



Spatial frames of reference in Seri

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ABSTRACT

This paper describes spatial frames of reference (FoRs) preferences among speakers of Seri, a language isolate of Sonora, Mexico. Seri speakers have various options when it comes to FoR selection in discourse, but tend to favor object-centered and direct FoRs. There is also noticeable speaker variation in terms of FoR preferences, especially as it pertains to landmark-based FoRs, which are favored by only some speakers, and the scarce use of absolute FoRs, which seems to be determined by speaker age.

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1. Introduction

This paper presents preferences in spatial frames of reference (FoRs) use among speakers of Seri, a language isolate spoken in the northwestern part of Sonora, Mexico. FoRs are coordinate systems used in order to locate an object, the **figure**, with respect to a referential **ground**, where 'figure' is defined as the "moving or conceptually movable entity" and 'ground' the object "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). The data presented here focus on FoR preferences in discourse in both orientation and location descriptions and show that, in general, Seri speakers have various options when it comes to their FoR arsenal. In fact, Seri speakers used various types of FoRs, but the data suggest that they have a preference for FoRs that are centered on an object or a particular observer (object-centered and direct FoRs) and they do not favor FoRs where the **anchor** of the coordinate system – the feature or entity that serves as the basis or model for the FoR (Danziger, 2010, see also Levinson, 1996) – is an environmental gradient or feature, such as that exemplified by the cardinal directions in English (e.g., *The forest is north of the city*). Seri speakers also show some preferences for FoRs that are dependent on the viewpoint of the observer, in which the observer is the anchor of the coordinate system and the FoR highly depends on the orientation of the observer (relative FoRs). The data show that there is variation of FoR preferences between different speakers, especially as it pertains to FoRs where the anchor is a local landmark and the few uses of FoRs where the anchor is an environmental gradient, which in the case of Seri is wind directions.

These results are discussed in the context of the hypotheses of the Spatial Language and Cognition in Mesoamerica (Mes-oSpace) research project (NSF Award #BCS-0723694), especially as they pertain to Seri's role as one of two control languages considered in comparison to a sample of Mesoamerican languages that play the primary roles in this study. In particular, the

Abbreviations: ABS, absolutive; ART, article; AUX, auxiliary; DECL, declarative; DEF, definite; DEM, demonstrative; DEP, dependent; DETRANS, detransitivizer; DIR, direct; DP, distant past; FOC, focus; INDEF, indefinite; IRR, irrealis; LOC, locative; NEG, negative; NMLZ, nominalizer; OBJ, object; OBL, oblique; PL, plural; PLURAL, plural action; POSS, possessive; REAL, realis; RP, recent past; SBJ, subject; SG, singular; SR, switch reference; UNSPEC, unspecified.

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MesoSpace project has as one of its foci, investigating the relationship between conventionalized object-part naming systems (or meronymic systems) and a lack of preference for the relative FoR, which is an observer-centered FoR where the ground in the spatial representation is not the same as the anchor of the coordinate system (see O'Meara and Pérez Báez (2011) for more information on the MesoSpace hypotheses). Seri provides a baseline for the MesoSpace project, as it is a language that does not seem to use meronyms in as systematic of a way as some Mesoamerican languages, such as Zapotec languages (MacLaury, 1989; Lillehaugen, 2006; Pérez Báez, in press) or Tzeltal (Levinson, 1994). Additionally, Seri speakers do use relative FoRs (observer-centered), particularly in orientation descriptions.

This paper begins with a background on the Seri language and its speakers in Section 2. This section provides some additional information on the sociolinguistic situation in the Seri community where the data was collected. Section 3 presents background on FoR classifications. The theoretical framework that is used in the coding and analysis of the Seri data consists of a classification that contrasts six FoR types. Background information about the MesoSpace project and Seri's role as a control language in this project are also presented in Section 3. In Section 4, the methods used to collect data on FoRs are discussed. Section 5 contains the discussion of the Seri data on FoRs, including detailed descriptions of FoR preferences in locative descriptions and in orientation descriptions. The paper ends with Section 6, which contains a final discussion of the data along with concluding remarks.

2. The Seri language and the Seri people

The Seri language, which is locally known as *cmiiique iitom*, is a language isolate spoken in two small coastal villages in north-western Sonora, Mexico by the Seri people, known to themselves as *comcaac* 'Seri people', the plural of *cmiiique* 'Seri person'. The two Seri villages are *Haxöl lihom* 'El Desemboque (del Rio San Ignacio)' and *Socaaix* 'Punta Chueca'. As of 2007, there were around 900 speakers of Seri (Lewis, 2009). The two Seri villages are located along the coast of the Sea of Cortez northwest of Hermosillo, Sonora. The Seri territory lies north of the boundaries of the Mesoamerican cultural area, as defined by Campbell et al. (1986). The size of the Seri territory is around 211,000 hectares and includes around 100 km of coastline along the gulf. The Seri territory is particularly isolated and rural and there are not many roads within the territory. *Haxöl lihom* is located down an approximately 22 km dirt road that connects up with a highway that leads north to the small Mexican fishing village of Puerto Libertad, which traditionally belonged to the Seri territory (Marlett, ms., p. 36) and is known to the Seri people as *Xpanoháx* (lit. 'fresh water in the sea'). *Socaaix*, which was settled more recently than *Haxöl lihom*, is located around 45 miles to the south of *Haxöl lihom* and around 16 miles to the north of the Mexican fishing village and tourist town of Bahía de Kino (known to US tourists as Kino Bay), which was also traditionally part of the Seri territory. In addition to these two villages, the Seri people occasionally reside in temporary fishing camps during different times of the year (see Map 1).

The Seri people were traditionally sea turtle hunters and desert foragers. They lived a semi-nomadic lifestyle that revolved around the availability of natural resources, especially freshwater. The shift from a more nomadic way of life to a more sedentary way of life began in the early 20th century. Interestingly enough, after various attempts, the Seri were never converted to agriculturalists or horticulturalists by colonial forces. They currently participate and depend on, for the most part, a cash economy. Their livelihood consists of small-scale commercial fishing, the sale of arts and crafts, especially baskets and ironwood figures, as well as the sale of bighorn sheep hunting permits to outsiders. Given the picturesque location of the Seri villages and the rich biological diversity that exists in the Seri territory, there have been recent attempts at starting up ventures related to eco-tourism, but these efforts are relatively new and only time will tell if they will be a successful source of income for the Seri people or not and what type of impact it might have on the local environment.

The Seri language is, for the most part, head-final (Marlett, 2005, p. 54). This can be seen by the fact that main clauses in Seri, which are marked by verbal morphology that differs from that which marks dependent clauses, follow dependent clauses; verbs follow their complements; adpositions are postpositions, i.e., follow their complements; possessed noun phrases follow possessor noun phrases; and so on. Example (1) illustrates the order of main clause and dependent clause. Note that the verb form in the dependent clause contains a mood prefix that only occurs in dependent clauses. Verb forms also follow their dependents, as is also illustrated in (1), where the arguments precede the verbs in both the dependent and main (or independent) clause.

(1) Dependent clause

<i>Caay</i>	<i>cap</i>	<i>yeen</i>	<i>cap</i>
horse	DEF.ART.SG.stand	3.POSS.face	DEF.ART.SG.stand
<i>i-PO-CAAT</i>	<i>x,¹</i>		
3;3-IRR.DEP-Swing	UNSPEC.TIME		

Main clause

<i>anxö</i>	<i>ma</i>	<i>s-aaí</i>	<i>haa</i>	<i>hi.</i>
much	2.DIR.OBJ	IRR-make	SBJ.NMLZ.be	DECL

'That horse is going to injure you (lit. make you more) if it swings its head.' (Marlett, 2005, p. 55)

¹ This particle seems to indicate that the event described by the clause in which it appears, occurs at some unspecified time. This particle is used at the end of dependent clauses or in nominalized clauses (Moser and Marlett, 2005, p. 576).



Map 1. El Desemboque (del Rio San Ignacio), Sonora, Mexico.

