture system suggests that children in this age range should be at roughly comparable stages.

Table 5.1: Children's ages at the time of task completion.

Jordan	Blanca	Ruzaani'	Guie' Xhuuba'
6;5	6;3	6;11	6;9

By about the age of 5, children have acquired adult-like levels of co-speech gesture frequency, and their gestures have taken on many of the characteristics of adult gestures including arbitrariness, flexibility, and contrast (McNeill 1992:297-299). This process of acquisition of the speech-language system has been characterized as a process of increasing "symbol formation," by which signs become increasingly symbolic, and thus "distanced" from their referents (Werner and Kaplan 1963). In the earliest stages of

gesture acquisition, then, children's gestures remain closer to enactments of actions performed with or by the objects depicted. With such increased "distancing" also comes increased differentiation of the functions of the speech and gesture channels (McNeill 1992:299).

Around the age of two or three, true iconic gestures—which co-occur with speech—begin to emerge. Following the Peircian sense of "iconic," iconic gestures are those that bear a close formal relationship to the semantic content of speech. The iconic gestures of children may differ from those of adults in their use of space, timing, and viewpoint (McNeill 1992:303-319). Non-iconic gestures, including beats, metaphorics, and abstract pointing emerge later, after the age of five. As McNeill explains, although these gestures are some of the most simple in terms of motor skills required, they are cognitively complex because they require a meta-level understanding of the relationship of discourse to context, and of pragmatic meanings (McNeill 1992:321). "Beat" gestures are small, low-energy gestures that do not represent a discernable meaning. In adults, they typically have a biphasic form and a metanarrative function. This function emerges quite late, around age 12; younger children use beat gestures in coordination with temporal terms and repair sequences. "Metaphorics" are gestures that depict images of abstract concepts. For example, a "container" gesture may be used to represent the concept of a bounded segment of time. The use of metaphorics depends upon the ability to view abstract concepts as objects, and emerges in children after age five. Deictic, or pointing gestures, are the first to emerge in young children, yet abstract deixis is the last to emerge. This involves pointing to entities previously construed in symbolic space; for example, during the course of a narrative, the left region of gesture space may represent

character X and the right region, character Y (McNeill 1992:79-80). From age 5 through

adolescence, children's uses of these non-iconic gestures continue to develop, but there is

no reason to believe that the four children in this study would be at radically different

stages of development in terms of their speech-gesture systems.

5.3.1 Animals-in-a-field task

The results of the Animals-in-a-field task illustrate an apparently stark contrast

between Guie' Xhuuba' and the other children (Table 5.2). Guie' Xhuuba' had 4 out of 6

egocentric trials on the task, and no allocentric trials. In contrast, none of the other

children had any egocentric responses. Jordan and Blanca each had 4 allocentric

responses, and Ruzaani' had 2 allocentric responses.

Table 5.2: Egocentric and allocentric responses by child for the Animals-in-a-Field task.

	Jordan	Blanca	Ruzaani'	Guie' Xhuuba'
Egocentric Animals responses	0/6	0/6	0/6	4/6
Allocentric Animals responses	4/6	4/6	2/6	0/6
Object-centered animals responses	0/6	2/6	1/6	1/6

Aside from these quantitative differences, Guie' Xhuuba' seemed to approach the task in

a very different way from the other children, evidence for which may be found in the

video recordings from the task. Compared to the other children, Guie' Xhuuba' arranged

her body differently during the task, used speech where the other children did not, and

interacted with the researcher in a way that the other children did not. Image 5.5, below,

shows Guie' Xhuuba' as she "remembers" an array of animals in the presentation phase.

While the other children stared silently at the array, Guie' Xhuuba' leaned over it,

pointed to each animal, and silently moved her mouth, as if reciting their names or

locations to herself. This bodily orientation and the accompanying hand and mouth

gestures contribute to what seems like a performance of "studying," and suggest that

Guie' Xhuuba' interpreted the task within a "school" framework.

Figure 5.5: Guie' Xhuuba' performs "studying" the array, pointing to each animal.

Guie' Xhuuba' was also the only child to speak while arranging the animals

during the test phase of the task, and the only child to seek the approval of the researcher

at least once during each trial. In Transcript 5.1, these phenomena can be seen as they

emerged during the course of one of her trials. In Line 1, she places the animal while

naming it audibly, and then turns to look at the researcher, who is standing behind her. I

studiously avoided giving feedback to any children during any trial, but all children were

told "good job" at the completion of each trial, regardless of what they had actually done.

In Spanish, this was rendered as _muy bien_ or _bueno_, and in JCH as _neza_ or _hueno_. I do

not respond when Guie' Xhuuba' turns to look at me in Line 1. In Lines 2 and 3, Guie'

Xhuuba' places the final two animals and continues to narrate her actions. Upon placing

the final animal—the sheep—she turns to look at the researcher again and smiles proudly

(Line 3, second frame).

Transcript 5.1: Guie' Xhuuba' (G) completes an Animals task trial with Melanie (MM).

1.	G	<u>un</u> <u>marranito</u> *a little pig*	*G places the pig with her right hand.*
			G holds her hand on the pig and looks back at the researcher.
2.		<u>después</u> <u>éste</u> *then this*	*G places the second pig with her left hand.*
3.		<u>éste</u> *this*	*G places the sheep with her right hand.*
			G steps back from the table and turns to look at the researcher and smiles.

The other children's behavior on the tasks contrasted with Guie' Xhuuba's. When studying the presentation array, the other children did not move or speak, except to nod quickly to indicate they were ready for the test phase. During the test phase, the other

children stood further from the table, did not lean over the table, and often moved their bodies in order to be able to observe their responses from other perspectives. Furthermore, they did not turn to look at the researcher during or after the trials. Blanca, for example, adopted a predictable pattern of movement during the task. As shown in Figure 5.6, she stood upright while arranging the animals, reaching with her arm, but not bending her body.

Figure 5.6: Blanca stands upright when arranging the animals.
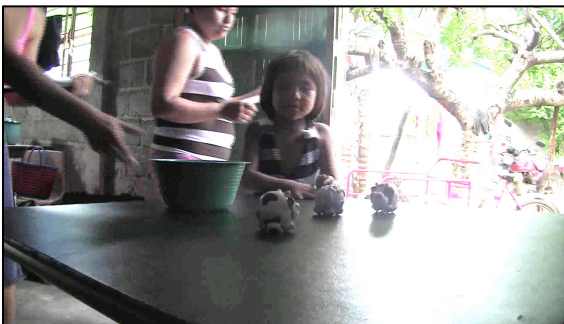
Figure 5.7: Blanca steps to the side to view her array of animals.

After each trial, she stepped to the side, as if going around the table for the next presentation phase, but stopped to view her work from the corner of the table. An example of this action may be seen in Figure 5.7.

Jordan's body position was also consistent throughout his test phase trials. Although all the children were instructed where to stand on their first trial, and sometimes physically positioned by the researcher to face the table, Jordan turned his

body sideways when arranging the animals. His body position while arranging the animals, seen in Figure 5.8, would allow him to view the array from the same perspective as he had viewed it in the presentation phase. In this position, he is facing his house and his back is to the yard, even though he should have been turned square to the table, facing the sheet.

Figure 5.8: Jordan arranges animals with his body turned sideways relative to the table.

During the presentation phase, Jordan would have been standing at the table on the other side of the sheet, but at its far edge so that he would likewise be facing his house with his back to the yard. Figure 5.9 illustrates the general procedure for the Animals task, showing where the camera and house are positioned.

Ruzaani' also consistently viewed her test array from a different perspective upon completing it, but she tended to step back from the table after each trial. Though she was often off-camera during this action, Figure 5.10 shows her viewing her array on one trial; she stands facing the table with folded arms and a serious face, as the researcher, Ana, has already started to walk back to the presentation table for the next trial.
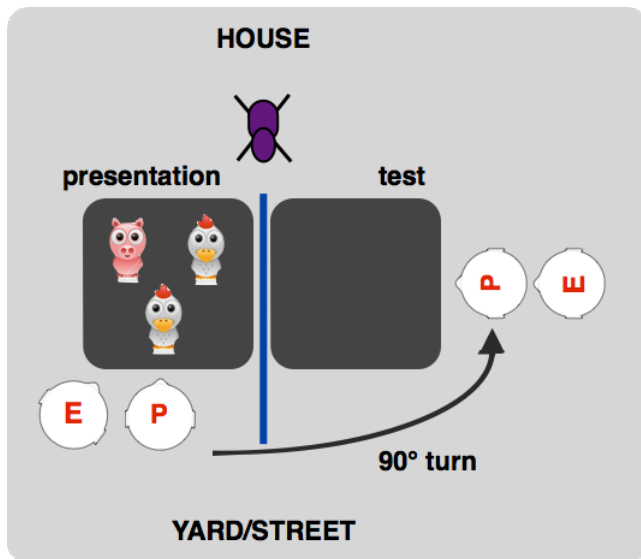
Figure 5.9: Animals-in-a-Field procedure.

Figure 5.10: Ruzaani' steps back from the table and crosses her arms to examine her work.

The bodily positioning and movements of Blanca, Jordan, and Ruzaani' suggest that their attention was focused on the array of animals itself, and that they sought to view it from more than one perspective, perhaps in order to match what they were visually perceiving to the remembered version of the presentation array. In contrast, Guie' Xhuuba' seemed to orient herself more toward the researcher than to the array itself. When studying and arranging the array, she performed actions and speech that seemed directed toward an interlocutor, rather than employed in the sole service of completing the task. These difference suggest that Guie' Xhuuba's egocentric responses, which

rendered her an outlier on the task, are somehow related to her different "orientation" to the task itself, rather than to—or perhaps in addition to—some difference in spatial conceptualization. This hypothesis will be explored further with reference to the results of the next task, the Toppling Blocks task.

5.3.2 Toppling Blocks task: Frame of reference results

The results from the Toppling Blocks task revealed a slightly different pattern than those from the Animals task, but also showed some clear differences among the children. Blanca showed the most consistency in her response type, with no egocentric trials, and 9 out of 12 allocentric trials. Ruzaani' patterned similarly if less consistently, having 1 egocentric trial and 7 allocentric trials. Jordan and Guie' Xhuuba' showed a decidedly mixed pattern (Table 5.3).

Table 5.3: Egocentric and allocentric responses by child for the Toppling Blocks task.

	Jordan	Blanca	Ruzaani'	Guie' Xhuuba'
Egocentric Blocks responses	4/12	0/12	1/12	4/12
Allocentric Blocks responses	3/12	9/12	7/12	4/12

Upon closer inspection of the data, however, it appeared that, in general, the children demonstrated a preference for gesturing along the sagittal axis. Indeed, this would be consistent with the finding, on the adult version of the task, that axis of presentation predicted frame of reference use. For the adults, my co-authors and I compared individuals who saw a lateral presentation, with motion events alternating between leftward- and rightward-moving, with individuals who saw a sagittal presentation, with motion events alternating between frontward- and backward-moving. We found that individuals who saw a lateral presentation produced egocentric gestures on

only 47% of trials, while those who saw a sagittal presentation produced egocentric gestures on 87% of trials; this effect was significant (p=.01). In other words, the sagittal presentation axis elicited a higher rate of egocentric responses than a lateral presentation axis. We did not find a significant effect of presentation axis on allocentric responses in the adult data. However, if we assume a general preference for front/back gesturing, we might expect a higher rate of allocentric responses when the presentation axis is lateral.
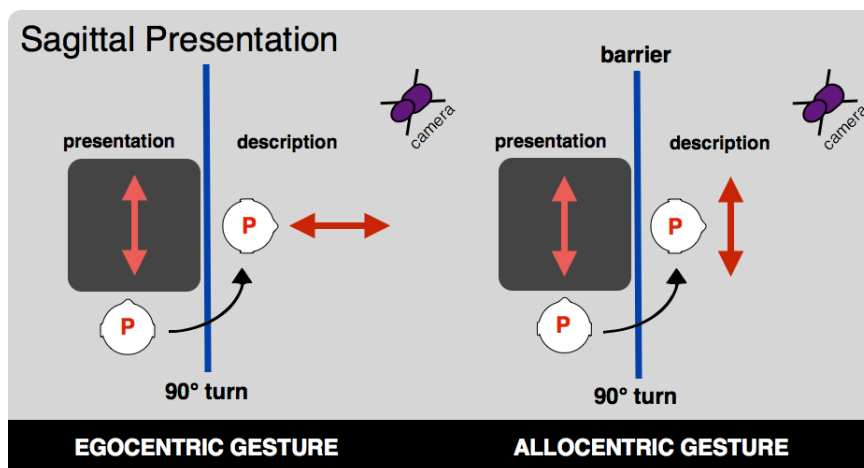

Figure 5.11: Toppling Blocks task procedure. Egocentric and allocentric response types are illustrated for sagittal presentation trials. Allocentric responses must overcome the putative sagittal gesture bias.
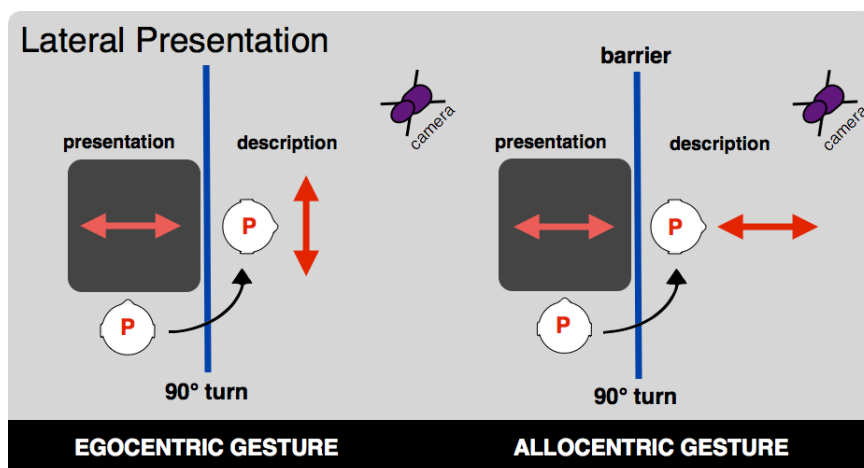

Figure 5.12: Toppling Blocks task procedure. Egocentric and allocentric response types are illustrated for lateral presentation trials. Egocentric responses must overcome the putative sagittal gesture bias.

Figures 5.11 and 5.12 illustrate that allocentric responses for a sagittal trial, and egocentric responses for a lateral trial are the types of responses that must overcome the

putative sagittal gesture bias. When we consider the children's data with this potential

bias in mind, we see that, indeed, all but one egocentric trial occurred with a sagittal axis

of presentation: only Guie' Xhuuba' overcame the bias and produced one egocentric trial

with a lateral axis of presentation. Similarly, all of Jordan's and Guie' Xhuuba's

allocentric trials occurred with lateral presentation, meaning that their allocentric gestures

were along the sagittal axis. In contrast, both Blanca and Ruzaani' overcame the sagittal

gesture bias to produce allocentric responses with sagittal presentation. Ruzaani'

produced 2 allocentric out of a total of 6 sagittal trials, and Blanca produced 9 out of a

total of 12 sagittal trials (Table 5.4). Unfortunately, no lateral trials were conducted with

Blanca. However, she showed such an overwhelming preference for allocentric responses,

that this oversight is unlikely to have affected the results.

Table 5.4: Egocentric and allocentric responses by axis of presentation for the Toppling Blocks task. Sagittal allocentric and lateral egocentric response types (in bold font) overcome the putative bias for sagittal gesture.

	Jordan	Blanca	Ruzaani'	Guie' Xhuuba'
Sagittal presentation				
Egocentric trials	4/6	0/12	1/6	3/6
Allocentric trials	0/6	9/12	2/6	0/6
Lateral presentation				
Egocentric trials	0/6	n/a	0/6	1/6
Allocentric trials	3/6	n/a	5/6	4/6

If we consider just the results that overcome the sagittal gesture bias, we see that

Blanca and Ruzaani' were the only children who overcame the bias to produce allocentric

trials, and only Guie' Xhuuba' overcame the bias to produce one egocentric trial. Jordan

did not overcome the bias, gesturing sagittally on all trials that were coded. Furthermore,

if we consider trials that were coded as "Other" because frame of reference was not

discernable or because no gesture was present, we see that Jordan and Guie' Xhuuba'

gestured almost exclusively sagittally on all trials; Ruzaani' utilized both axes, and

Blanca utilized the lateral axis almost exclusively (Table 5.5).

Table 5.5: Gesture directionality for trials coded "Other" on the Toppling Blocks task.

	Jordan	Blanca	Ruzaani'	Guie' Xhuuba'
"Other" trials				
Sagittal gesture	4/5	1/2	2/4	3/4
Lateral gesture	0/5	0/2	2/4	0/4

5.3.3 Toppling Blocks task: A closer look

A close qualitative analysis of the children's speech and gesture during the

Toppling Blocks task revealed, as in the Animals task, apparent differences in how the

children approached the task. Overall, Ruzaani' and Blanca patterned similarly to one

another, and Jordan and Guie' Xhuuba' in turn, patterned similarly to one another and

differently from the other two girls. In what follows, I will discuss these patterns in

gesture space, use of the body, gesture types, and speech.

Both Ruzaani' and Blanca used frame of reference gestures that were coded as

absolute, but that show some evidence of potentially employing the direct frame of

reference. The ambiguity is due to another salient characteristic of their gestures: they

took place in a rather vast gesture space, extending beyond their bodies. McNeill has

characterized adult gesture space as "a shallow disk in front of the speaker, the bottom

half flattened when the speaker is seated" (1992:86), but he also notes that the

organization of gesture space varies cross-culturally. The examples that follow will

demonstrate that Ruzaani' and Blanca have gesture spaces that differ from this

characterization, while those of Jordan and Guie' Xhuuba' match the model described by

McNeill.

In Transcript 5.2, below, Ruzaani' describes the direction that the blocks fell in one trial. In her accompanying gesture, she extends her right arm well to the right and behind her own body, contorting her shoulder and leaning back in her chair in order to do so. As her hand comes down to shoulder-level, her outstretched fingers deliberately strike the sheet behind her, which obscures the presentation table on which the motion event occurred. The path she indicates is one that extends behind her, toward the south, which is the direction the blocks fell.

Transcript 5.2: Ruzaani' *"It fell this way."*

1. bi-aba-ni ndi' COMPL-fall-3I DEM *it fell this way,*	*R raises her right arm up and to the right, and begins to stretch it back behind her body.*	
2. derechu ca bi-aba-ni straight DET COMPL-fall-3I *straight, it fell*	*R reaches her arm behind her body, indicating with an upward-facing palm; the backs of her fingers make deliberate contact with the sheet.*	

In Transcript 5.3, a similar example is presented for Blanca. Here, she extents her right arm far to the right, and then sweeps it up and back, straining at the shoulder and tapping the sheet with her finger tips. The path she indicates extends to her right, toward the west, which is the direction the blocks fell.

Transcript 5.3: Blanca, *"It went this way."*

1.	u-y-aa de.repasu COMPL-go-1SG right.by *I passed right on by*	*B extends her right arm to the lower right.*	
2.	u-yé-ni che-rí COMPL-go-3I LOC.DIST-PROX *it went over here*	*B sweeps her right arm up, extending her shoulder slightly so that her arm is behind her. Her finger tips tap the sheet.*	

In these examples, the frame of reference may be interpreted as either absolute or direct. On the one hand, both girls indicate the absolute direction in which the blocks fell, to the south and to the west, respectively. Calculating from just the vector of their arm movements, it would appear they are anchoring the directionality of the motion event absolutely. However, the fact that they tap the sheet, and that they both contort their bodies slightly in the direction of the presentation table, suggests that they are attempting to point directly to the space in which the motion event occurred. Ruzaani's gesture may be said to use her own body as an anchor, if we calculate from her back instead of her front. And Blanca, although she points to the west, contorts her arm behind her as if to show that the blocks fell westward, but in the space at her back. Thus, the girls' extended gesture space allows them to perform apparently direct gestures, without turning completely around or bending their arms at the elbows to point.

Blanca and Ruzaani' also used their entire bodies when gesturing, moving into non-canonical positions in their chairs, as seen in Ruzaani's response in Transcript 5.2, or

adjusting their entire bodies in order to position their gestures in certain spaces. Although Ruzaani' is an unusually animated speaker and Blanca is reserved and shy, they both show this pattern of bodily accommodation to gesturing. In Transcript 5.4, Blanca illustrates the phenomenon through a subtle shift in her seating arrangement. In Line 1, she sits a bit slumped in her chair, with her legs loosely apart, her shoulders down, and facing slightly right, toward Ana. She begins to explain that the block "lay like this" (Lines 2-3), creating with her gestures a circular shape facing east, to her left. In order to create this gesture, she tenses her body, lifts her right knee up, and scoots her bottom to the left in her chair. By the time the gesture is complete, she is sitting firmly upright with her core muscles engaged and turned slightly to the left, away from Ana.

Transcript 5.4: Blanca, *"It lay like this."*

| 1. ma gu'-ta-ni ca COMPL COMPL-lie-3I DET *now it lay,*	*B sits with her legs relaxed and apart, facing slightly right. She begins to lift her right hand up off the chair.*	
	B brings her right hand up toward her lap. She lifts her right knee and moves her right leg closer to her left leg.	
2. gu'-ta-ni COMPL-lie-3I *it lay*	*B continues to bring her right leg close to her left leg and shifts slightly in her chair to the left.*	
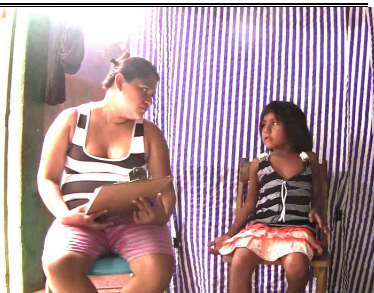
Transcript 5.4: Blanca, *"It lay like this,"* continued.

B brings her right hand toward her left hand on the left sider of her body.

B's righ hand meets her left hand, now just past her body on the left.
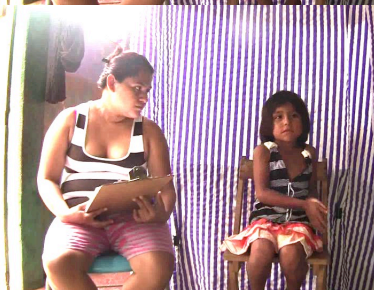
3. za-ca-rí   yanna
    MANN-DEIC-DEIC now
    like this, this time

B brings both arms up to make a circular shape away from her body; she is now turned slightly left in her chair.
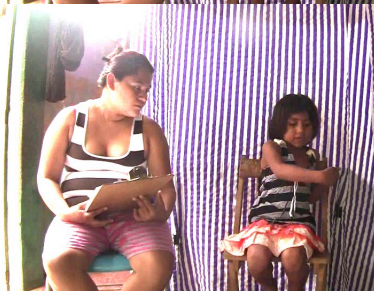
This kind of bodily accommodation to gesture is something that was never observed for Jordan or Guie' Xhuuba'. A holistic look at the still frames in Transcripts 5.5 and 5.6, below, show that both children remain remarkably stationary in their seats throughout these, and other trials. Both face forward in their chairs, sit upright, gesture in a relatively confined space in front of their bodies, and use predominantly one hand when gesturing. Guie' Xhuuba' directs her narrative partially to the researcher and partially to the camera, something none of the other children did. These transcripts also illustrate instances of non-iconic gestures performed by Jordan and Guie' Xhuuba'. The first example occurs in Line 1 of Guie' Xhuuba's narrative in Transcript 5.5. She begins her narrative with an authoritative *mira* 'look,' and emphatically gestures by holding her

arms upright at bent elbows and spreading her hands open on either side of her body.

This gesture appears to be a metaphoric gesture used to open the narrative by depicting it

as an object or as container in which the narrative object may be contained.

Transcript 5.5: Guie' Xhuuba', "They toppled it toward the inside."

1.   <u>mira</u>
     look

2.   <u>este le hicieron un rectángulo</u>
     um this one, they made in a rectangle

3.   <u>y un una formación</u>
     and a a formation

Transcript 5.5: Guie' Xhuuba', *"They toppled it toward the inside,"* continued.

4.   después que le punieron seis seis rectángulos
      after they placed six six rectangles on it,

5.   después ya lo tiraron
      then they toppled it

6.   lo tiraron aldentro
      they toppled it toward the inside

Transcript 5.5: Guie' Xhuuba', *"They toppled it toward the inside,"* continued.

7. después ya se cayó don-
    then it fell whe-

8. se cayó los palitos
    the blocks fell

9. después ya así
    and then like this

10. ya ya dejó
    then then it stopped

Jordan's gestures differ qualitatively from those of the other children in that he

seems to use his hands more precisely, making finer hand shapes and fewer whole-arm

movements. In the following transcript, Jordan performs several such fine gestures, including two of the type Streeck (2009) has called "drawing." In drawing gestures, the extended index finger traces a line in the air; though the line does not physically exist, it can be seen because "seeing is not a bodily process of perception, but an *achievement*" (Streeck 2009:137). Jordan's drawing gestures appear at the end of the following transcript. After he describes the motion of the blocks falling (Line 6), he explains that "it fell…in a little box of blocks" (Lines 7-8). As he utters these words, he lifts his right hand to chest level and bends his writs at a 90-degree angle so that his index finger points away from his body. He draws the shape of a square, beginning with the top right corner and tracing each edge in a clockwise direction (Line 8, still frames).

The second drawing gesture follows immediately after this first one, and is quite similar in form. Jordan's hands come to full and prolonged rest in his lap as he hesitates for over a second (Line 9). He then lifts his right hand to the same position as before, but with his wrist bent less dramatically and index finger pointing slightly up. As he says, "And there was a wall there," he draws a short horizontal line to the right, a longer downward line, and a longer upward line (Line 9). His finger shape is a bit hooked during this gesture sequence. His hand returns to its starting point in the top right corner of his gesture space as Jordan ends his utterance. However, the gesture continues after the speech has ended. Without any accompanying speech, he draws three more lines: a short horizontal one toward his left; a long, slanted line toward the bottom left of the gesture space; and then, quickly returning his finger to the original starting point, a symmetrical, long, slanting line to the bottom right of the gesture space. The resulting shape appears to be a flat-topped pyramid with no base (Line 11).

Transcript 5.6: Jordan, "It fell in a little box of blocks."

1. había algunos palitos
there were some little sticks

2. puso los palitos y
*he placed the little sticks
and…*

3. y… y… y…
and…and…and…

4. pegó Tyler su mano al cubito
*Tyler hit the little block with
his hand*

Transcript 5.6: Jordan, *"It fell in a little box of blocks,"* continued.

5. <u>ba ba ba</u>
boom boom boom

6. <u>se cayeron</u>
they fell

7. <u>cayó en una</u>
it fell in a

8. <u>en un cubito de cubito</u>
in a little box of blocks

J draws a square in gesture space with his right index finger. He begins in the top right corner of the square, and traces each side, moving clockwise.