Example (2) illustrates that the preferred order of constituents in locative descriptions in Seri is the noun phrase that refers to the figure, *ziix ano icoosi quih* 'the cup', followed by the noun phrase that refers to the ground, *hehe iti icoohitim com* 'the table', and then the verbal expression.

- | | | | |
|-----|---|----------------|--|
| (2) | <i>Ziix</i> | <i>ano</i> | <i>i-c-oosi</i> |
| | thing | 3.POSS.in | 3.POSS-UNSPEC.SBJ-OBL.NMLZ.DETRANS.drink |
| | <i>quih</i> | <i>hehe</i> | <i>i-ti</i> |
| | DEF.ART.SG.UNSPEC | wood | 3.POSS-on |
| | <i>i-c-oohitim</i> | <i>com</i> | |
| | 3.POSS-UNSPEC.SBJ-OBL.NMLZ.DETRANS.eat.PLURAL | DEF.ART.SG.lie | |
| | <i>i-ti</i> | <i>y-iij.</i> | |
| | 3.POSS-on | DP-sit | |
| | 'The cup is on the table.' (AIM BowPed_1) | | |

Seri is verb-final, which makes it different from most Mesoamerican languages (Campbell et al., 1986). There are other features of Seri that are atypical of Mesoamerican languages, such as the fact that Seri has switch reference, there are no numeral classifiers, there is no noun incorporation and many of the semantic calques reported as common across the Mesoamerican linguistic area do not seem to apply to Seri (Campbell et al., 1986).

Some verbs in Seri co-occur with lexical items that appear to be postpositions, but the postposition-like items occur close to the verb form and at times, their complement can occur non-contiguously. These have been described as something like relational preverbs by Marlett (ms., pp. 803–805). This is of particular relevance to orientation descriptions of the chair in the B&C task. To illustrate the point that these relational preverbs cannot be separated from the verb they occur with, but can be separated from their complement, Marlett's examples are cited in (3) and (4).

Table 1Literacy information from the population of *Haxöl lihom* 'El Desemboque' from 2005 census (see footnote 5).

Population of 8–14 yrs old that does not know how to read or write	1
Population of 15 yrs and older that does not know how to read or write	15

- (3) [Hi-trooqui quij]_{DP} [hasaaiti coozlil quih]_{DP}
 1.POSS-vehicle DEF.ART.SG.Sit lubricating.oil DEF.ART.SG.UNSPEC
 [ano h-s-ah-aama]_{VP} aha.
 3.POSS.in 1.SG.SBJ-IRR-CAUS-trickle AUX.DECL
 'I am going to put oil in my car.' (Marlett, ms., p. 187)
- (4) *Hitrooqui quij ano hasaaiti coozlil quih ano hsahaama aha.

As a result of the status of these relational preverbs, verb roots as they occur in combination with postpositions (or relational preverbs) as a unit, such as a verbal expression, are presented here.

2.1. Sociolinguistic overview

Seri is considered to be a fairly vibrant language (Marlett, 2008). The majority of people living in the Seri villages speak Seri on a regular basis, including both children and adults. According to the 2005 census data,² there is a total population of 253 people living in *Haxöl lihom* 'El Desemboque'³ and, of the population above 5 years of age, 201 are native speakers of an indigenous language, Seri being the only indigenous language spoken in the village. Additionally, 246 of the inhabitants reside in a home where the head of the household is a speaker of an indigenous language. Some aspects of daily Seri life are conducted in Spanish, namely, schooling at the Mexican schools and business with outsiders (e.g., dealing with Mexican fish buyers or dealing with government officials). In my opinion, television, which has been much more prevalent in the last 8–10 years after the villages were electrified, has a strong influence on children and their exposure to Spanish. According to the 2005 census data,⁴ of the 63 homes reported to be in *Haxöl lihom* 'El Desemboque', 36 have televisions. Children who live in households with television, from my observation, tend to spend a fair amount of time watching television and at times playing in Spanish with other Seri children. If television were less common, children would have less exposure to Spanish.

Literacy in Seri is nearly non-existent. Part of this likely has to do with the fact that there is not a long written tradition in Seri. Additionally, there was until recently no standardized orthography in print, but this has changed with the publication of the trilingual Seri–Spanish–English dictionary (Moser and Marlett, 2005). On the other hand, most Seri people are literate in Spanish, their second language, as is shown in Table 1. However, there are certainly some Seri people, particularly more elderly community members who do not speak very much Spanish and are illiterate in Spanish, although many have a passive understanding of Spanish. Certainly the levels of literacy correlate with age and school attendance rates.

In the Seri villages there is a pre-school, an elementary school (grades 1–6) and a middle school (grades 7–9). If children wish to attend high school (a college preparatory school) or any further schooling, they must leave the village and go to a nearby Mexican town to do so, such as Puerto Libertad or Kino Bay. This option is not something available to all children since it is onerous for families to house their children in another town during the week and to transport them back and forth to the Seri village when they have breaks from school, in addition to paying the cost of books and other school supplies. Some information regarding formal schooling in the village of *Haxöl lihom* 'El Desemboque' is provided in Table 2.

Note that, of the younger generation, most children attend school. There is a small contingent of adults who did not pass any grades in elementary school. This likely corresponds to the older generation of Seri people who did not have the opportunity to attend school because there was no school in the village when they were younger.

3. Spatial frames of reference

As mentioned above, FoRs are coordinate systems used to locate an object with respect to a referential ground. Such coordinate systems partition the space beyond the ground object such that the addressee of a given utterance can locate a particular figure object. There have been various propositions by linguists and psychologists on how to best classify the types of FoRs that are available cross-linguistically. This section presents an overview of previously proposed types of FoRs and the FoR classification that is used to describe the Seri data presented here.

² http://www.inegi.org.mx/sistemas/consulta_resultados/default.aspx?c=10395&s=est, last accessed on July 5, 2010.

³ Only demographic information from *Haxöl lihom* is presented here since that is where the Seri data was collected. It is likely the case that the sociolinguistic information presented here is not too different from that of *Socaaix* 'Punta Chueca', the other Seri village.

⁴ http://www.inegi.org.mx/sistemas/consulta_resultados/default.aspx?c=10395&s=est, last accessed on July 5, 2010.

Table 2Some schooling information from the population of *Haxöl lihom* 'El Desemboque' from 2005 census (see footnote 5).

Population of 5 yrs old that do not go to school	1
Population of 6–11 yrs old that do not go to school	3
Population of 6–14 yrs old that do not go to school	7
Population of 15–24 yrs old that go to school	9
Population of 15 yrs and older who have not passed any years of elementary school	36
Population of 15 yrs and older who have passed at least one grade past middle school	6

This study uses a six-way classification of FoRs to code and analyze the Seri data. This classification is derived from Levinson's three-way FoR classification (1996, 2003). Levinson's FoR classification has been used to describe FoR preferences within and across various languages as part of the research conducted by the Language and Cognition Group at the Max Planck Institute for Psycholinguistics in Nijmegen. The three types of FoRs that are used in this classification are absolute, intrinsic and relative. The approximate meaning of these terms following Levinson and colleagues is presented here (Levinson, 1996, 2003; Pederson et al., 1998; Majid et al., 2004).

Three-way FoR classification:

- *Absolute* FoRs are coordinate systems whose bearings are fixed and generally involve an environmental gradient or feature that is constant as the anchor, such as the places in the horizon where the sun rises and sets. The following is an example of an English utterance involving an absolute FoR: *My house is south of the city*.
- *Intrinsic* FoRs involve coordinate systems that are based on the inherent facets or parts of a ground object, as in the English example *Pete's bike is parked in front of the house*. English speakers know that conventionally the front of the house is the side that has a front door and/or is facing the street. In other words, the assignment of front does not come from the orientation or location of the speaker, but rather the conventionalized parts or facets of the ground object.
- *Relative* FoRs involve a coordinate system that is dependent upon the perspective of a viewpoint, which generally comes from the observer. This type of FoR is frequently used by speakers of English in descriptions of locations of objects in small-scale space (but can also be used in large-scale space), as in, for example *The plate is to my right*.