Transcript 5.6: Jordan, *"It fell in a little box of blocks,"* continued.

9. y…
    and…

    J's hands come to rest in his lap and his gaze moves away from his interlocutor.

10. y ahí había una pared
    and there was a wall there

    J draws three lines in gesture spac eusing his right index finger, which has a hooked shape. The first line is a short, righward stroke; the second line is longer and straight downward; the third line is upward and returns his finger to its starting point.

Transcript 5.6: Jordan, *"It fell in a little box of blocks,"* continued.

11. *((gesture not accompanied by speech))*

J draws a flat-topped pyramid in the air with his right index finger. The first stroke is short and toward his left; the second stoke is long and diagonal, toward the bottom left; the final stroke is long and diagonal, toward the bottom right of the gesture space.

Evidence from the accompanying speech suggests that Jordan's "drawing"

gestures in Transcript 5.6 represent elements of the shape of the overall formation of

blocks, rather than the shape of any individual block, or any aspect of the motion event.

Although it retains some element of iconicity—in that the traced square and pyramid are

similar in form to the "box" and the "wall"—this gesture is conceptually quite different

from iconic gestures based on actions. Streeck's (2009) gestural typology makes use of a

distinction between gestures based on *haptic* versus *tactile* engagements of the hands.

Haptic engagements involve grasping and manipulations of physical objects, while tactile

engagements involve contact with surfaces. Gestural drawing falls into this latter

category (Streeck 2009:147). This distinction is significant within Streeck's broader

argument—that gesture is not a mere representation, but a method for understanding the

world bodily:

> Because gestures are visual phenomena for interlocutors and are often
> looked at and seen by the people making them, it is often falsely assumed
> that gesture is a medium that transforms visual representations. Instead,
> gesture, as a medium of human understanding, incorporates *haptic
> epistemology*, more than other media of communication; it presents the
> world not as visible, but as handle-able. It is shaped by the body's
> practical acquaintance with the tangible environment which it has forever
> explored, lived in, and modified….gestures do not usually correspond to
> what we see, but what we know about something (Streeck 2009:150).

Within this framework, the differences in the gestural practices of the four children may be understood as indexing differences in their haptic, tactile, and other embodied experiences in the world. Jordan's use of a drawing gesture, which the other children did not employ, for example, may be linked to more extensive experience with two-dimensional representations, encountered in practices such as reading, writing and drawing. Experience with literacy and schooling may also account for Guie' Xhuuba's facility with metaphoric gesture, not seen among the other children on this task. The use of metaphoric gestures requires experience with abstract concepts and, perhaps, experience "handling" those concepts in a figurative but objectifying way. Children may be socialized to such practices earlier in a school setting than at home. Indeed, my ethnographic data suggest that at-home literacy practices were commonplace for Jordan and Guie' Xhuuba' but rare (and of a different sort) for Blanca and Ruzaani'.

Furthermore, literacy and school success were a salient feature of home socialization for Jordan and Guie' Xhuuba' but not for Blanca and Ruzaani'. Guie' Xhuuba' was sent to after-school tutoring to help improve her grades, and both she and Jordan spent several hours at home each day working on homework with the assistance of their parents or siblings. They had both attended preschool, had books in their homes, and regularly witnessed family members engaged in literacy practices. In contrast, neither Ruzaani's nor Blanca's caregivers were literate, and their homes had little reading material except for the children's schoolbooks. Ruzaani' occasionally did homework at home with the help of her brother. Blanca rarely attended school even after she was officially enrolled at age 5. I was told that the reason for this was that she had become a distraction for her sister Suelita, who, though four years older, was only a grade ahead of

her, and whom the teachers summoned whenever Blanca was disruptive—which was often. And so at Suelita's insistence, Blanca frequently stayed home from school.

Understanding gesture as a medium incorporating "haptic epistemology" exposes the extent to which the development of the speech-gesture system must be crucially related to children's early experiences with the world, many of which occur in play. Streeck nods to the possible relationship between gesture and play, suggesting that "model-worlds"—conceptual creations in gesture "which can instantiate and concretize abstract, intangible matter, and…make abstract concepts tangible by translating them into haptic or kinesthetic forms" (2009:167)—share a logic with that of fictional play: "the semiotic foundation is similar in that a small piece of space is turned into a scenery, populated by agents and props" (2009:149). Streeck's notion of model-worlds is useful for understanding some of the differences in the children's gestures on the Blocks task, and also suggests the provocative hypothesis that these differences might be further exemplified by differences in the ways the children engage in fictional play. Jordan and Guie' Xhuuba's preference for sagittal gestures, their relatively confined gesture spaces, and their static body positions contrast with Blanca and Ruzaani's use of both sagittal and lateral gestures, their expanded gesture spaces, and their incorporation of their entire bodies into their gestures.

These patterns may be linked, for example to different ways of conceptualizing their bodies within a model-world, and ultimately, to different ways of conceptualizing their bodies within the world. My ethnographic data demonstrates, for example, that Guie' Xhuuba's experience navigating spaces was quite different from the other children's. On the one hand, she tended to travel further from her home more often than the other

children, but she was also granted less freedom to travel independently to places around her home. The other children roamed quite freely in their respective neighborhoods, entering others' homes and playing in streets and alleyways. Furthermore, Guie' Xhuuba's style of play differed from the other children's. She mostly played alone, confined within her house or patio area, and she was likely to play with toys or books, or spend her after-school time watching cartoons. The other children had the constant company of other children of various ages, and tended toward improvised games not involving toys, such as tag, catch, digging in the dirt, or the creation of fantasy worlds from trash or found objects. These children also watched television, but Blanca and Guie' Xhuuba' spent more time watching adult programming rather than cartoons. Space does not allow a more thorough exploration of these parallels here, but this is a promising area for future analysis linking elicited data to naturalistic video data collected with the children.

In addition to these different patterns in gesture, the children also showed differences in their use of speech on the task. At the level of the larger narrative, each child invoked a different narrative genre for use on the task, which was reflected both in narrative structure and in affective elements in the narratives. This pattern may be related to another pattern in the speech data, having to do with which aspects of the motion event were attended to and discussed in speech: while Blanca and Ruzaani' focused almost exclusively on the motion event itself, Jordan and Guie' Xhuuba' included details about the set-up and initiation of the motion event. The children also different in their use of certain linguistic constructions: The JCH-speakers used evidential language, while the Spanish speakers did not; but the Spanish speakers included information about agents,

while the JCH speakers did not.

All the children watched the construction of the blocks for at least the first trial. As the research assistant made the first array, the child stood and watched, and was then read the preliminary explanation of the task. They were then told, "Watch, because something is going to happen." The Spanish and JCH versions were rendered as follows:

Mír-a-lo   porque va   a pas-ar   algo
watch-2SG.FAM.IMP-DO because go-3sg.PRES to happen-INF something

B-iiya   dxi-ni   purti xixa   z-aca
COMPL-look quietly-3I because something FUT-happen

This prompt was repeated for each trial. Presumably, while the child was narrating the motion event, the assistant would be setting up the next array, but on many occasions he or she was not yet done and so the child witnessed the set-up of multiple arrays. During the "watch" condition of the task, from which all examples in this chapter are drawn, the research assistant initiated the motion event by pushing or rolling a block. During the narrative phase of the task, the child was instructed to sit down and the interviewer sat next to her. The child was then prompted, "Now, tell me what you saw."

Ahora, cuénta-me   lo que viste
now   tell.2SG.FAM.IMP-me DO that see.2SG.FAM.PRET

Yanna la, gu-dxi   naa xi   b-iiy-u'
now   FOC COMPL-tell 1SG what COMPL-see-2SG

Unlike in the adult task, the children were prompted with more specific questions in the case that they did provide key information about the motion event. These included: "How were the blocks arranged?" "How did they fall?" and "Which way did they fall?" These prompts were rarely used with any of the children except Blanca, who was the most reserved of the children.

For the purposes of comparison, I have selected just one trial from each child, but the children were generally consistent in their narrative styles across trials. Guie' Xhuuba's style stood out from the other children's for its authoritative, didactic tone. This and other elements of her narratives suggested she was drawing on her experience with formal schooling when constructing her responses. Guie' Xhuuba's narrative, represented in Transcript 5.5, above, begins with the command *mira* 'look,' already discussed in the context of the accompanying metaphoric gesture. The use of this word evokes an explanatory framework in which she takes seriously the fiction that her interlocutor may not know what occurred at the presentation table. The next series of utterances focus on the *set-up* of the array of blocks (Lines 2-4).

2.   este le **hicieron** un **rectángulo**
        um this one, they made in a rectangle

3.   y un una **formación**
        and a a formation

4.   después que le **punieron** seis seis **rectángulos**
        after they placed six six rectangles on it,

These utterances are noteworthy first, for their use of third person plural verbs to express the agent of the action[1]. The use of these verb forms was surprising not only because the actual agent was a single person, but also because the agent was the same person to whom Guie' Xhuuba' was narrating the event. This usage served to create distance between the "narrated space" and the "narrating space" (Haviland 1993) by decoupling the event-initiator from the interviewer, even though they happened to be the same individual. The usage also has an effect similar to that of the use of the passive

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[1] Notwithstanding the un-adult-like rendering of *pusieron* as *punieron*.

voice, in that no specific agent need be named or expected. The above utterances are also noteworthy for the sophisticated vocabulary employed to describe the array. Guie' Xhuuba' was the only child to use the names of geometric shapes, such as *rectángulo* 'rectangle,' to describe elements of the arrays of blocks; and the noun *formación* 'formation' was also unique to her corpus. Although other children counted numbers of blocks up to one and two, she was the only child to have counted as high as six blocks. Indeed, there were six upright blocks in the array she had viewed for this trial.

The next segment of the narrative focuses on the *setting off* of the motion event (Lines 5-6). These utterances persist in the use of the third person plural agent, who is now described as toppling the blocks in a particular direction. Interestingly, the use of *adentro* 'inside' and its accompanying gesture toward the sheet, suggest the use of an object-centered frame of reference using the sheet as the ground object; this is one of the only instance of an object centered FoR on this task for all children and adults.

5.　después ya lo **tiraron**
　　then they toppled it

6.　lo **tiraron aldentro**
　　they toppled it toward the inside

The next segment focuses on the motion event itself (Lines 7-8). This portion uses two instance of the motion verb *caerse* 'to fall,' now emphasizing the motion of the blocks themselves, rather than the agent who initiated the motion. Little information about manner or directionality is included in the speech, but the accompanying gesture—an upright arm, bent at the elbow, and rigid movement toward her body—provides some information about the falling movement and directionality toward the sheet.

7. <u>después ya</u> **se cayó** <u>don-</u>
    then it fell whe-

8. **se cayó** los palitos
    the blocks fell

Finally, Guie' Xhuuba' provides a short "coda" (Labov 2006) to her narrative, which

signals its end. She explains that the motion had stopped; with that, her narrative stops as

well (Lines 9-10).

9. <u>después ya así</u>
    and then like this

10. <u>ya ya dejó</u>
    then then it stopped

In its structure, Jordan's narrative (Transcript 5.6) was remarkably similar to Guie'

Xhuuba's, showing a distinct four-part organization describing the set-up, the initiation of

the motion event, the motion event itself, and concluding with a coda. Also like Guie'

Xhuuba', Jordan indexes the agent who set up and set off the motion event through third-

person verb forms—though his are singular rather than plural. Jordan begins by

describing both the setting up (Line 2) and the complete, static set-up of the array of

blocks (Line 1).

1. **había** algunos palitos
there were some little sticks

2. **puso** los palitos y
he placed the little sticks and…

Jordan's first words here, *había algunos* 'there were some' are structured as if to introduce new information to the discourse. Thus, like Guie' Xhuuba's use of the third person plural verb forms, this construction serves to distance the narrated event from the context of narration: Jordan behaves as if his interlocutor were not privy to the motion event, even though she was present at the time. He then uses a third-person singular verb form in describing the agent who arranged the blocks. In this case, my collaborator Tyler had arranged the blocks, and so the interviewer and block-arranger were indeed two separate individuals.

The next segment of the narrative describes the initiation of the motion event. In Line 4, Jordan calls the agent by name and explains that he 'hit,' *pegó* the block with his hand. The accompanying gesture takes the perspective of the agent, as Jordan mimics this hitting motion with his own hand.

4. **pegó Tyler** su mano al cubito
Tyler hit the little block with his hand

Line 5 provides an interesting transition between the description of the initiation of the motion event and the description of the motion event itself. In this utterance, Jordan uses a combination of onomatopoeia and gesture. The onomatopoeia, *ba, ba, ba*, could be interpreted as pertaining to the sound of either the "hitting" action or the "falling" of the blocks, to be described next. The gesture, however, shifts perspective from the previous gesture. Here, Jordan loosely points his right finger upward and wags his hand at the wrist in rhythm with the onomatopoeia. This gestural perspective suggests that Jordan means to specify the motion of the blocks and not the action of the agent.

5. ba ba ba
   boom boom boom

Jordan briefly describes the motion event itself in Line 6. This description is noteworthy for its brevity, which contrasts with the description of the motion event given by Ruzaani'. The verb form here, *cayeron* 'they fell,' pertains to the downward path of the motion.

6. <u>se cayeron</u>
    they fell

He then concludes the narrative by describing where the blocks fell (Lines 7-8), and their

final resting location (Line 10). In Talmy's (1985) terms, these details may be

characterized as providing information about the Goal of the motion. This is the segment

that included the "drawing" gestures described above. In this segment of the narrative,

Jordan returns to a description of static positions and existence, indexed with the same

term *había* 'there was,' with which his narrative began, thus signaling the end of the

motion event and of the narrative.