Taking this three-way classification as a point of departure, as well as the direct FoR, which results in a four-frame matrix that distinguishes FoRs where the ground and anchor are the same entity from FoRs where the anchor is an external third entity (Danziger, 2010), a six-way FoR classification was developed by the MesoSpace project. In this classification, distinctions are made between FoR types in which the anchor is the same as the observer, as in observer-based FoR types such as direct and relative FoRs. To further explain the six-way distinction between FoR types, the following section provides information on each FoR type in detail.

- *Object-centered* FoRs involve a coordinate system where the anchor of the coordinate system is the same as the ground object, but where the ground is distinct from the observer. The axes of the ground object serve as the basis for the axes of the coordinate system. For instance, inherent parts or facets of the ground object serve as the basis for the projection of the FoR's axes, as in the example of *The ball is in front of/behind the chair*.
- *Relative* FoRs are anchored to the body of the observer, in that the anchor is the (body of the) observer and the ground in the spatial representation is different from the observer. The axes of the coordinate system are projected from the axes of the body of the observer onto the ground object. Examples of such an FoR type include: *The ball is to the right of the chair* or *The chair is facing my right*.
- *Direct* FoRs are anchored to the body of an observer (which, in linguistic representations, is typically, but not necessarily, the speaker and/or addressee). In this FoR type unlike the relative FoR there is no projection of the observer's body axes onto an external ground (or figure in the case of orientation descriptions), as in *The ball is in front of you/me/us*. Direct FoRs can also be involved in descriptions where the anchor is distinct from the ground of the spatial representation, but where the anchor of the coordinate system is the observer's body (or the observers' bodies), such as in *The ball is toward me (from the chair)* where a ground or reference point that is distinct from the anchor must be understood even if it is not explicitly mentioned. In this case the reference frame is based on an axis that is not projected from the anchor, but rather points toward it. This definition differs from that found in Danziger (2010).
- *Absolute* FoRs involve a coordinate system where the anchor is distinct from the ground and is some gradient or feature in the environment. The axes of the coordinate system are abstracted from the environmental feature or gradient, as in, for example *The ball is north of the chair*. In this case, even though the place where the sun rises and sets shifts throughout the course of the year, the direction which is meant by *north* in English is fixed and does not change, since the coordinate system is abstracted from the four cardinal directions.
- *Landmark-based* FoRs involve an anchor that is different from the ground and the anchor, in this case, is a landmark, which can mean a local landmark such as a church, a building or even a window in a house or it could be a more distant landmark such as a nearby town or mountain. The axes of the coordinate system are vectors that point toward the landmark, as in *The chair is facing toward Punta Chueca* or *The ball is on the church side of the chair*.

- *Geomorphic* FoRs involve an anchor that is different from the ground and in this case, the anchor is an environmental gradient or feature. The axes of the coordinate system are projected from the axes of the environmental gradient or feature onto the ground object. For instance, if a river is the environmental feature, the axes of the flow of water of a river can serve as the basis for the FoR's coordinate system, which are then projected onto the ground, as in *The ball is downstream of the chair*.

Note that the absolute FoR type has a different scope from how it was previously presented in [Levinson's three-way FoR classification \(1996, 2003\)](#). The absolute FoR is more narrowly defined and excludes the landmark-based and geomorphic FoRs. This is significant in that the absolute type involves abstraction from an environmental gradient or feature. As such, if you were to take a speaker of a language that has strong preferences for absolute FoRs in discourse from the village where the language is generally spoken and have them describe the location of objects nearby, they would still use the absolute FoR, regardless of the actual location of the anchor of the absolute FoR. In other words, the absolute FoR is not dependent upon the orientation of the observer, nor upon the orientation of the ground and the coordinate system is fixed, which is not the case for landmark-based FoRs, for instance. For more information see [O'Meara and Pérez Báez \(2011\)](#).

In addition to the FoR types mentioned above, the Seri data was coded to indicate whether the utterances used to complete the B&C task involved topological descriptions and absolute FoRs in the vertical plane, as opposed to absolute FoRs in the horizontal plane, which is what we are primarily concerned with when we discuss absolute FoRs. Absolute FoRs involving the vertical plane, which is referred to as the vertical FoR, generally involve some notion of gravitational force, for instance *The ball is above the chair*. So far, there is no evidence for the cross-linguistic variability of the absolute FoR in the vertical dimension, although there is evidence of cross-linguistic variation when it comes to the absolute FoR in the horizontal dimension. Consequently, since neither topological descriptions, nor descriptions involving an absolute FoR in the vertical plane are relevant to the debate on FoR preferences in discourse and in non-linguistic usages, they are not further discussed here. Nevertheless, the Seri data was coded for these notions as well.

4. Methods, data collection and coding

MesoSpace researchers designed, piloted and ran a referential communication task to investigate FoR preferences observable in discourse. This task is called Ball and Chair (B&C). The results presented in this paper in Section 5 come from the data collected from this task. The MesoSpace team also piloted and ran an updated version of Animals In A Row (AIAR), a recall memory task that was originally designed by members of the Language and Cognition Group at the Max Planck Institute for Psycholinguistics ([Levinson and Schmitt, 1993](#); see also [Levinson \(1996\)](#) and [Pederson et al. \(1998\)](#) for a discussion and results from AIAR) to look at non-linguistic FoR coding in recall memory. MesoSpace's updated version of AIAR is called New Animals (NA) ([Bohnenmeyer, 2008](#)). This task attempts to collect data that can address the debate on alignments of FoR preferences in language and cognition ([Li and Gleitman, 2002](#); [Majid et al., 2004](#); [Li et al., 2005](#)). While this task was run with Seri speakers, the data is not conclusive and consequently, FoR preferences in recall memory will not be discussed further here. For more information on the methods of the NA task see [Bohnenmeyer \(2008\)](#) and [O'Meara and Pérez Báez \(2011\)](#).

An important component of the MesoSpace project is the investigation into the possible connection between the prevalence of productive meronym (or object part naming) systems in Mesoamerican languages and the dispreference for the relative FoR (see [Bohnenmeyer \(2008\)](#) and [O'Meara and Pérez Báez \(2011\)](#), for a more detailed discussion of this hypothesis). Data from Juchitán Zapotec ([Pérez Báez, 2011](#)) shows an example of a language with a productive meronymic system that disprefers relative FoRs and in fact, disprefers observer-based FoRs in general. This dispreference for observer-based FoRs is further confirmed in the Juchitán Zapotec results from the NA task.

The Seri language is, however, not part of the Mesoamerican *sprachbund* ([Campbell et al., 1986](#)). Seri culture is very different from that of Mesoamerican communities and the language is not genetically related to any Mesoamerican language (see Section 2 for more information on the Seri language). As such, Seri serves as a control language within the MesoSpace project along with Sumu/Mayangna, which is spoken at the southern border of the Mesoamerican cultural area in Nicaragua.

Seri speakers use meronyms (or spatial relational nouns that name object parts or spatial regions) quite commonly in everyday discourse, however, unlike what has been reported for many Mesoamerican languages ([Levinson, 1996](#); [MacLaury, 1989](#); [Pérez Báez, in press](#); [Pérez Báez, 2011](#)), based on the data collected so far in Seri there does not seem to be a productive process for labeling entities with meronyms. For instance, it has been proposed that Tzeltal speakers use a geometric algorithm for naming object parts that involves properties of visual object recognition ([Levinson, 1996](#)). [MacLaury \(1989\)](#), on the other hand, has described object part naming in Ayoquesco Zapotec to be based on global analogical mapping from the human body to object parts.⁵ The fact that Seri does not exhibit this type of productive object part naming as in Tzeltal and Ayoquesco Zapotec makes the role that Seri plays in the MesoSpace project as a control language all the more relevant: given that Seri does not seem to have a productive meronymic system, it would be expected that Seri speakers would not exhibit a bias against relative or observer-based FoRs. FoR preferences in Seri discourse are discussed in detail in Section 5.

As mentioned earlier, the data on FoR preferences in discourse was collected using a set of stimuli called the B&C pictures used in a referential communication task ([Bohnenmeyer, 2008](#)). This task was developed as part of the MesoSpace project in

⁵ Part of the MesoSpace project is to collect further data to investigate the mechanisms behind such productive meronymic systems.

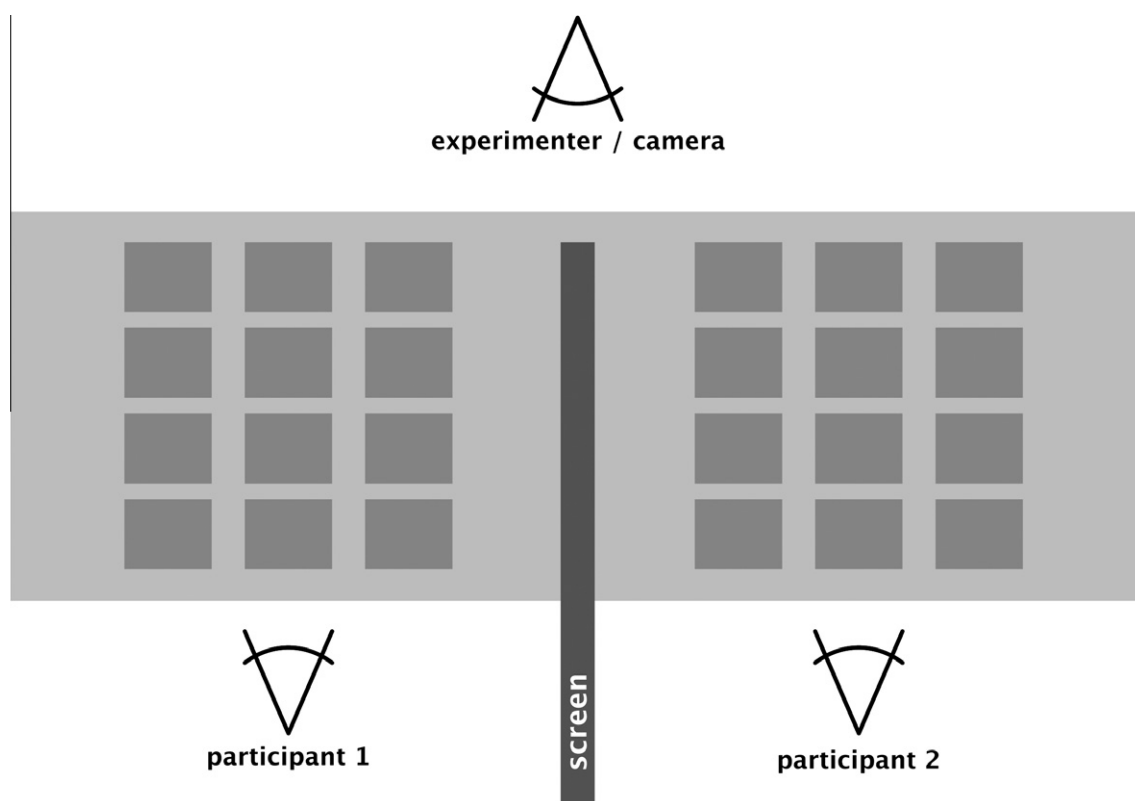


Fig. 1. Set up for Ball and Chair task with table that has a barrier between the two native speakers.

order to improve upon the Men & Tree matching game (M&T) that was designed by Eve Danziger and Eric Pederson of the Cognitive Anthropology Research Group at the Max Planck Institute for Psycholinguistics (Danziger, 1992).⁶ Both B&C and M&T are referential communication tasks involving photo-to-photo matching. These tasks are run with two native speakers of a language looking at a set of the same stimuli, which is in both cases sets of color photographs, but the two speakers are seated at a table or on the ground facing the same direction with a barrier between them that prevents each of them from seeing the other speaker. In both tasks there are a total of four sets of 12 photos each, one complete packet of all four sets of photos for each native speaker consultant. The photographs in M&T featured, not surprisingly given the name, a toy man and a toy tree (as well as some distracter photographs that featured toy men and toy pigs). The design of M&T was such that the toy tree was intended to be the ground and the toy man was intended to be the figure in descriptions of the photographs. However, the toy man proved to be a much more salient ground for some speakers, as the toy man has an inherent front, back and sides. That was one of the design changes made during the creation of the B&C photographs. In particular, a ball was chosen as the intended figure and a chair was chosen as the intended ground, following, for example, Talmy's notions for what constitute salient figure and ground objects (2000). Unlike the M&T pictures, the B&C pictures feature actual objects, as opposed to toy representations of entities. This reduced the level of complexity of the stimulus by a factor of one and based on my observations, speakers referred to the objects in the B&C pictures more like real objects, whereas they used names for the toy man in the M&T pictures that indicated it was a toy that they were describing.

The procedure used for the B&C referential communication task is as follows. Two native speaker consultants of Seri were selected. Since most Seri households have tables, the two consultants were asked to sit side-by-side (facing the same direction) at the table in the house (or outside of the house, usually in a covered area) where we were working and then a screen was set up on the table between the two of them such that they could not see each other or the space of the table in front of the other person. This set up is roughly illustrated in Fig. 1. The two speakers are separated by the barrier so that they cannot rely on gesture in order to solve the task and in general, in order to push the limits of description of the different configurations of the ball and chair. The 12 photographs of the first set were dealt out in front of one of the speakers in semi-random order and then 12 photographs from the first set in front of the other speaker in semi-random order, making sure they do not have the photos in the same order.

⁶ As part of my dissertation research (see O'Meara, 2010), data on Seri FoR preferences was collected using M&T, but as part of the MesoSpace project more data was collected using B&C so that the Seri data could be compared across the project's language sample. The data reported on here come from B&C.

Instructions to the task were provided in Seri to the two native speaker consultants following the guidelines in the MesoSpace field manual (Bohnenmeyer, 2008, p. 31). The consultants decided among themselves who would play the role of director, the one who chooses photographs and describes them to the other one, and of the matcher, the one who picks out the photograph that the director is describing. If the native speaker consultants so desired (which was generally the case), they switched their roles as director and matcher with each set of photographs. During the course of the task, the director was instructed to put coins or pebbles on the photographs as they were matched. At the end of describing each set, speakers could then discuss among themselves the photos that caused them problems, if any such difficulties arose.

During the course of the tasks, all sessions were audio recorded; they were also videotaped whenever speakers allowed. In addition, notes were taken in a notepad of photographs as they were matched by consultants during the course of the “game” and the photo number was recorded in the audio recording by saying it out loud. Once the sessions were recorded, they were transcribed and translated with the assistance of a native speaker consultant.

Once the data was transcribed and translated, it was then coded using the coding sheet that was developed as part of the MesoSpace project by the project's principal investigator, Jürgen Bohnemeyer. Using the coding sheet and the revised FoR classification, which was presented in Section 3, FoR types that occurred in descriptions that specified the location of the ball with respect to the chair were coded, as well as the FoR types that occurred in descriptions of the orientation of the chair, in addition to some other types of spatial description that are not discussed here. Only descriptions that were provided by the director were coded and any clarification questions or statements provided by the matcher were excluded. Utterances that contained negative verb forms were also excluded.

To provide an overview of the native speaker consultants who participated in the B&C task, Table 3 provides some information about gender and age of the dyads.

5. Results from the B&C task: frames of reference in Seri discourse

This section presents the results from the B&C task. The first subsection focuses on locative descriptions involving FoRs used to describe the location of the ball. The second subsection focuses on orientation descriptions involving FoRs used to describe the orientation of the chair. The data presented here are the result of work with 10 native speakers of Seri or five dyads of speakers. The dyads of native speakers that participated in the B&C task range from the following characteristics: 2 females – 30s, 50s; 2 females – 30s, 40s; 2 females – 30s, 40s; 1 female and 1 male – teens, 40s; 1 female and 1 male – 60s, 20s.