7. <u>cayó en una</u>
    it fell in a

8. <u>en un cubito de cubito</u>
    in a little box of blocks
9. <u>y…</u>
    and…

10. <u>y ahí había una pared</u>
    and there was a wall there

Overall, Jordan's and Guie' Xhuuba's narratives may be characterized by their

four-part structure, which paralleled their attention to phenomena besides the main

motion event during the presentation phase of the task. The first three parts corresponded

chronologically to events in the presentation phase, while the final part consisted of a

coda, closing the narration. These narratives were also characterized by the conceptual

distance created between narrated space and narration space. This distancing was

achieved through the use of third-person verb forms and discourse structure designed to

introduce new information. Jordan and Guie' Xhuuba' used animate subjects on every

trial when describing the set-up and initiation of the motion event by an agent. This was

in extreme contrast with Ruzaani' and Blanca. Blanca used no animate subject on any trial, and Ruzaani' used only two, both of which appear in the trial discussed below. Jordan and Guie' Xhuuba' also took an authoritative tone in their narratives, partially characterized by a lack of evidential language or any expression of uncertainty, both of which were displayed by Ruzaani' and Blanca. This tone was also indexed by Guie' Xhuuba's opening _mira_ 'look.' Together, these elements combine to suggest that Jordan and Guie' Xhuuba' were relying on their experience producing narratives within a school framework as they produced narratives on the Blocks task. In Guie' Xhuuba's case, she may partially have been playing a "teacher" role, while Jordan seemed to take on the role of a student being tested.

Ruzaani's narrative style stood apart from the other children's in its use of features characteristic of the genre of speech used in Juchitán for gossip or the telling of interesting stories. The following example (Transcript 5.7) from her task corpus was probably her most animated performance, but other trials showed similar features. The "gossip" genre is most saliently indexed by Ruzaani's use of an evidential-like marker, _biiya'_ 'I saw' as a refrain throughout the narrative; through her evaluation of her narrative, accomplished through gesture style, facial expression, and voice quality; and through the repetitive structure of the narrative.

Ruzaani' begins her narrative with a description of the motion event itself. This description is framed by several uses of _biiya'_ 'I saw' (Lines 1-3). These tokens establish the narrative as something based on her prior visual experience of it. They serve as a link between the narrated context and the narrative context by indexing the source of her knowledge of the events she will report. Ruzaani's description of the motion of the

blocks departs from Jordan's and Guie' Xhuuba's in its repetitiveness, length, and position at the opening of the narrative. Whereas Jordan and Guie' Xhuuba' described the motion of the blocks with just two instances each of the verb form *cayó* 'it fell,' Ruzaani' uses five verbs to describe the motion. This includes four instances of *biaba* 'it fell' (Lines 2, 3, 5, 6) and one instance of *uxhiáni* 'it crumbled' (Line 5). Overall, then, her description of the motion includes information about both the path and the manner of motion in speech.

Another interesting feature of Ruzaani's description of the motion event is that it functions independently as a mini-narrative within the narrative. Ruzaani' adds drama to the events in the narrative by extending the vowels in the motion verbs *biaba* (Line 3) and *uxhiá* (Line 5). Her use of the "cohesive device" (Gumperz 1982) *ma racá la* 'and then' (Line 4) establishes for this portion of the narrative its own sequence of events. The narrative culminates with the description in Line 5, in which Ruzaani' uses falling intonation and gestures with very precise arm shapes. Here, she also provides information about the setting of the event, saying that the action took place *ra nuu mexa' ca* 'where the table is' (Line 5). Like the evidential term *biiya'* 'I saw,' the use of the definite marker *ca* here provides a link between the contexts of narrated space and narrative space. It presumes the interlocutor is familiar with "the table" and treats it as old information. Ruzaani's use of the double focus marker *nga nga* to frame a final repetition of the description of the "falling" and her "seeing" it serve as a coda and bring this segment of the narrative to a close (Line 6).

Transcript 5.7: Ruzaani' *"I saw that it fell."*

1.   R   naa la   b-iiy-a'   ja'a
              1SG FOC COMPL-see-1SG HES
              I saw, um

2.   naa b-iiy-a'   bi-aba
              1SG COMPL-see-1SG COMPL-fall
              I saw that it fell

3.   naa la   b-iiy-a'   i-rá-ni
              1SG FOC COMPL-see-1SG all-CLF-3I
              la,   bi-a::ba-ni
              FOC COMPL-fall-3I
              I saw all of them, it feeeeeell

Transcript 5.7: Ruzaani' *"I saw that it fell,"* continued.

4   ma   ra-cá   la,
COMPL LOC-DEIC FOC
and then,

5   u-xhiá:-ni   la, ne bi-aba
POT-CAUS.crumble-3I FOC and COMPL-fall
i-rá-ni   a   n-uu mexa' ca
all-CLF-3I LOC STA-is table   DET
it crumbled, and they all fell where the table is

Transcript 5.7: Ruzaani' *"I saw that it fell,"* continued.

6 (ng)a nga b-iiy-a'   la,
   DEM FOC COMPL-see-1SG FOC
   bi-aba-ni   la,
   COMPL-fall-3I FOC
   that is what I saw, it fell,

7 u-xidxi-ná-ca-be-ni   la,
   COMPL-make.noise-hand-PL-3H-3I FOC
   ne bi-aba-ni   s-ti   biaje
   and COMPL-fall-3I POSS-INDF occasion
   they made a noise with their hand, and it
   fell again

8 bi-aba-ni
   COMPL-fall-3I
   it fell

Transcript 5.7: Ruzaani' *"I saw that it fell,"* continued.

9	ora ca la, hour DET FOC *at that time*	
1	bi-ni-ca-ni si-ca-cá la, COMPL-do-PL-3I MANN-DEIC-DEIC FOC u-xidxi-ni a n-uu mexa' COMPL-make.noise-3I LOC STA-is table ca DET *she did it like this, and it made a noise* *where the table is*	

The next portion of the narrative skips backward chronologically to the initiation of the motion event. This is the only trial in which Ruzaani' mentioned the initiation of the motion by an agent, and the two third-person verb tokens in this transcript are the only ones in her Blocks corpus. In Line 7, she describes the action of initiation using the complex third-person plural verb form "they made a noise with their hand." The choice of verb is noteworthy in that it emphasizes the aural dimension of the motion event, rather than the visual or tactile. This utterance is accompanied by a gesture in which Ruzaani' forms a ring with her right thumb and pointer finger, other fingers splayed, and makes a flicking motion with her fingers and a pushing motion with her arm (Line 7, first still frame). In this gesture, she takes the perspective of the initiator of the motion event.

She then uses her arm to represent a falling block: as she repeats, yet again, that the block fell, she brings her extended arm downwards to meet her other open palm (Line 7, second still frame). In Line 8, she again repeats the motion verb, and then, in Line 10, returns to describing the initiation of the motion event. Here, she uses gesture to illustrate how the motion was initiated, drawing attention to her gesture in speech through the neutral verb *bini* 'did' and the manner demonstrative *sicacá* 'like this' (Line 10). She repeats the "flicking" gesture, but with slightly less energy, and then again describes the result of the action in terms of the falling blocks. In this instance, however, her gesture depicts the falling motion, while her speech describes the sound of the falling with the verb form *uxidxi-ni* 'it made noise' (Line 10). Thus, although this segment of the narrative describes the initiation of the motion event, it couples this information with additional information about the result of the action—the motion event itself—despite this having been already described previously. Because the motion event is the central "complicating action" (Labov 2006), as it were, she repeats it throughout the narrative.

The final portion of Ruzaani's narrative, appearing in Transcript 5.8, may be characterized as providing an *evaluation* of the narrative. After Labov (Labov and Waletzky 1967, Labov 2006), a narrative "evaluation" is taken as the aspect that indicates the point of the narrative. In this segment, Ruzaani' uses voice quality, facial expressions, and an emphatic gesture style to communicate a sense of excitement in the events she is describing, thus lending them some worth, or reason to be retold. She begins this segment with a direct point to the original context of the narrated event, and another repetition of the evidential *biiya'* 'I saw' (Line 11). Again, these actions link narrated context to narrative context, and also serve as a marker of structural transitions in the narrative.

In Line 12, she gives her most dramatic rendition yet of *biaba-ni* 'it fell,' extending the [a] vowel for several beats, and lowering her voice. She also creates a theatrical gestural representation of the falling action, bringing her right arm heavily down upon her left, and compacting her torso downward with the force. As she says this, she cocks her head and makes direct eye contact with Ana, her interlocutor, further reinforcing the importance of this portion of the narrative. In her culminating evaluation, Ruzaani' likens the event of the falling blocks to an earthquake. She builds up this dramatic comparison with several long pauses. She begins by holding her right arm upright, with her pointer finger extended, and says that the blocks "went…" (Line 13). Here, she pauses, holding her gesture. She then brings her right arm down onto her left, as she continues to hold out for an apt simile. As she performs this depiction of the falling motion, she says, "like…" (Line 14). Another pause follows as she holds her arms in this crossed position. Then, the comparison comes to her, and she emphatically proclaims *xu!* 'an earthquake!' Her voice rises in volume and pitch with this syllable, and her eyes grow wide, as if to convey surprise. She makes a fist and repeats the downward motion of her right hand onto the left, but this time with more of a forward punching action (Line 15).

Ana smiles and lets out a stifled laugh (Line 16). As Ruzaani' finishes her narrative with a brief coda (Line 17), Ana tries to stifle her laughter, and finally lets out a chuckle when Ruzaani' has finished speaking. Ana's laughter here is enlightening because it is likely partially attributable to the absurdity of Ruzaani's affect-laden evaluation of the rather trivial motion event of the elicitation task. Ruzaani' may have tried a bit to hard to make an interesting story out of something rather boring; at the same time, however, we see how she adapts the task requirements to a narrative style she is

familiar with and likely uses in her daily life. She is able to create a "tellable" story that gets a reaction from her audience, even with little of interest to work with. Ana later claimed that she laughed because she "likes how Ruzaani' talks," further testament to her skill as a teller of stories.

Transcript 5.8: Ruzaani' *"It went like an earthquake."*

11.   sa-ca-cá   b-iiy-a'   la,
        MANN-DEIC-DEIC COMPL-see-1SG FOC
        I saw it like this

12.   bi-a::ba-ni
        COMPL-fall-3I
        it fell

13.   bi'-ni-ni
        COMPL-do-3I
        it went…

14.   casi
        like
        like…

Transcript 5.8: Ruzaani' *"It went like an earthquake,"* continued.

15.   xu
                earthquake
                an earthquake!

16.   Ana   *((laughs))*

17.   R   bi-aba-ni   la, ne
                COMPL-fall-3I FOC and
                b-iiya-ni
                COMPL-see.1SG-3I
                it fell and I saw it

18.   Ana   *((laughs))*

Finally, the coda is worth some commentary. Although it appears to be a mere repetition of the refrain of "falling" and "seeing," the order here is reversed from previous instances. Whereas she began her narrative with the utterance *Naa biiya' biaba* 'I saw that it fell' (Line 2), she concludes with *Biaba-ni la, ne biiya-ni* 'It fell and I saw it.' This utterance is accompanied by another direct pointing gesture toward the sheet

behind her (Line 17). Aside from creating a pleasing parallelism within the narrative structure, these utterances illustrate that Ruzaani' uses the evidential term as a sort of transition from the narrated event to the narration. Her "having seen" serves as the bridge that allows her to begin the narrative; it is also a current condition that links the narrative timeframe to the present, one of the more sophisticated types of coda Labov has catalogued (2006:222). In contrast to Jordan and Guie' Xhuuba' then, who worked to create distance between the narrated and narrative events, Ruzaani' employed linguistic and bodily resources that created conceptual and perceptual links between the two contexts.

Blanca was the shyest and most reserved of the children and also the one who, based on my ethnographic data, seemed to have the least experience relaying narratives to adults. In my interactions with her at home, I observed that most of her speech concerned the "here-and-now" rather than past events, and that she spoke more extensively with other children than with adults. These patterns may account for her relatively brief responses on the Blocks trials. The trial represented here, in Transcript 5.9, shows one of her more extensive responses; however, it was elicited by Ana using several of the additional task prompts. As a result, the narrative structure may be of less interest than other features of her speech. However, as a "genre," it may be said to parallel in some ways the genre she typically used when relaying information to adults, in which she provided brief responses to a series of interrogations.

Like Ruzaani', Blanca begins her response with the evidential *biiya'* 'I saw.' Rather than open a long narrative with this device, however, Blanca provides a concise response in a single utterance (Line 1). This utterance provides quite complex

information about the path of motion, encoded in the term *ziyaba-ni* 'it went falling,' as well as manner of motion at impact, encoded in *birenda-ni* 'it crashed.' She also appends *sti biaje* 'again,' a reference to previous trials in which similar events had occurred. Thus, she presumes some knowledge of these past events on the part of her interlocutor, and does not strictly divorce the event context from the narrative context. Blanca's speech here was not accompanied by gesture however; likely as a result of this, Ana prompts her further about what the figures looked like (Line 2) and then how they were arranged (Line 5).