5.1. Frames of reference in locative descriptions

This section presents the ways in which Seri speakers described the location of the ball with respect to the chair while completing the B&C task. Locative descriptions in Seri generally involve a noun phrase that contains the nominal expression that refers to the figure object, a postpositional phrase that contains the nominal expression that refers to the ground object, and a verb that describes the position or disposition of the figure object (see O'Meara (2008) and O'Meara (2010) for more information on locative constructions in Seri). The locative description in (5) shows a structure such as the one just described, which includes the noun phrase that contains the figure denoting nominal, *cmaacoj cop* ‘the old man’, followed by the noun phrase that contains the ground denoting nominal *haaco cap isxap hac* ‘the roof of the house’, the postposition *iti* ‘on it’ and finally a finite form of the positional verb *-ap* ‘stand’.

(5)	[<i>Cmaacoj</i> old.man <i>isxap</i> 3.POSS.top.of.head ‘The man is standing on the roof of the house.’ (GHF BowPed 34)	<i>cap</i> _{figure phrase} DEF.ART.SG.stand <i>hac</i> _{ground phrase} DEF.ART.SG.LOC	[<i>ha-aco</i> ABS.POSS-house <i>i-ti</i> 3.POSS-on	<i>cap</i> DEF.ART.SG.stand <i>y-oop</i> DP-stand
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As is shown in (5), in order to refer to specific parts of objects, Seri speakers use spatial relational nouns in the ground phrases, such as *-sxap* ‘top of the head’. However, as already mentioned, there does not appear to be an algorithmic application of labels to object parts as has been, for example, described for Tzeltal (Levinson, 1996) or analogy following what has been described for Ayoquesco Zapotec (MacLaury, 1989) or Juchitán Zapotec (Pérez Báez, in press).

As can be seen in Table 4, when completing the B&C task Seri speakers most frequently used propositions regarding the location of the ball with respect to the chair by using an object-centered FoR, which involves reference to spatial regions projected from intrinsic parts of the ground object, namely, the chair. This type of FoR was used 14% of the time.

For instance, in (6) the speaker indicates that the ball is behind the chair, or more literally in this case, that the ball is in the (area projected from the) back side of the chair. The spatial relational noun *-pac* ‘back’ can refer to the back of a person or inanimate object, as well as the area projected from the back of a person or object.

Table 3
Information about consultants who participated in the B&C task.

Dyad	Gender	Age
1	F	30s
	F	60s
2	M	50s
	F	Teens
3	F	50s
	M	20s
4	F	40s
	F	30s
5	F	40s
	F	30s

- (6) *Hehe* *i-ti* *iquicolim*
 wood 3.POSS-on 3.POSS.UNSPEC.SBJ.OBL.NMLZ.SIT.PLURAL
quij *hi-nol* *aapjoj* *iicp* *hac*
 DEF.ART.SG.SIT 1.POSS-hand enormous.PL 3.POSS.side DEF.ART.SG.LOC
iiqui *t-iizc* *ma,* ***ipac*** ***iicp***
 3.POSS.toward REAL.DEP-face SR 3.POSS.back 3.POSS.side
hac *ah* *iic* *y-ij,*
 DEF.ART.SG.LOC FOC 3.POSS.side DP.SIT
ziix *c-oqueht* *quij.*
 thing SBJ.NMLZ-bounce DEF.ART.SG.SIT
 'The chair (lit. wood on which one sits) is facing our right, the ball (lit. thing that bounces) is **behind it** [the chair].' (AIM B&C 3–11, see Fig. 2)

In a similar manner, when describing the location of the ball with respect to the chair, Seri speakers used the spatial relational noun *-izc* 'front' to refer to the spatial region projected from the front part of the chair. Note that this noun can also be used to refer to a person's face or the front of a person's body. An example of this noun used to refer to the spatial region projected from the front of an object is provided in (7). The FoR involved here is, as in (6), object-centered.

- (7) *Hehe* *i-ti* *iquicolim* *quij*
 wood 3.POSS-on 3.POSS.UNSPEC.SBJ.OBL.NMLZ.SIT.PLURAL DEF.ART.SG.SIT
iiqui *t-ooipj* *ma, i-tooit* *coi*
 3.POSS.through REAL.DEP-perpendicular SR 3.POSS-foot.PL DEF.ART.PL
i-hiin *taax ah ziix* *c-oqueht* *quij* *ano*
 3.POSS-near DEM FOC thing SBJ.NMLZ-bounce DEF.ART.SG.SIT 3.POSS.in
y-ij, iicp ***iicp*** ***hac*** *iic* *y-ij.*
 DP-SIT 3.POSS.front 3.POSS.side DEF.ART.SG.LOC 3.POSS.side DP-SIT
 'The chair is perpendicular, the ball is a little bit **in front** of the chair, between its legs.
 (AIM B&C 4–8, see Fig. 3)

Table 4
Types of FoRs used across subjects in propositions of the location of the ball with respect to the chair.

FoR	Dyad 1	Dyad 2	Dyad 3	Dyad 4	Dyad 5	Total	%
Non-projective							
Topological	25	20	20	40	37	142	47
Projective							
Object-centered	11	7	14	3	7	42	14
Direct	1	1	2	3	1	8	3
Absolute	0	1	1	0	0	2	1
Vertical	3	8	8	9	12	40	13
Landmark	0	11	2	15	1	29	10
Geomorphic	0	0	0	0	0	0	0
Relative	6	0	10	4	7	27	9
No description of ground or uncoded	6	2	1	1	0	10	3
Total	52	50	58	75	65	300	100



Fig. 2. B&C 3–11.



Fig. 3. B&C 4–8.



Fig. 4. B&C 4–9.



Fig. 7. B&C 2–10.

Note that the utterance in (8) also contains information regarding the orientation of the chair, namely with the verb phrase *Hehe iti iquicolim quij Socaaix iicp hac, Hezitim quih iicp hac iiqui tiizc...* 'The chair is facing Punta Chueca and the city...', which involves a landmark-based FoR. In Seri, as is discussed in Section 5.2, speakers frequently used different strategies for describing the orientation of the chair as opposed to the location of the ball in the B&C task.

Seri speakers also used ad hoc landmarks in descriptions of the location of the ball with respect to the chair in the B&C task. This was the second most common FoR type used and was used 10% of the time, as is shown in Table 4. These types of descriptions involve landmark-based FoRs. Seri speakers used a variety of landmarks in such descriptions. These landmarks vary, but include ad hoc landmarks that are immediately available in a given discourse context, such as *iglesia cop* 'the church' in (9) and *tia Auralia quih yaaco quih* 'Aunt Auralia's house' in (10).

- (9)
- | | | | | |
|-------------------|--------------------|-------------------|-------------|-----------------------|
| ...ziix | <i>c-oqueht</i> | <i>quij</i> | <i>hant</i> | <i>com</i> |
| thing | SBJ.NMLZ-bounce | DEF.ART.SG.Sit | land | DEF.ART.SG.lie |
| <i>i-ti</i> | <i>t-ijj ma,</i> | <i>haco</i> | <i>mos</i> | <i>iglesia</i> |
| 3.POSS-on | REAL.DEF-sit SR | already | again | church |
| <i>cop</i> | <i>iicp</i> | <i>hac</i> | <i>iicp</i> | |
| DEF.ART.SG.stand | 3.POSS.side | DEF.ART.SG.LOC | 3.POSS.side | |
| <i>t-ijj...</i> | | | | |
| REAL.DEF-sit | | | | |
- '...the ball (lit. thing that bounces) is on the ground, again, it is on **the side of the church...**' (OPT B&C 2–12, see Fig. 5)
- (10)
- | | | | | | |
|---------------------|--------------------|---------------------------|-------------------|-----------------------|--------------------|
| ...ziix | <i>c-oqueht</i> | <i>quij</i> | <i>tia</i> | <i>Auralia</i> | <i>quih</i> |
| thing | SBJ.NMLZ-bounce | DEF.ART.SG.Sit | aunt | Auralia | DEF.ART.SG.UNSPEC |
| <i>yaaco</i> | <i>quih</i> | <i>iicp</i> | <i>hac</i> | | |
| 3.POSS.house | DEF.ART.SG.UNSPEC | 3.POSS.side | DEF.ART.SG.LOC | | |
| <i>iiqui</i> | <i>t-iizc</i> | <i>ma...</i> ⁷ | | | |
| 3.POSS.toward | REAL.DEF-face | SR | | | |
- '...the ball is facing (**toward the side of**) **Aunt Auralia's house...**' (OPT B&C 3–2, see Fig. 6)

In addition to the more local ad hoc landmarks discussed above, Seri speakers regularly use geographic landmarks in locative descriptions. These landmarks include names of villages or towns located nearby or more general geographic features in the area, such as the ocean or the desert. In (11), the landmark that is used is the village *Xpanohax* 'Puerto Libertad', which is located north of *Haxöl lihom* 'El Desemboque', where the sentence in the following example was uttered.