In response to this latter question, Blanca responds by saying that the blocks looked "like a little house" (Line 8). As in Ruzaani's comparison of the motion of the blocks to an earthquake, Blanca seeks an association between the task and something familiar from her own experience. She ends this utterance with *zuluá'* 'I think,' indicating a kind of doubt about her assessment not seen among the other children. This usage may be functionally similar to the use of an evidential marker, however, in that it signals that the event is one being *reported* based on the speaker's witnessing of it. This would be consistent with the presumed genre Blanca has adopted in her approach to this task, mirroring one she uses when reporting information to an adult questioner. Her final rendition of the motion event, like her first one, is also quite complex, again providing information about path of motion in the verb stem *riete* 'fall;' manner of motion in the modifier *-tí-* 'rolling;' and Goal, in the prepositional phrase *ndaani ca* 'into that' (Line 13). As she utters *ndaani ca*, Blanca gestures toward the sheet with her head and gaze, indicating the narrated space. Thus, she locates the Goal of the motion event in the narrated space rather than transposing it to narrative space.

Transcript 5.9: Blanca, *"Like a little house, I think."*

1. B **b-iiy-a'** ja'a z-i-y-aba-ni
COMPL-see-1SG HES Z-go-POT-fall-31
bi-renda-ni s-ti biaje
COMPL-entangle-3I POSS-INDF occasion
I saw that it went falling, it crashed again
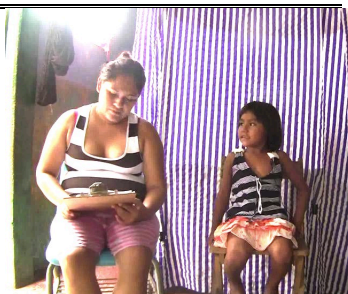
2. Ana xi modo b-iiy-u' ca figura ca
what manner COMPL-see-2SG PL figure DET
what did the figures look like?

3. B u-renda-ni la, ora ca la ja'a
POT-entangle-3I FOC hour DET FOC HES
it crashed, and then, um

4. u-renda-si-ni
POT-entangle-just-3I
it just crashed
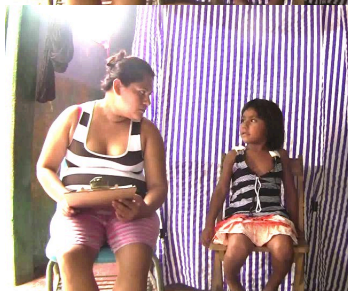
5. Ana b-iiy-u' xi modo zu-huaa ca
COMPL-see-2SG what manner STA-stand PL
figura huiini' ca la?
figure little DET Q
did you see how the little figures were standing?

6. B *((nods))*

7. Ana xi modo
what way
how?

Transcript 5.9: Blanca, *"Like a little house, I think,"* continued.

8.   B   casi ti   yoo   huiini' **zu-lu-á'**
          like INDF house little   FUT-think-1SG
          like a little house, I think
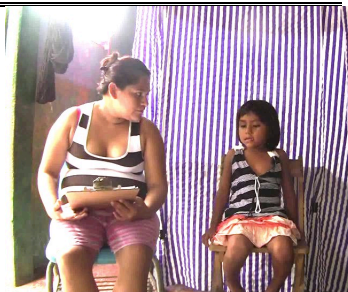
9.   An ra-cá   ya'?
     a   LOC-DEIC WH.Q
        and then?

10. B   ora ca la ja'a
          hour DET FOC HES
          bi-renda-ca-nga-ni
          COMPL-entangle-PL-DEM-3I
          then, um, those ones crashed into it

11.   chupa casi de nga que
          two   like of DEM DET
          two like that one

12.   ora ca   la jm'm
          hour DET FOC HES
          then, um…

13.   ora ca bi-ete-tí-ni   ndaani
          hour DET COMPL-descend-rolling-3I inside
          ja'a ndaani ca
          HES inside   DEM
          then it went rolling down into um, into that

Transcript 5.9: Blanca, *"Like a little house, I think,"* continued.

Blanca's response in this trial shares several other characteristics with Ruzaani's narrative, which contrast with Jordan and Guie' Xhuuba's narratives. Blanca focuses her response on the blocks and on motion event itself, and does not discuss either the setting-up or initiation of the motion event. Indeed, she used no third person verb forms in her entire corpus from the Blocks task, and did not discuss the agents involved in the set-up or initiation of the motion event. Her insistence on the motion event as the central phenomenon of interest is also apparent in her repetition of the motion verbs throughout the dialogue, regardless of the various questions Ana asks. Blanca repeats information about the motion event on each of her speaking turns, using the verb *rirenda* 'entangle, crash' on four occasions (Lines 1, 3, 4, 10), a form of *riaba* 'fall' (Line 1), and a form of *riete* 'descend' (Line 13). Overall, then, Blanca's response, though perhaps not a true narrative, shares more features with Ruzaani's narrative than with the other two children's.

5.4 Discussion: Language and (Changing) Contexts

This micro-ethnographic analysis of data from the Animals-in-a-Field and Toppling Blocks tasks illustrates that the four children differed in their performance on the task in various aspects, only one of which was frame of reference. However, the

pattern of frame of reference use, in which Guie' Xhuuba was an outlier in her use of the egocentric FoR, may be related to the patterns of bodily action and discursive style analyzed here, in which Guie' Xhuuba' and Jordan patterned similarly, and Ruzaani' and Blanca patterned similarly. I have identified two broad themes that contrast across these pairings: the children's interpretation of the tasks within particular interactional frameworks; and the children's conceptualization of their own bodies in relation to spaces, both narrated and interactional. Regarding the first theme, I have suggested that Guie' Xhuuba' interpreted the tasks within a framework borrowed from her experience in a school setting. Evidence for this was provided by her performance of "studying" during the Animals task, by her pursuit of approval of her performance on the Animals task, and by her speech register during the Blocks task. Furthermore, both Guie' Xhuuba's and Jordan's narratives appeared to be shaped by experience in a school setting, in which certain kinds of narrative structures are expected. For example, both attended to the set-up, initiation, and motion of the blocks, reporting these events in chronological order. They also distanced the narrative context from the narrated context through their use of distancing verb forms, information structure, and confined gesture space. Finally, both used non-iconic gestures that may indicate their facility with abstract concepts, acquired, perhaps in school.

I have suggested that Ruzaani', in contrast, interpreted the Blocks tasks within a "gossip" framework; and that Blanca, similarly, interpreted the task as "reported speech," especially of the type that might be elicited by an adult. Evidence for this was provided by the girls' use of evidential language and their focus on the motion event itself as the most "tellable" aspect of the task. Their narratives were structured around the tellability

of this event, rather than according to chronology. Blanca and Ruzaani' also created explicit links between the narrative context and the narrated context through their evidential speech, through their presumption of shared information with their interlocutors, and through their use of direct pointing gestures occurring in an extended gesture space.

This pattern may be an indication in differences in the use of "portable" signs by the various children. "Portability" is a concept Haviland has used to describe the potential of certain signs to be "sufficiently emancipated from the particularities of the speech situation…to be easily movable between different contexts" (2013:163). The processes by which portable signs are transported have been described under the rubrics of "transduction" (Urban 1996) and "decontextualization" (Bauman and Briggs 1990). In their Blocks narratives, Guie' Xhuuba' and Jordan employed signs that were more portable than did Blanca and Ruzaani', in that the signs, both in speech and gesture, were interpretable for an interlocutor without access to the narrated event. The less portable signs used by Blanca and Ruzaani' were more firmly embedded in the context of the narrated event, and depended more for their interpretation upon the experience of the narrated event shared between interviewer and interviewee.

Regarding the second theme, the conceptualization of the body in space, I have argued that Guie' Xhuuba' displayed a different orientation to context than did Blanca and Ruzaani', with Jordan patterning somewhere in between. This was most evident in differences in the children's bodily orientation to the Animals task and in how they used their bodies throughout the Blocks task. On the Animals task, Guie' Xhuuba' leaned into the table, spoke out loud, and gestured toward the animals; the other children, meanwhile,

arranged the animals at some distance from the table, moved their bodies so as to view the animals from different perspectives, and did not speak or gesture during the task. On the Blocks task, Blanca and Ruzaani' accommodated their bodies to their gestures, which occurred in an expanded gesture space extending beyond and even behind their bodies. Their gestures consisted exclusively of iconic and deictic gestures, including several direct pointing gestures. Jordan and Guie' Xhuuba' remained notably still in their seats and gestured in a confined disk-shaped area in front of their bodies; their gestures included examples of deictic, iconic, and non-iconic gestures, but no direct pointing. I suggested that these differing patterns in gestural practices could be the result of their different embodied experiences in the world, following Streeck's (2009) argument that manual gestures are shaped by haptic and tactile knowledge.

Some of the most salient differences, then, in the children's linguistic performances on a task designed to elicit "spatial communication" have to do with differences in how the children conceived of and related to *context*. In contrast with Blanca's and Ruzaani's, Jordan's and Guie' Xhuuba's speech and gesture were more emancipated from the context of the narrated event to which it referred. Evidence from differences in the children's use of their bodies on the tasks points to differences in embodied experience in the world as at least partially responsible for this variation. If this account is correct, measures of what has been called "spatial frame of reference" in communicative tasks may be better understood as indexing how people conceptualize context, including the different "laminated" contexts of narrated and narrative spaces (Haviland 1993), and the various "social fields" that make up interactional contexts (Hanks 2005).

The use of a communicative task designed to elicit both speech and gesture helped detect the different treatments of context by the children because, as McNeill has suggested, "Speakers reveal in their gestures what they regard as relevant and salient in the context" (1992:105). But more than merely "revealing" internal processes, gesture is itself a form of embodied cognition; speakers may rely on their bodies to provide a conceptual structure when construing phenomena in speech (Streeck 2009:151). Inasmuch as gesture is an integral element of a unified speech-gesture system, this perspective of gesture *as* thinking problematizes the notion of language—at any level— "influencing" thinking. Instead, the same embodied practices that give rise to particular patterns of speaking and gesturing also give rise to compatible ways of conceptualizing the world.

This discussion leads to the hypothesis that extreme linguistic portability is a diagnostic feature of a particular way of speaking and thinking: perhaps one introduced through schooling, or otherwise associated with modernity. In *Voices of Modernity* (2003), Richard Bauman and Charles Briggs trace the evolution of a complex of modern linguistic ideologies that have permeated not just the imagination of the Western public, but also of Western linguistic scholarship. They describe ideologies and practices associated with this modernist project, including the following: the privileging of the referential linguistic function, the obsession with linguistic "purity," the creation of universal language categories, the notion that linguistic authority rests in a centralized body, and, most significantly, the propagation of decontextualized texts. This summary is not meant to be exhaustive, but points to some of the themes of a modern/nonmodern ideological complex surrounding ideas about language and ideals about linguistic

practices. Inasmuch as the school is a vehicle for imparting such modernist linguistic ideals, it is unsurprising that schooling could inspire radically different linguistic abilities and practices.

However characterized, in terms of differential access to modernity or as differences in social class, the differences in lifestyle and embodied practices among the four children are hard to deny. This chapter began with a brief ethnographic sketch of each child and his or her family, intended to illustrate that the variation to be observed in their task performances are presumably not random. But now we may hone in on some of the most relevant of these differences as those pertaining to haptic and tactile experiences in the world, styles of fictional play, and experiences with narrative forms comparable to those elicited in the task. Whether particular patterns of habitual practice in these realms socialize children to use either more portable or more context-bound communicative resources is an empirical question that begs for further investigation. In the context of an investigation of linguistic relativity, the identification of these particular socio-cultural variables as pertinent to an apparently patterned and habitual difference in linguistic practice serves as a prime starting point for such an investigation.

Although the kinds of variability discussed in this chapter were identified with reference to four individuals of the same generation, a further presumed conclusion is that this pattern is actually indicative of a process of cultural change, which, over time, will reveal itself as occurring across generations. The variability in frame of reference use in the adult population may be attributable to these same differences in conceptualization of context and self. In any case, it seems that "spatial frames of reference" are indexical of important differences across the population of Juchitán, associated not with differing

linguistic competence, but with the cultural changes befalling this and other indigenous places. This study reveals that Juchitán is a place in flux, and that this changing *context*, rather than changes in the linguistic codes themselves, is related to shifting styles of conceptualization.

Transcription Conventions

Juchitán Zapotec and Spanish linguistic examples throughout this dissertation will be glossed using the Leipzig method. Some common abbreviations for each language are summarized below. Throughout this dissertation, Spanish text appears underlined and JCH text appears unmarked.

In some cases, transparent Spanish loan terms present in JCH text are underlined. This is done when a term's status as a Spanish loan may be relevant to the analysis. However, Spanish loans in JCH do not all have the same status: some are quite old and integrated into JCH grammar, while others might be nonce borrowings or codeswitches. I do not make any claims about the status of various Spanish loans when they appear underlined, except as specified in any accompanying analysis of a given text.

JCH Abbreviations

1	first person
2	second person
3A	third person animal
3H	third person human
3I	third person inanimate
CAUS	causative prefix
CLF	classifier
COMP	completive aspect
DEM	demonstrative pronoun
DET	determiner
DIST	distal
EMPH	emphatic
EXCL	exclusive
FOC	focus marker
FUT	future tense
HAB	habitual aspect
HES	hesitation marker
INCL	inclusive
INDF	indefinite article
IRR	irrealis aspect
LOC	locative
NAME	proper noun
NEG	negative
NMLZ	nominalizer
MANN	manner particle
PERF	perfective aspect
PL	plural
POSS	possessive
POT	potential aspect
PRES	present tense (only occurs with verb stem 'go')

PROG	progressive aspect
PRON	free pronoun stem
PROX	proximal
Q	yes/no question
QUOT	quotative
RECP	reciprocal
SG	singular
STA	stative prefix
VOC	vocative
WH.Q	wh- question
Z	on-the-wayative aspect

Spanish Abbreviations

REFL	reflexive
1	first person
2	second person
3	third person
ART	article
COND	conditional
DO	direct object
F	feminine
FAM	familiar (T/V)
FORM	formal (T/V)
IMP	imperative
INF	infinitive
M	masculine
PL	plural
PPRT	past participle
PRES	present tense
PRET	past preterite indicative
PRT	present participle
SBJV	subjunctive mood
SG	singular
REFL	reflexive

Other Conventions

(single parentheses)	Indicate uncertain transcriptions or translations.
((double parentheses))	Enclose descriptions of features of the interaction not discernable from transcribed speech or video still frames.
[square brackets]	Indicate overlapping utterances
bold type	Indicates features of an example relevant to the discussion in the text.
underlining	Indicates Spanish text.