⁷ Note that the speaker here indicated that the ball is facing Aunt Auralia's house. In general, speakers did not indicate that the ball was facing a particular direction since it does not have a clear front or back. Instead, they said it was sitting on the side of X, where X is a landmark. However, this speaker and the speaker that served as the matcher in the task found this description of the location of the ball suitable.



Fig. 8. B&C 4–11.

- (11) *Hehe* *iti* *iquicolim* *quij* *hant*
 wood 3.POSS-ON 3.POSS.UNSPEC.SBJ.OBL.NMLZ.SIT.PLURAL DEF.ART.SG.SIT land
t-iiij *ma,* *Xpanohax* *i-icp* *hac* *iicp*
 REAL.DEF-SIT SR Puerto.Libertad 3.POSS-side DEF.ART.SG.LOC 3.POSS.side
t-iiij...
 REAL.DEF-SIT

'The chair is in its normal position (sitting) and [the ball] is on **the side of Puerto Libertad**...' (OPT B&C 2–10, see Fig. 7)

Similarly, Seri speakers use the city of Hermosillo (by referring to it as *Hezitim*, which is actually a more general term for settlement or city) as a coordinate in a landmark-based FoR, as is illustrated in (12). Hermosillo is located southeast of *Haxöl lihom* 'El Desemboque'.

- (12) *...ziix* *c-oqueht* *quij* *haptco* *mos* *me* *miicp*
 thing SBJ.NMLZ-bounce DEF.ART.SG.SIT yet again 2 2.POSS.side
hac *iic* *qu-iiij* *iha, Hezitim* *quih*
 DEF.ART.SG.LOC 3.POSS.side SBJ.NMLZ-SIT DECL settlement DEF.ART.SG.UNSPEC
iicp *hac* *iic* *qu-iiij* *iha...*
 3.POSS.side DEF.ART.SG.LOC 3.POSS.side SBJ.NMLZ-SIT DECL

'...the ball, again, is on your side, it is on **the side of the city [Hermosillo]**...' (OPT B&C 4–11, see Fig. 8)

One axis that seems to play a significant role for Seri speakers is the seaward vs. desertward axis (*xepe com iicp hac* vs. *heen iicp hac*). This axis, at least in the cases of speakers who are located in *Haxöl lihom* 'El Desemboque', is complemented by the axis that corresponds to upshore and downshore, which is indicated by the towns located upshore and downshore of *Haxöl lihom* 'El Desemboque', namely *Xpanohax* 'Puerto Libertad' and *Socaaix* 'Punta Chueca'. This axis of seaward and desertward was not utilized very frequently in responses to the B&C task that describe the location of the ball with respect to the chair. However, utterances involving this axis occurred in route descriptions and descriptions of the location of geographic features in the Seri territory, an example of which is provided in (13).

- (13) *...xepe* *com* *iicp* *hac* *iic* *c-aahca*
 sea DEF.ART.SG.lie 3.POSS.side DEF.ART.SG.LOC 3.POSS.by SBJ.NMLZ-be.LOC
hac *taax* *hax* *z* *an*
 DEF.ART.SG.LOC DEM freshwater INDEF.ART 3.POSS.in
i-m-iih *hi.*
 OBL.NMLZ-NEG-be.LOC DECL
 '...it is on **the side of the sea**, that one [well] does not have water in it.'
 (GHF 7/26/06 2 3)⁸

⁸ This example is not from the discourse resulting from the M&T task or the B&C task, but rather was taken from a description of where a person can find fresh water near *Haxöl lihom* 'El Desemboque'.



Fig. 10. B&C 3–9.

- (15) *Mos* *tiix* *hant* *cō-i-h-iiij* *iha,* *xo* *cmaax* *ziix*
 again DEM land 3.OBL-3.POSS-OBL.NMLZ-sit DECL but now thing
c-oqueht *quij* ***yeen*** ***iicp*** ***hac***
 SBJ.NMLZ-bounce DEF.ART.SG.Sit 3.POSS.face 3.POSS.side DEF.ART.SG.LOC
i-ti *y-iiij.*
 3.POSS-on DP-sit
 'Again, the chair is in the position as the other one, but the ball is **in front of** the chair.' (MLA B&C 3–9, see Fig. 10)

In describing the location of the ball with respect to the chair, Seri speakers also provided utterances that involved a direct FoR. However, instances of propositions involving direct FoRs in this context were limited to around 3% of the total responses regarding the location of the ball with respect to the chair. As a reminder, a direct FoR involves a coordinate system that is anchored to an observer's body, but is not projected from it onto a distinct ground. In (16) the ball is described as being on 'my side', the side of the chair that is closest to the speaker.



Fig. 11. B&C 3–10.

- (16) ...*cm̥aax* *ziix* *c-oqueht* *quij*
 now thing SBJ.NMLZ-bounce DEF.ART.SG.Sit
hiicp *hac* *ah* *iic* *m-iij.*
 1.POSS.Side DEF.ART.SG.LOC FOC 3.POSS.side RP-Sit
 '...and now the ball (lit. thing that bounces) is **on my side**.' (AIM B&C 3–10, see Fig. 11)

There is a more substantial discussion of the direct FoR in the next section, as it plays a more significant role in descriptions of the orientation of the chair.

Similarly, there were only two instances of an absolute FoR used to describe the location of the ball with respect to the chair—one description each from two separate dyads. This FoR was not preferred in this context and in general, as is discussed in more detail in the following section, absolute FoRs seem to be specific to older speakers.

5.2. Frames of reference in orientation descriptions

This section focuses on FoRs used in descriptions of the orientation of the chair in the B&C task. In order for speakers to more accurately provide information regarding the location of the ball with respect to the chair, describing the orientation of the chair is crucial, especially given the contrasts in the way that the chair is oriented in the B&C photos. All, if not almost all, descriptions of a new photo during the task began with a description of the orientation of the chair, followed by a description of where the ball was with respect to the chair.

Seri speakers relied heavily on direct FoRs in order to describe the orientation of the chair. In fact, of the proposition types used to indicate the orientation of the chair in the B&C task that involved one of the six FoR types in the fine-grained classification, the direct FoR was the most frequent and by a striking amount, consisting of 42% of the total instances of propositions involving the orientation of the chair, as is illustrated in Table 6.

In particular, Seri speakers indicated whether the front of the chair was facing them or had its back toward them. In both cases the observer serves as both the anchor of the coordinate system and the ground. The case of the chair facing the observer can best be described as involving a vector extending from the front part of the chair to the observer. An example of this type of description is provided in (17). Descriptions of orientation can involve the verbal expression *-iqui -iizc* 'facing toward', which involves a relational preverb, *-iqui*, which means something like 'on a straight line with respect to X', where 'X' is an entity referred to by the possessive prefix that occurs with *-iqui*. However, for lack of a better single-word gloss in English, the gloss 'toward' is used. The verb root *-iizc* comes from the body part term *-izc* 'front'.