Spatial frames of reference

	Allocentric Anchor is not a speech-situation participant	Egocentric Anchor is a speech-situation participant
Ternary Anchor is clearly distinguishable from Ground	**Absolute** *The ball is west of the chair*	**Relative** *The ball is to the left* of the chair* *from the speaker's perspective
Binary Anchor is not clearly distinguishable from Ground	**Object-Centered** *The ball is at the chair's back* **Geo-Centered** *The chair is facing west*	**Direct** *The ball is in front* of me* *with reference to the speaker's own front

Spatial frames of reference as applied to gesture

	Allocentric Anchor is not a speech-situation participant	Egocentric Anchor is a speech-situation participant
Ternary Anchor is clearly distinguishable from Ground	**Absolute ("Transposed pointing")** *A Ground object is construed in gesture space and a Figure is located in gesture space with reference to the Ground object. Some external object or region serves as the Anchor.*	**Relative** *A Ground object is construed in gesture space and a Figure is located in gesture space with reference to the Ground object. The gesturer's real or imagined perspective is the Anchor.*
Binary Anchor is not clearly distinguishable from Ground	**Direct** *The gesturer points directly at the object or region in question, contorting her body or body parts as necessary.*	

Who's who of Juchitán

Shading indicates separate households.

Jordan	A little boy who lives in the heart of Yoxho; speaks mostly Spanish but understands some JCH (born September 2006).
Maite Pilar	Jordan's mother.
Javier Senior	Jordan's father.
Javier Junior	Jordan's brother, 4 years older, fluent bilingual.
Ta Ponce †	Jordan's maternal grandfather, Maite Pilar's father (died 2012).
Jordan Senior †	Jordan's maternal great uncle, Ponce's elder brother (died 2011).
Ta Guugu	Jordan's maternal great grandfather, father of Ponce, Jordan Senior, Teo.
Ta Teo †	Jordan's maternal great uncle, Ponce's elder brother (died 2004).
Na Paz	Jordan's great aunt, widow of Ta Teo.
Quinto	Son of Na Paz.
Alma Pilar	Youngest daughter of Na Paz.
Manolo	Alma Pilar's husband.
Belén	Alma Pilar's infant daughter.

Ruzaani'	A little girl who lives in the heart of Yoxho; fluent bilingual and attends a bilingual school (born June 2006).
Calvino Junior	Ruzaani's brother, 5 years older, fluent bilingual.
Na Purísima	Ruzaani's mother.
Calvino Senior	Ruzaani's father.

Guie' Xhuuba'	A little girl who lives in Cubi; speaks and understands only Spanish (born October 2006).
Katia	Guie' Xhuuba's sister, 10 years older, passive bilingual.
Cornelio	Guie' Xhuuba's father.
Na Simona (Mona)	Guie' Xhuuba's mother, daughter of Na Lavinia.
Ta Paco	Guie' Xhuuba's paternal grandfather, *bocina* announcer, father of Cornelio, lives in Yoxho.

Blanca (Maria Mercedes, Chapulín)	A little girl who lives in the far south of Yoxho; was raised speaking only JCH but is learning Spanish in school (born July 2007).
Na Lavinia	Blanca and Guie' Xhuuba's maternal grandmother; is raising Blanca, Suelita, and Arlo; mother of Simona, Delfina, Serafina, Lola, Flaco, Venturo Junior, and Valentín.

Ta Venturo Senior	Na Lavinia's husband; Blanca and Guie' Xhuuba's maternal grandfather.
Suelita	Blanca's sister, 3 years older than her, JCH-dominant bilingual.
Arlo	Blanca's brother, 12 years older than her.
Flaco	Na Lavinia's youngest son, 2 years older than his nephew Flaco.
Delfina	Na Lavinia's youngest daughter, 2 years older than her brother Flaco.
Dario	Delfina's son, 2 years older than Blanca, JCH-dominant bilingual.
Ema	Delfina and her husband's infant daughter, Dario's half sister.
Serafina	Blanca's mother; her children were born out of wedlock and she remains unmarried; sometimes lives in Oaxaca.
Elio	Blanca's 'secret' brother; 1 year older; raised by his uncle, Na Lavinia's son Venturo Junior; JCH-dominant bilingual.
Abril	Blanca's 'secret' sister; 5 years older; raised by her aunt, Na Lavinia's daughter Lola; lives in Oaxaca.
Valentín	Na Lavinia's son.
Enzo	Son of Valentín; 1 year younger than Blanca; was raised speaking only JCH and had not yet started school.
Na Ramona	Na Lavinia's mother.

Language Use Interview (Spanish)
Parte A: Datos
1. ¿Cómo te llamas?
What's your name?
2. ¿Cuál es tu fecha de nacimiento? ¿Dónde naciste?
When is your birthday? Where were you born?
3. ¿Siempre has vivido en esta casa? Cuéntame de las casas donde has vivido.
Have you always lived in this house? Tell me about other houses where you've lived.
4. ¿Cuándo llegaste a esta casa?
When did you arrive at this house/place?
5. ¿Dónde pasaste tu niñez?
Where were you raised? Where did you spend your childhood?
6. ¿Has trabajado alguna vez en tu vida fuera de tu pueblo? ¿Dónde? ¿Cuándo? ¿Por cuánto tiempo?
Have you ever worked outside the village? Where? When? For how long?
7. ¿A qué trabajas ahora?
What do you do for a living now?
8. ¿A qué trabajabas antes?
What did you do for a living before?
9. ¿Cuántos años de escuela hiciste?
How many years have you been schooled?
10. ¿Dónde asistías a la escuela?
Which school did you go to?
11. ¿Votas en las elecciones? ¿Con cuál partido?
Do you vote in the elections? What party do you support?
12. ¿Tienes tierra en alguna colonia? ¿Cuál? ¿Vas a las juntas de la colonia?
Do you have a land in any government-subsidised neighborhood? Which one? Do you go to any board meetings of the neighborhood?
13. ¿Te gustan las pachangas? ¿Te gusta tomar cerveza?
Do you go to parties? Do you like drinking beer?
14. ¿A qué iglesia asistes ahora? ¿Antes?
What church do you usually attend? and in the past?
15. ¿Cuánto tiempo llevas con esta iglesia?
How long have you been attending this church?
Parte B: Conversación
1. Cuéntame algo de tu vida, por ejemplo algo bueno que te pasó un día, o lo que te guste contar.
Tell about your life, for example, something good that happened some day or what you feel like telling.
2. Cuéntame algo de Juchitán, por ejemplo algo de las costumbres de aquí.
Tell me something about Juchitán, for example, something about the traditions in here.
Parte C: Uso de los idiomas
1. ¿La última vez que los viste, en cuál idioma hablaste con las siguientes personas?
What language did you use the last time you saw the following people?
2. ¿ La última vez que los viste, en cuál idioma te hablaron las siguientes personas?

What language did the following people use with you the last time you saw them?

	Puro en zapoteco *Only in Zapotec*	En zapoteco más que en español *In Zapotec more than in Spanish*	Igual los dos *Both*	En español más que en zapoteco *In Spanish more than Zapotec*	Puro en español *Only in Zapotec*
Tu papá *You father*					
Tu mamá *Your mother*					
Tu hermano *Your brother*					
Tu hermana *Your sister*					
Tu hijo *Your son*					
Tu hija *Your daughter*					
Los maestros de tu hijos *Your children's teachers*					
Tus vecinos *Your neighbors*					
Gente de la iglesia *People from the church*					

1. ¿Cuál idioma usaste la ultima vez que:
What language did you use the last time that:

	Zapoteco	Español

	Zapotec	*Spanish*
fuiste a la iglesia *you went to church*		
platicaste en la calle *talked in the street*		
hablaste por teléfono *spoke on the telephone*		
escuchaste música *listened to music*		
escuchaste la radio *listened to the radio*		
compraste en el mercado *shopped at the market*		
platicaste en una fiesta/culto *talked in a party/prayer group*		
estabas en tu casa *you were at your home*		
fuiste al trabajo *went to work*		
fuiste a comprar tortillas *went to buy tortillas*		
hablaste groserías *said swear words*		
regañaste a un niño *scolded a child*		
contaste un cuento *told a story*		
chismeaste con un/a vecino/a *gossiped with a neighbor*		
vendiste *sold something*		

rezaste con dios *prayed to god*		
soñaste *dreamt*		
escribiste algo *wrote something*		

Parte D: Idioma

1. ¿Cuál aprendiste primero, el español o el zapoteco?
What did you learn first, Spanish or Zapotec?

2. Cuéntame lo que puedas de cómo aprendiste los idiomas de niña/niño. ¿Te costó mucho aprender uno u otro? ¿Cuál hablaste en la casa de tus papás?
Tell me how you learnt the languages in your childhood. Was it hard to learn either of them? What language did you speak at your parents' home?

3. ¿Cuándo aprendiste a escribir y a leer en español?
When did you learn to write and read in Spanish?

4. ¿Puedes leer o escribir en zapoteco? ¿Cómo aprendiste?
Can you read and write in Zapotec?

5. ¿Cuál idioma te gusta más usar?
What language do you prefer using?

6. ¿Se te han burlado por la forma que hablas el zapoteco o el español? ¿Qué te dijeron?
Have you ever been mocked for the way you speak Zapotec or Spanish? What did they say to you?

7. ¿Con quién hablas más el zapoteco?
With whom do you speak more Zapotec?

8. ¿Con quién hablas más el español?
With whom do you speak more Spanish?

9. ¿Qué piensas de como habla la gente ahora el zapoteco? ¿Hablan bien? ¿Hablaban mejor antes?
What is your opinion regarding the people who speak Zapotec now? Do they speak it correctly? Do they speak better now than in the past?

10. ¿En cuál otro pueblo hablan el zapoteco? ¿Les puedes entender?
In what other villages people also speak Zapotec? Can you understand them?

11. ¿Qué cosa dicen que sea diferente?
What things do they say differently?

12. ¿En qué pueblo hablan el mejor zapoteco? ¿Qué cosa dicen que es mejor?
In what village do people speak the best Zapotec? What do they say that makes it better?

13. Y en Juchitán, ¿conoces a alguien que habla muy bien el zapoteco? ¿Quién?
and in Juchitán, do you know someone who speaks Zapotec very well? Who?

14. ¿Te gusta hablar el zapoteco?
Do you like to speak Zapotec?

15. ¿Hay alguién de tu familia que no habla el Zapoteco?
Is there anyone in your family who does not speak Zapotec?

16.   ¿Hay alguién de tu familia que no habla el Español?
Is there anyone in your family who does not speak Spanish?
17.   ¿Se ha casado alguién de tu familia con alguién que no sea de Juchitán?
Has anyone in your family got married with someone who is not Zapotec?
18.   Y usted, ¿qué tal hablas el zapoteco?
And you, how well do you speak Zapotec?
1 (nada)   2 (poco)   3 (normal)   4 (bien)   5 (excelente)
1 none   2 a little   3 regular   4 well   5 excellent
19. ¿Y el español?
And how about Spanish?
1 (nada)   2 (poco)   3 (normal)   4 (bien)   5 (excelente)
1 none   2 a little   3 regular   4 well   5 excellent
20. Y los jóvenes de por acá, ¿hablan zapoteco? ¿hablan bien?
And the youngsters around here, do they speak Zapotec? Do they speak it well?
21. ¿Es necesario el zapoteco? ¿Es hermoso?
Is Zapotec necessary? Is it beautiful?
22. ¿Tienes vergüenza de hablar el zapoteco?
Are you ashamed of speaking Zapotec?
23. Si no, ¿hay gente que sí tienen vergüenza de hablar el zapoteco?
If not, are there people ashamed of speaking Zapotec?
24. Y los niños, ¿deben de aprender a hablar el zapoteco en la escuela?
and the kids, do they need to learn to speak Zapotec at school?
25. ¿Crees que se esté desapareciendo el zapoteco aquí?
Do you think Zapotec is disappearing in here?
26. Si se desapareciera el zapoteco, ¿cómo te sintieras?
If Zapotec disappeared, how would you feel about it?

Animals-in-a-field instructions (Spanish)
Párate aquí.
Stop here
Vamos a hacer un juego de memoria. Te voy a explicar el juego.
Let's play a memory game. I am going to explain the game.
En este juego hay cuatro animalitos. Hay un marrano. Hay una gallina. Hay una vaca. Hay un borrego.
There are four little animals in this game. There is a pig. There is a chicken. There is a cow. There is a lamb.
[Enseña los animalitos]
[She shows the little animals.]
El va a colocar tres de los animales, así.
He is going to arrange three of the little animals, like this.
[Asistente arregla la primera construcción de animales.]
[Assistant fixes the first animal construction/arrangement.]
Ahora ve bien los animalitos y acuérdate bien como están. Luego los voy a quitar y tú los vas a formar otra vez, igual. Me dices cuando estás listo/a. ¿Ya?