- (17) *Hehe* *i-ti* *iquicolim* *quij*
 wood 3.POSS-on 3.POSS.UNSPEC.SBJ.OBL.NMLZ.Sit.PLURAL DEF.ART.SG.Sit
hiiqui *t-iizc* *ma...*
 1.POSS.toward REAL.DEF-face SR
 'The chair (lit. wood on which one sits) is **facing me** [and the ball is in the corner].' (AIM B&C 3–3, see Fig. 12)

Similarly, if the chair is facing away from the observer, with the back of the chair toward the observer, speakers use the verbal expression *-iqui -ipac* 'have back toward'. In this case, the verb root *-ipac* comes from the body part term *-pac* 'back' and it involves a vector that extends from the back part of the chair pointing toward the observer.

Table 6

Types of FoRs used across subjects in propositions of the orientation of the whole chair.

FoR	Dyad 1	Dyad 2	Dyad 3	Dyad 4	Dyad 5	Total	%
Non-projective							
Topological	0	0	0	0	0	0	0
Projective							
Object-centered ^a	0	0	0	0	0	0	0
Direct	30	10	14	11	26	91	42
Absolute	0	0	0	6	0	6	3
Vertical	5	2	1	0	0	8	4
Landmark	2	14	2	7	6	31	14
Geomorphic	0	0	0	0	0	0	0
Relative	12	5	4	1	9	31	14
No description of ground orientation or uncoded	1	2	5	31	10	49	23
Total	50	33	26	56	51	216	100

^a Note that orientation descriptions cannot be described using an object-centered FoR as a figure cannot be oriented with respect to itself.

An example of such a description is provided in (18).

- (18) *Hehe* *i-ti* *iquiicolim* *quij*
 wood 3.POSS-on 3.POSS.UNSPEC.SBJ.OBL.NMLZ.Sit.PLURAL DEF.ART.SG.Sit
hiiqui *t-ipac* *ma...*
 1.POSS.toward REAL.DEF-back SR

'The chair (lit. wood on which one sits) **has its back to me** [and the ball is on my side]. (AIM B&C 1–7, see Fig. 13)

In addition to using direct FoRs in describing the orientation of the chair in the B&C task, Seri speakers regularly used landmark-based FoRs. Propositions involving the orientation of the chair involving landmark-based FoRs were the next most frequent after direct FoRs consisting of 14% (and tied with relative FoRs in terms of frequency), as was shown in Table 6. This is illustrated in the description in (19) where the speaker indicates that the chair is facing the direction of the desert. In the description provided in (20), the speaker indicates that the chair is facing the direction of *Socaaix* 'Punta Chueca'. These types of descriptions involve vectors that extend from the front of the chair toward the direction of the landmark that serves as the anchor of the coordinate system and the ground in the description. For more types of landmarks that are used in Seri within this context, see Table 5.



Fig. 12. B&C 3–3.



Fig. 13. B&C 1–7.

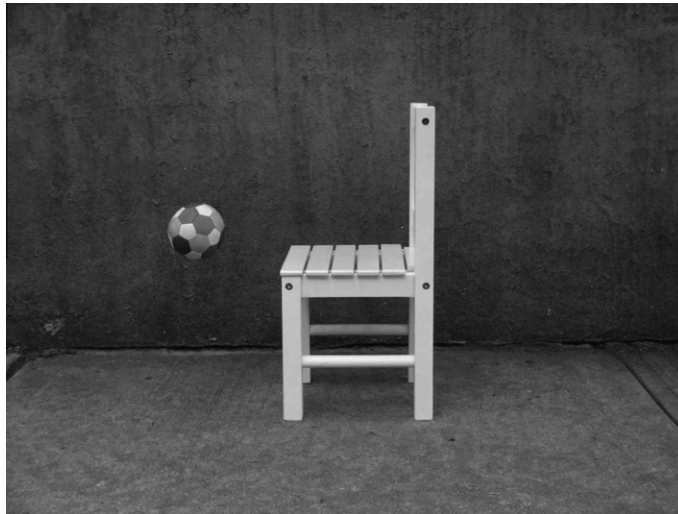


Fig. 14. B&C 4–9.

- (19) **Heen** **iicp** **hac** **i-iqui**
 desert 3.POSS.side DEF.ART.SG.LOC 3.POSS-toward
qu-iizc *iha.*
 SBJ.NMLZ-face DECL

'It [the chair] is facing **toward the desert**.' (MLA B&C 4–9, see Fig. 14)

- (20) Hehe i-ti iquiicolim quij
 wood 3.POSS-on 3.POSS.UNSPEC.SBJ.OBL.NMLZ.Sit.PLURAL DEF.ART.SG.Sit
Socaaix **iicp** **hac**
 Punta.Chueca 3.POSS.side DEF.ART.SG.LOC
t-iizc, *hinol* *aapjoj*
 REAL.DEF-face 1.POSS.hand enormous.PL
hac **iiqui** **t-iizc**
 DEF.ART.SG.LOC 3.POSS.toward REAL.DEF-face
ma. . .
 SR

'The chair (lit. wood on which one sits) is facing**toward Punta Chueca** and [the front of it] is facing our right (lit. our enormous hand)... ' (AIM B&C 3–6, see Fig. 15)

In descriptions involving landmark-based FoRs, the location of the landmark is important, but the orientation of the landmark does not play a role. For instance, in (19) the orientation of the landmark *heen* 'desert', which is part of the ground phrase *heen iicp hac* 'desertwards', is irrelevant, if it even has an orientation. Additionally, it likely goes without saying that vectors in the context of landmark-based FoRs do not necessarily have their direction aimed to a point in space, but rather more likely point toward a spatial region according to the general location of the landmark.

As can be seen in Table 6, Seri speakers also provided propositions involving the orientation of the chair in the B&C task that involved relative FoRs. This type of FoR was less frequent than direct FoRs and just as frequent as landmark-based FoRs, comprising 14% of the responses. An example of a description involving a relative FoR is provided in (21). In the photo that was described here, as is shown in Fig. 16, the chair was pointing toward the side of the configuration made up by the director and matcher that the director was on, thus, the speaker indicated that the chair was facing their left.

- (21) Hehe i-ti iquiicolim quij
 wood 3.POSS-on 3.POSS.UNSPEC.SBJ.OBL.NMLZ.Sit.PLURAL DEF.ART.SG.Sit
he **hi-sliic** **iicp** **hac** **iiqui**
 1 1.POSS-left 3.POSS.side DEF.ART.SG.LOC 3.POSS.toward
qu-iizc *ih.*
 SBJ.NMLZ-face DECL

'The chair (lit. wood on which one sits) is facing **my left**.' (AIM B&C 1–3, see Fig. 16)



Fig. 15. B&C 3–6.



Fig. 16. B&C 1–3.

At times the use of a relative FoR caused confusion for Seri speakers trying to complete the B&C task. It is not entirely clear if this had more to do with the fact that some Seri speakers are less comfortable using the terms *-sliic* 'left' and *-nol aapa* 'right' or if there is just general confusion regarding the interpretation of such terms under a relative FoR as opposed to an object-centered FoR. Perhaps there is influence from Spanish, speakers of which frequently use the terms *izquierda* 'left' and *derecha* 'right' within a relative FoR. Nevertheless, these terms caused misunderstanding and at times frustration between some of the pairs of Seri speakers who completed the B&C task.

The use of an absolute FoR in the B&C task and in the M&T task was limited to older speakers and as can be seen in Table 6, only accounts for 3% of these types of responses in the B&C task. Both men and women used an absolute FoR, but again, almost exclusively older speakers (above 50 years old) provided descriptions involving an absolute FoR (see Table 3 for more information on the ages and gender of the participants). In the case of orientation descriptions recorded during the B&C task, only speakers from dyad 4 used an absolute FoR. The terms that are used in this type of FoR and the wind terms they are derived from are illustrated in Table 7 (taken from O'Meara (2010)). The terms that are used in association with an absolute FoR are derived from wind terms and they function in a similar manner to terms for cardinal directions in English, like *north*, *south*, *east*, and *west*. However, instead of a coordinate system based on terms that correspond with the location of where the sun sets and rises (east and west) and those on the intersecting axis (north and south), Seri speakers use a variety of terms that correspond with the direction that the different seasonal winds come from.