Now look carefully and remember how animals are arranged. Afterwards, I am going to take them out and you are going to arrange them in the same fashion. You tell me when you're ready, ok?

[Quita los animalitos]

[he takes away the little animals]

Ahora espérate un momento mientras preparan la cámara en la otra mesa.

Now wait for a moment while they prepare the camera at the other table.

[Espera 30 segundos. Los investigadores preparan la cámara y cuentan 30 segundos. [Hablan "ya" cuando pasan los 30 segundos]

[Waits for 30 minutes. Researchers prepare the camera and count 30 seconds. They say 'now' when the 30 secs are up.

Ya. Vamos a la otra mesa. [Lleva la persona a la otra mesa]

Ok. Let's go to the other table. [he takes the person to the other table]

Ahora hazlo otra vez.[Si preguntan algo contesta así:]

Now do it again [if they ask something, answer like this]

- Igual que en la otra mesa.

the same as in the other table

- *¿Importa dónde pongo el animal? ¿Importa por dónde ve el animal?*--Vas a enseñarme en esta mesa lo que viste en la otra mesa.

Does it matter where I put the animal? Does it matter where the animal sees? - you're going to show me in this table what you saw in the other table.

- Vas a formar los animales en esta mesa igual que estaban en la otra mesa.

Muy bien, ahora lo vas a hacer otra vez. Vamos a la otra mesa.

You're going to arrange the animals in this table in the same way they were at the other table. Very good, now you're doing it again. Let's go to the other table.

Geographical Scale Space Task instructions (Spanish)

Siéntate aquí. En este juego vamos a platicar de unos lugares en tu pueblo.

Sit down here. In this game we are going to talk about the place in your village

List 1

¿Dónde queda la Bodega de la Sol con respecto a la gasolinera del crucero? Habla un poco más.

Where is the Bodega de la Sol in relation to the gas station of the intersection? Talk a little bit more.

¿Dónde queda la iglesia del Calvario con respecto a la cancha del Calvario? Habla un poco más.

Where is the Calvario church in relation to the Calvario filed/pitch? Talk a little bit more.

Si estuvieras en la Casa de la Cultura, ¿cómo caminarías para llegar en frente del palacio? Habla un poco más.

If you were at the Casa de la Cultura, how/where would you go in order to get in front of the palace? Talk a little bit more.

Si estuvieras en el seguro de salud y te subieras en un taxi, ¿cómo caminaría el taxi para llegar al crucero? Habla un poco más.

If you had a health insurance and you got into a taxi, where would the taxi go to get at the intersection? Talk a little bit more.

List 2

¿Dónde paran los buses para Xadani con respecto al parque revolución? Habla un poco más.
Where do buses stop on the way to Xadani in relation to the revolution park? Talk a little bit more.
¿Dónde queda la iglesia de los pescadores con respecto a la cancha de los pescadores? Habla un poco más.
Where is the church of the 'pescadores' in relation to the field of the 'pescadores'?
Si estuvieras en la cancha de los pescadores, ¿cómo caminarías para llegar a la carretera de la playa? Habla un poco más.
If you were at the field of the 'pescadores', how would you get to the beach road? Talk a little bit more.
Si estuvieras en el centro y te subieras en un taxi, ¿cómo caminaría el taxi para llegar al panteón de Cheguiigu? Habla un poco más.
If you were in the downtown and you go into a taxi, how would the taxi get to the Cheguiigu pantheon? Talk a little bit more.

TURN to POINT

S	Si te salieras de la iglesia San Vicente y te pararas en frente de la iglesia [indica un punto en frente del pecho], y luego caminaras una cuadra así [indica un camino derecho], ¿dónde llegarás? Habla un poco más. *If you went out of San Vicente's church and you stopped in front of it [indicate a point in front of the chest], and then you walked a block like this [indicate a straight path], where would you arrive? Talk a little bit more.*
W	Si te salieras del seguro y te pararas en frente de la Casa del Pueblo [indica un punto en frente del pecho], y luego caminaras una cuadra así [indica un camino derecho], ¿dónde llegarás? Habla un poco más. *If you left the hospital and you stopped in front of Casa del Pueblo [indicate a point in front of your chest], and then you walked one more block like this [indicate a straight line/path], where would you arrive? Talk a little bit more.*

Toppling Blocks, Watch Condition, instructions (Spanish)
Párate aquí. [Arregla los cubos]
Stop here. [Arranges the blocks]
En este juego algo va a pasar con estos cubos y tú vas a contar lo que pasó.
In this game something is going to happen to these blocks and you are going to tell what happened.
Ahora miralo porque va a pasar algo. ¿Listo/a?
Now look at it because something is going to happen. Ready?
[Empieza la primera marcha]

[first round starts]
Vamos a esperar un momento u luego vamos a otro lugar. Ahora ven conmigo al otro lugar.
Let's wait for a moment and then go somewhere else. Now come with me some other place.
[Camina al otro lugar]
[Walks to another place]
Siéntate aquí. Ahora cuéntame lo que viste.
Sit down here. Now tell me what you just saw.
[Escucha]
[Listens]
Bueno. Habla un poco más.
Good. Talk a little bit more.
[Escucha]
[Listens]
Bueno.
Good
****

Ahora lo vamos a hacer otra vez.
Now we're going to do it again.
[Regresa al primer lugar. Arregla seguna construcción de cubos]
[Goes back to the first place. Arranges a second construction of the blocks]
Bueno, lo vamos a hacer otra vez. Míralo porque algo va a pasar. Despúes, vas a hablar lo que pasó. Igual que antes. ¿Estás listo/a?
Well, let's do it again. Look at it because something is going to happen. Afterwards, you are going to tell what just happened. Are you ready?
[Empieza la segunda marcha]
[second round starts]
Ahora ven conmigo al otro lugar.
Now come with me some place else.
[Camina al otro lugar]
[Walks some place else]
Siéntate aquí. Ahora dime que viste.
Sit down here. Now tell me what you saw.
[Escucha]
[Listens]
Bueno. Habla un poco más.
Good. Talk a little bit more.
[Escucha]
[Listens]
Bueno. Es todo.
Good. That's all.

Toppling Blocks, Touch Condition, instructions (Spanish)
Párate aquí. [Arregla los cubos]

Stand here.[Arranges the blocks]
Este juego es un poco diferente. Algo va a pasar con estos cubos, pero esta vez tú lo vas a hacer. El gringo te va a enseñar como, y lo vas a hacer igual. Luego vas a contar lo que pasó.
This game is bit different. Something is going to happen with these blocks, but this time you are going to do it. The gringo is going to teach you how and you are going to do the same. Afterwards, you are going to tell what happened.
Ahora mira lo que te enseña. Lo vas a poner en marcha. Tiralo como te enseñó. ¿Listo/a?
Now look at what he teaches you. You're going to make it work. Throw it as you were taught. Ready?
[Empieza la primera marcha]
[first round starts]
Vamos a esperar un momento u luego vamos a otro lugar. Ahora ven conmigo al otro lugar.
Let's wait a moment and then let's go some other place. Now come with me somewhere else.
[Camina al otro lugar]
[walks to another place]
Siéntate aquí. Ahora dime que viste.
Sit down here. Now tell me what you saw.
[Escucha]
[listens]
Bueno. Habla un poco más.
Good. Talk a little bit more.
[Escucha]
[listens]
Bueno.
Good.
****
Ahora lo vamos a hacer otra vez.
Now we're going to do it again.
[Regresa al primer lugar. Arregla seguna construcción de cubos]
[goes back to the first place. Arranges the second construction of the blocks]
Bueno, lo vamos a hacer otra vez. Ahora haz lo que te enseña. Lo vas a poner en marcha.
Good. we're going to do it again. Now do what you've been taught. You are going to make it work.
Después, vas a hablar lo que pasó. Igual que antes. ¿Estás listo/a?
Afterwards, you are going to tell what happened. Just as before. Are you ready?
[Empieza la segunda marcha]
[second round starts]
Vamos a esperar un momento u luego vamos a otro lugar. Ahora ven conmigo al otro lugar.
Let's wait for a moment and then go somewhere else. Now come with me some place else.
[Camina al otro lugar]
[walks some place else]

Siéntate aquí. Ahora dime que viste.
Sit down here. Now tell me what you saw.
[Escucha]
[Listen]
Bueno. Habla un poco más.
Good. Talk a little bit more.
[Escucha]
[listens]
Bueno. Es todo.
Good. That's all.

Spatial Vocabulary Comprehension Task instructions (Spanish)
Hay una jícara en la mesa y tiene cubitos en sus lados. Hay otra jícara en un tapete y tiene animalitos en sus lados. Te voy a hacer unas preguntas.
There is a small cup on the table and it has little blocks by its sides. There's another small cup in a rug and it has little animals in its sides. I am going to ask you some questions.
1. Toca con tu mano el cubo que está del lado izquierdo de la jícara en el piso.
Touch with your hand the block that is placed on the left side of the cup on the floor.
2. ¿De qué color es la jícara en el piso?
What's the color of the cup on the floor?
3. Toca con tu mano el cubo que está del lado derecho de la jícara en el piso.
Touch with your hand the block that is placed on the right side of the cup on the floor.
4. ¿Qué forma tiene ese cubo?
What's the shape of that block?
5. ¿Cuál animal está al lado izquierdo de la jícara en la tapete?
What animal is placed on the left side of the cup on the rug.
6. ¿De qué color es ese animal?
What's the color of the animal?
7. ¿Cuál animal está al lado derecho de la jícara en la tapete?
What animal is placed on the right side of the cup on the rug?
8. Toca el cubo en el piso que está al norte de la jícara en el piso.
Touch the block on the floor that is placed north of the cup on the floor.
9. ¿De qué color es la jícara en el piso?
What's the color of the cup on the floor?
10. Toca el cubo en el piso que está al oeste de la jícara en el piso.
Touch the block on the floor that is placed west of the cup on the floor.
11. ¿Cuál animal está al sur de la jícara en el tapete?
What animal is south of the cup on the rug?
12. ¿De qué color es la jícara en la tapete?
What's the color of the cup on the rug?
13. ¿Cuál animal está al este de la jícara en la tapete?
What animal is placed east of the cup on the rug?
14. Enséñame tu mano izquierda.
Show me your left hand.

15. Enséñame tu mano derecha.
Show me your right hand.
16. ¿Cuál animal está hacia Tehuantepec?
What animal is facing Tehuantepec?
17. ¿Cuál animal está hacia el mar?
What animal faces the sea?
[Cambia al otro lado de la mesa.]
[changes to the other side of the table]
18. Toca el cubo que está al lado izquierdo de la jícara en el piso.
Touch the block that is placed on the left side of the cup on the floor.
19. ¿De qué color es la jícara en el piso?
What's the color of the cup on the floor?
20. Toca el cubo que está al lado derecho de la jícara en el piso.
Touch the block that is placed on the right side of the cup on the floor.
21. ¿Qué forma tiene ese cubo?
What's the shape of the this block?
22. ¿Cuál animal está al lado izquierdo de la jícara en la tapete?
What animal is placed on the left side of the cup on the rug?
23. ¿De qué color es ese animal?
What's the color of this animal?
24. ¿Cuál animal está al lado derecho de la jícara en la tapete?
What animal is placed on the right side of the cup on the rug?
25. Toca el cubo en el piso que está al sur de la jícara en el piso.
Touch the block on the floor that is south the cup on the floor.
26. ¿De qué color es la jícara en el piso?
What's the color of the cup on the floor?
27. Toca el cubo en el piso que está al este de la jícara en el piso.
Touch the block on the floor that is east the cup on the floor.
28. ¿Cuál animal está al norte de la jícara en la tapete?
What animal is north the cup on the rug?
29. ¿De qué color es la jícara en la tapete?
What's the color of the cup on the rug?
30. ¿Cuál animal está al oeste de la jícara en la tapete?
What animal is west the cup on the rug?
31. Enséñame tu mano izquierda.
Show me your left hand.
32. Enséñame tu mano derecha.
Show me your right hand.
33. ¿Cuál animal está hacia Tehuantepec?
What animal is facing Tehuantepec
34. ¿Cuál animal está hacia el mar?
What animal is facing the sea?

Language Use Questionnaire (JCH)
Parte A: Datos
1. ¿Tu lá lu?
2. ¿Xi dxi gulelu' ne paraa?
3. ¿Ñee ma xa dxi nabezu' ndaani yoo ndí' la? Buie' ne naa de ca yoo ra gulezalu'.
4. ¿Pa dxi beedandou' ndaani yoo ndi'?
5. ¿Paraa gudi'du guenda ba'du stiu?
6. ¿Huayu'nu' dxiiña ti dxi la, fuera de xquidxilu'?
   a. ¿Paraa, pa dxi, ne pabiá dxi?
7. ¿Xi dxiiña ru'nu' yanna?
8. ¿Xi dxiiña bi'nu' dxi' qué?
9. ¿Panda iza de scuela bi'nu'?
10. ¿Paraa guzaalu' scuela?
11. ¿Runi votar lu' lu elección la?
    a. ¿Xi ne partidu?
12. ¿Napu' terrenu ra xixa colonia la?
    a. ¿Paraa?
    b. ¿Xi modo ni?
    c. ¿Rieu junta sti colonia la?
13. ¿Riulaadxilu' pachanga la? Riulaadxilu' güeu' cerveza la?
14. ¿Xi yu'du rieu' nagasi? ¿Xi modo ni? ¿Rieu' lu mixa' la?
    a. ¿Ne dxi' qué la?
15. ¿Panda iza zineu' ne yu'du ca?
Parte B: Conversación
16. Buie ne naa caadxi de vida stiu', por ejemplo xixa galán ñacalu' ti dxi, o ni riulaadxilu' güilu'.
17. Buie ne naa xixa de xquidxilu', por ejemplo xixa de ca costumbre de rarí.
Parte C: Uso de idiomas
- Último dxi biiyu' _____ ¿xi lengua gunineu' laabe?