Fig. 17. B&C 4–10.

Table 7

Terms derived from those that refer to wind in Seri.

Cardinal directions	Gloss	Derived from	Gloss
<i>xnaa iicp</i> , <i>xnaaiicp</i>	'toward the south'	<i>xnaai</i>	'southwind'
<i>hai iicp</i>	'toward the north'	<i>hai</i>	'northwind', 'wind'
<i>hai heeno moca iicp</i>	'from the mountains'	<i>hai heeno moca</i>	'wind that blows from the desert'
<i>haapa iicp</i>	'toward the northwest'	<i>happa</i>	'northwest wind'
<i>hast ipac hai</i>	'southwest' (lit. 'wind that comes from the back of the mountain')	<i>hai</i>	'northwind', 'wind'
<i>ano yaait iic cōihihizatz</i>	'east' (lit. 'toward where there is shade in the afternoon')		

An example of a description of the orientation of the chair in the B&C task that involves an absolute FoR is provided in (22).

(22)	<i>Hehe</i>	<i>i-ti</i>	<i>iquicolim</i>	<i>xnaai</i>
	wood	3.POSS-ON	3.POSS.UNSPEC.SBJ.OBL.NMLZ.Sit.PLURAL	south.wind
	<i>iicp</i>	<i>hac</i>	<i>iiqui</i> <i>qu-iizc...</i>	
	3.POSS.side	DEF.ART.SG.LOC	3.POSS.toward SBJ.NMLZ-face	

'The chair is facing **south** (lit. the direction of the southerly wind)...' (MLA B&C 4–10, see Fig. 17)

At this point it is not clear if an absolute FoR was at some point in the past more frequent in Seri discourse. Given that only older speakers used these terms in the B&C and M&T tasks, it is likely that an absolute FoR involving wind terms was more prevalent in Seri discourse, but has in more recent times fallen out of use in the discourse used by younger generations. Additionally, given the very low frequency of use of absolute FoRs in descriptions at geographic scale space (as ascertained from situated route descriptions that were elicited from speakers in the context of natural elicitation of terms that refer to geographic objects in Seri), it is not clear what role it currently plays in that domain either. The wind terms themselves are understood by both older and younger generations (based on informal interviews with speakers), particularly as they are used to refer to the winds themselves. When the terms are used in descriptions involving an absolute FoR, younger speakers also seem to understand the terms and the coordinate system being evoked, but in the B&C data younger speakers rarely, if ever spontaneously use such a coordinate system.

6. Discussion

Based on the data presented above that was collected with the B&C referential communication task, it is clear that Seri speakers have many options when it comes to which FoRs they can use to describe the orientation of a particular object or the location of an object with respect to a referential ground. Seri exhibits some characteristics of referential promiscuity as is described for Yucatec Maya as "a style characterized by the unrestricted availability of all major types of FoRs and the absence of a default perspective" (Bohnenmeyer, 2011). Seri could be considered to match this description, as Seri speakers

use various FoR types to describe the location of objects. However, it could easily be said that Seri is as referentially promiscuous as Yucatec since the data from the B&C task illustrate that Seri speakers do show preference for using various FoRs in discourse, even in describing the same photograph from the B&C task. For instance, see examples (6), (8) and (20) for instances of descriptions of B&C photographs that involve multiple FoRs. The dominant FoR preferences in Seri discourse lie in observer-based FoRs, such as direct FoRs and also, to a more limited extent, relative FoRs. Additionally, preferences were found for object-centered FoRs, where the anchor is the same as the ground object. Additionally, landmark-based FoRs were frequently utilized to complete the B&C task and also appear regularly in discourse used to describe the location of objects in larger-scale space. The absolute FoR was used very infrequently and the geomorphic FoR was not used at all, which indicates that there are some limitations in FoR availability for Seri speakers, thus making it difficult to say that Seri speakers are definitively referentially promiscuous. In fact, many of the languages discussed in this special issue show preferences for various FoR types, but would best not be described as referentially promiscuous. However, a point worth making regarding the Seri data is that there do seem to be individual preferences among Seri speakers regarding which FoRs are more frequently used in discourse. An example of such a case is the landmark-based FoR. Based on the data from all of the speaker dyads that participated in the B&C task, which is shown in Tables 4 and 6, it can be seen that landmark-based FoRs were favored by dyads 2 and 4 in both descriptions of the location of the ball with respect to the chair and the orientation of the chair. Other dyads used landmark-based FoRs, but this FoR type dominated the responses by dyads 2 and 4, especially the data from dyad 2. Gender does not seem to play a role as both of these dyads were comprised of both male and female speakers, but both speakers who served as directors for some of the tasks in both dyad 2 and 4 were middle-aged or older. More research needs to be done to see if there are factors that determine whether a speaker has an individual preference for landmark-based FoRs or not.

Additionally, it seems that the dyads of speakers who did not use landmark-based FoRs as frequently as dyads 2 and 4 favored the use of object-centered, relative, and in the case of orientation descriptions, direct FoRs. Similarly, speakers in dyads 2 and 4 made less use of object-centered and relative FoRs. The data show that there are definitely different FoR preferences within the Seri speaker community of *Haxöl lihom* 'El Desemboque', but the determining factors behind this variation are unclear. So far, the most likely predictor of such variation is age. However, age does not seem to explain the whole picture. Younger speakers still understand and use utterances involving landmark-based FoRs, as well as to a much lesser degree absolute FoRs. Further work needs to be done in order to understand in their entirety, the factors involved in individual speaker variation as it pertains to FoR preferences in discourse, including the role that literacy, education and bilingualism might play. Ideally more data would be collected to try to systematically investigate FoR preferences in natural discourse. At this point the data collected that includes FoRs are somewhat limited, but preliminarily it can be said that in natural discourse (i.e., data not collected from the B&C task) when describing geographic scale space, Seri speakers favor landmark-based FoRs.

More generally, one striking observation is that the most preferred FoR type for Seri speakers in location descriptions is the object-centered FoR and the most preferred FoR type in orientation descriptions is the direct FoR. Following the Levinsonian FoR classification, Seri speakers would be classified as having a strong preference for intrinsic FoRs, but this classification would have missed the observation that there is a difference between preferences in location descriptions and orientation descriptions – namely, that object-centered FoRs are favored in describing the location of an object, while direct FoRs are preferred in describing the orientation of objects.

Finally, as the Seri data relates to the hypotheses of the MesoSpace project, not too much can be said as to the validation of these hypotheses, as Seri serves as a control language and does not exhibit some of the same characteristics as many of the other Mesoamerican languages in the MesoSpace sample in that it does not seem to have a productive meronymic system for describing object parts. Further, Seri does not entirely lack preferences for the relative FoR, as can be seen in the data from the B&C task. However, descriptions involving the relative FoR are not the most frequent of all FoR types available to speakers. This observation in and of itself proves interesting as Seri does seem to share some characteristics with some of the languages being studied under the MesoSpace project. For instance, in descriptions of the location of the ball with respect to the chair, both Seri and Tzeltal of Tenejapa favor object-centered FoRs with landmark-based FoRs in second place (see Polian and Bohnermeyer, 2011). Similarly, many of the languages in the MesoSpace sample favor direct FoRs in describing the orientation of the chair. Nevertheless, given the fact that (a) Seri falls outside of the Mesoamerican language area, (b) its use of meronyms is less productive than meronymic systems of many Mesoamerican languages and (c) the language shows some preference for relative FoRs, it seems plausible to say that Seri serves as a good control language for the MesoSpace project. It serves as an example of a language that provides a potential counter-example to the MesoSpace hypothesis regarding the possible connections between meronymic systems and FoR preferences. As future reports come out with more detailed descriptions of the meronymic systems of the languages in the MesoSpace sample, perhaps more can be said as to this possible connection and what role Seri plays as a control language.

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