	Puro didxadá	Guiropani	Puro didxastiá	Neither	n/a
bixhoozo'					
jñoo					
bizaanu'					
bendu'/bi'chu'					
xiiñu lu gola					
xiiñu xhuncu					
nietu					
ca maestru sti ca xiiñu'					
ca xvecinu la					
ca binni de ra yu'du					
ca xamigu de dxiiña					

- Último viaje _____ ¿xi lengua biquiiñelu'?

	Didxazá	Didxastiá	Neither	n/a
ni bui'lu' diidxa ndaani neza				
guyeu' ra yu'du'				
guni'lu por teléfono				
bicaa diagu música				
bicaa diagu radio				
guiziu' ndaani luguiaa				
bui'lu diidxa ndaani ti pachanga/ después de ti cultu				
nuulu ra liidxu'				
bi'nu' dxiiña				
yesiu' gueta				
guniu' dxiidxa guidxa				
guidindeneu' ti xcuide huiini'				
bui'lu ti cuentu				
bui'lu ti chisme la ne vecina				
guini xcanda lu				
bicoo xixa				
binda lu xixa				
guni'neu' Dios				

Parte D: Idioma
1. ¿Xi biziidilu' primeru, didxastiá la, o didxazá? ¿Guna ni guni'lu' ra liidxu' ne ca bixhoozo'?
2. Buie ne naa xi modo biziidu' ca idioma ca. ¿Guca costar lii stale la, guiziidilu' tobi ne xtobi? ¿Cuántos años tenías cuando aprendiste el otro idioma? ¿Cómo lo aprendiste?
3. ¿Pa dxi biziidu' gucalu' ne gunda'lu' didxastiá?
4. ¿Zanda gunda'lu' o gucoo didxazá? ¿Xi modo biziidu'? Pa co', ¿riulaadxilu' guiziidu' la?
5. ¿Xi idioma riulaadxilu' jma rineu'? ¿Xiñe'?
6. ¿Huayuni burlacabe lii por modo riniu' didxazá o didxastiá la? ¿Xi gúdxicabe lii?
7. ¿Tu ne riniu' jma didxazá?
8. ¿Tu ne riniu' jma didxastiá?
9. ¿Xi runi pensar lu' de modo rini' binni yanna didxazá? ¿Rini'cabe neza la? ¿Rini'cabe jma galán yanna la, o dxi' qué la?
10. ¿Xi sti guidxi rini'cabe didxazá? Zanda guienelu' laacabe la?
11. ¿Xi cani'ca ni gaca gadxe?
12. ¿Xi sti guidxi rini'cabe jma galán didxazá? ¿Xi la rini'cabe galán?
13. ¿Ne xquidxilu' runibió tuuxa ni rini' neza didxazá? ¿Tu lá?
14. ¿Riulaadxu' riniu' didxazá la?
15. ¿Nuu tuuxa de familia lu' ni qui rini' didxazá la?

16. ¿Nuu tuuxa de familia lu' ni qui rini' didxastiá la?
17. ¿Huachagana tuuxa de bizaanalu', bendu (bi'chu), o xiiñilu' ne tuuxa que gaca de xquidxilu'?
18. Ne lii, xi tal xa riniu' didxazá:
    1: gasti'   2: huaxie'   3:bia' galán   4: neza
19. Xi tal riniu' didxastiá?
    1: gasti'   2: huaxie'   3:bia' galán   4: neza
20. ¿Ne ca ba'du nguiuu de cherí, rini'ca neza la?
21. ¿Ñee necesario didxazá la? ¿Sicaru ni la?
22. ¿Rituilulu' rinui' didxazá la? ¿Xiñe'?
23. Pa co', ¿nuu binni ni rituilu' guini' didxazá?
24. Ne ca xcuidi, ¿napaca xi de guiziidica guini'ca didxazá ra scuela?
25. ¿Xi nou' ya canitulu' didxazá di rarí la?
26. ¿Pa ninitilu didxazá xi modo ñaca sentirlu'?

Animals-in-a-Field Task instructions (JCH)
Bizhuaa' rari'.
Chi guninu ti juegu de memoria. Chi tiidxe' lii xi juegu.
Ra ca la ndi' nuu tapa mani huiini'.
[Enseña los animalitos].
Nuu ti biihui. Nuu ti bere. Nuu ti vaca. Ne nuu ti borregu.
Laabe chindaquibe ca mani huiini' ca zacari'. →
[Asistente arregla la primera construcción de animales.]
Yanna biiya chahui ca mani huiini' ca, guiasilu' lii neza modo nuuni.
Chi gaxha cani la, ne lii chindulu' cani neza sti viaje, zaqueca.
Ga'bu' naa hora ma nuulu' listu. ¿Ma la? →
[Asistente quita los animalitos]
Yanna la, guleza ti ratu huiini' purti cayuni preparar be sti' mexa'.
[Espera 30 segundos. Los gringos van a hablar "ya" cuando pasan los 30 segundos]
Ma chuunu lu sti mexa' ca.
[Lleva la persona a la otra mesa]
Yanna la, bi'ni ni sti viaje.
[Si preguntan algo contesta así:]
-----Ngeueca casi lu sti mexa' ca.
-----Chigu'nu lu mexa' ndi' la, ni biiyu lu sti mexa' ca.
-----Chu suhou' ca mani huiini' ca lu mexa' ndi' la, casi ca modo nuucame lu sti mexa'.
Bueno, yanna la, chi gu'nu' stobi. Ma chuunu lu sti mexa' ca.

Geographical Scale Space Task instructions (JCH)
[Si preguntan en que idioma van a hablar:] Diidxazá.
[Si no saben o no conocen el lugar:] Bueno, chuunu lu stobi ca.
Guri rari'. Ca juegu ndi' chi güi'nu' diidxa de tudxi lugar de xquidxilu'.
List 1

1. ¿De ra nuu gasolinera del crucero, paraa riaana gasolinera del crucero? Guni' xcaadxi stale.

2. ¿De ra nuu cancha del Calvario, paraa riaana yu'du Calvario? Guni' xcaadxi stale.
3. Pa ñuulu ra liidxi guendabiaani, ¿xi modo para nindou' ra palacio? Guni' xcaadxi stale.
4. Pa ñuulu ra seguro de salud ne ni gui'ba lu ti taksi, ¿xi modo ñee taksi ca ra crucero? Guni' xcaadxi stale.

List 2

1. ¿De ra nuu parque Revolución, paraa ruzhuaa ca urbano ni rie Xadani? Guni' xcaadxi stale.
2. ¿De ra nuu cancha de guze benda, paraa riaana yu'du guze benda? Guni' xcaadxi stale.
3. Pa ñuulu lu cancha de guze benda, ¿xi modo nizalu' para nindou' lu carretera playa? Guni' xcaadxi stale.
4. Pa ñuulu centru ne ni gui'ba ti taksi, ¿xi modo ninda taksi ca panteón cheguiigu? Guni' xcaadxi stale.

S ↖	Pa rireu' de ra yu'du San Vicente [indica un punto en frente del pecho] ne nuzuhuo' frente de yu'du raca nizalu ti cuadra zacari [indica un camino derecho], ¿paraa nindou'? Guni' xcaadxi stale.
W ↖	Pa nireu' de Casa del Pueblo ne nuzuhuo' frente de tienda ca [indica un punto en frente del pecho], raca nisalu' ti cuadra zacari' [indica un camino derecho], ¿paraa nindou'? Guni' xcaadxi stale.

Toppling Blocks, Watch Condition, instructions (JCH)
Bizhuaa' rari'.
[Arregla los cubos]
Lu juego ndi' la, chigaca ti cosa ne lii chiniu ni gucaa.
Yanna la, biiya' dxini porti xixa zaca. ¿Ma la?
[Empieza la primera marcha]
Yanna la, guleza ti ratu huiini', ti chuunu lu sti lugar ca.
[Camina al otro lugar]
Guri rari'. Yanna la, gudxi naa xi biiyu'. [Escucha]
Bueno, guni' xcaadxi stale. [Escucha]
Bueno, yanna la, chi guninu ni sti viaje.
[Regresa al primer lugar. Arregla seguna construcción de cubos]
Bueno, chi guninu ni sti viaje. Biiya' dxini porti xixa zaca. Raca la, chiniu' ni guca, ngueca casi stobi que. ¿Nuulu listu la?
[Empieza la segunda marcha]
Yanna la, guleza ti ratu huiini', ti chuunu lu sti lugar ca.
[Camina al otro lugar]
Guri' raca. Yanna la, gudxi naa xi biiyu'.
[Escucha]
Bueno. Guni' xcaadxi stale.
Bueno, yanna la, chi guninu ni sti viaje.
[Regresa al primer lugar. Arregla seguna construcción de cubos]

Toppling Blocks, Touch Condition, instructions (JCH)
Bizhuaa' rari'   [El gringo arregla los cubos]
Juegu ndi' la, ma tuudxi adxeni. Yanna la, chi gunu ni lii. Chi gaca ti cosa ne lii chiniu ni gucaa.
Dxu' ca la, chu gului lii. Lii chi gu'nu ni igual. Biiya' dxini.
[El gringo enseña la marcha]
Chi gu'nu ni zaca. Bindaa ni modo bilui'be lii. ¿Ma la?
[Empieza la primera marcha]
Yanna la, guleza ti ratu huiini', ti chuunu lu sti mexa' ca.
[Camina al otro lugar]
Guri rari'. Yanna la, gudxi naa xi biiyu'.   [Escucha]
Bueno, guni' xcaadxi stale.   [Escucha]
Bueno, yanna la, chi guninu ni sti viaje.
[Regresa al primer lugar. Arregla seguna construcción de cubos]
Bueno, chi guninu ni sti viaje. Raca la, chiniu' ni guca, ngueca casi stobi que. ¿Nuulu listu la? Biiya' dxini.
[Empieza la segunda marcha]
Chi gu'nu ni zacá. Bindaa ni modo bilui'be lii.
Yanna la, guleza ti ratu huiini', ti chuunu lu sti mexa' ca.
[Camina al otro lugar]
Guri' raca. Yanna la, gudxi naa xi biiyu'.   [Escucha]
Bueno. Guni' xcaadxi stale.   [Escucha]
Bueno, yanna la, chi guninu ni sti viaje.   [Regresa al primer lugar]

Spatial Vocabulary Comprehension Task instructions (JCH)
Nuu chupa xiga napani caadxi cosa alrededor de laani. Chi tiidxe lii caadxi pregunta.
1. Guda'ná cubu ni nuu ladu bigá de xiga ni nuu lu mexa' ca.
2. ¿Xi color xiga ni nuu lu mexa' ca?
3. Guda'ná cubu ni nuu ladu derechu de xiga ni nuu lu mexa' ca.
4. ¿Xi modo cubu ndi'?
5. ¿Xi mani huiini' ni nuu ladu bigá de xiga ni nuu lu tapete ca?
6. ¿Xi color mani huiini' ndi'?
7. ¿Xi mani huiini' ni nuu ladu derechu de xiga ni nuu lu tapete ca?
8. Guda'ná cubu ni nuu ladu guiá de xiga ni nuu lu mexa' ca.
9. ¿Xi color xiga ni nuu lu mexa' ca?
10. Guda'ná cubu ni nuu ladu riaazi gubidxa de xiga ni nuu lu mexa' ca.
11. ¿Xi mani huiini' ni nuu ladu guete' de xiga ni nuu lu tapete ca?
12. ¿Xi color xiga ni nuu lu tapete ca?
13. ¿Xi mani huiini' ni nuu ladu rindani gubidxa de xiga ni nuu lu tapete ca?
14. ¿Guna mani huiini' ni nuu neza Tehuantepec?
15. Bilui' nálu naa ladu bigá.
16. Bilui' nálu naa ladu derechu.

17. Gudxi naa xi guidxi nuu zitu de Juchitán.

Bueno, chuudu sti ladu ca

18. Guda'ná cubu ni nuu ladu bigá de xiga ni nuu lu mexa' ca.
19. ¿Xi color xiga ni nuu lu mexa' ca?
20. Guda'ná cubu ni nuu ladu derechu de xiga ni nuu lu mexa' ca.
21. ¿Xi modo cubu ndi'?
22. ¿Xi mani huiini' ni nuu ladu bigá de xiga ni nuu lu tapete ca?
23. ¿Xi color mani huiini' ndi'?
24. ¿Xi mani huiini' ni nuu ladu derechu de xiga ni nuu lu tapete ca?
25. Bilui' ná cubu ni nuu ladu guete' de xiga ni nuu lu mexa' ca.
26. ¿Xi color xiga ni nuu lu mexa' ca?
27. Guda'ná cubu ni nuu ladu rindani gubidxa de xiga ni nuu lu mexa' ca.
28. ¿Xi mani huiini' ni nuu ladu guete' de xiga ni nuu lu tapete ca?
29. ¿Xi color xiga ni nuu lu tapete ca?
30. ¿Xi mani huiini' ni nuu ladu riaazi gubidxa de xiga ni nuu lu tapete ca?
31. ¿Guna mani huiini' nuu neza ziuunu nisa do'?
32. Bilui' nálu naa ladu bigá.
33. Bilui' nálu naa ladu derechu.
34. Gudxi naa xi guidxi guiidi Juchitán.

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