

Article

Early Emergence of Agreement in Yucatec Maya Sign Language

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Abstract: In many sign languages, space is used to express grammatical features. However, verb agreement in space is noticeably slow to appear in emerging sign languages. Many reasons have been proposed to explain this delay or even absence: the reduced size of the community, the recent creation of the sign language and the lack of exposure to a fully formed language. To examine the way space is used to express agreement in Yucatec Maya Sign Language (YMSL), a new signed language from the peninsula of Yucatán (Mexico), a task was conducted using video stimuli created to elicit ditransitive constructions showing transfer events, such as events of giving or taking. Results show that agreement is present early in YMSL, even from the first generation of deaf signers. While many signers used single agreement constructions, the second generation of deaf children systematically employed double agreement constructions, placing them on the high end of the evolutionary path proposed for verb agreement in sign languages. I argue that cultural habits of the surrounding community, namely the preference for a geocentric frame of reference among Yucatec Maya speakers, is what facilitates the early emergence of the use of space to express agreement in YMSL.

Keywords: sign language evolution; signing space; verb agreement; pronouns; Yucatec Maya Sign Language



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1. Introduction

Sign languages are visual languages and their grammar relies heavily on the use of space. However, several authors have pointed out that the use of space to encode verb agreement takes time to develop (if it develops at all) in emerging sign languages (Senghas and Coppola 2001; Senghas 2003; Padden et al. 2009; Rathmann and Mathur 2008). Previous studies have looked at how signers from various types of sign languages use space for grammatical purposes. In sign languages generally, there is no agreement for indirect objects. However, it is typically verbs of transfer—verbs with subjects, direct objects, and concrete or abstract indirect objects—that form the category of agreeing verbs (Meir 2002), and agreement marks direct objects, and sometimes, subjects as well. Tasks based on eliciting verbs of transfer have been conducted in many settings around the world. Overall results point to the existence of an evolutionary path that initially lacks the expression of verb agreement in space (especially for early generations of emerging sign languages) which appears only later in the life of the sign language (de Vos and Pfau 2015; Meir et al. 2010).

This paper aims to explain how signers of the Yucatec Maya Sign Language (YMSL) have managed to develop a new class of verbs that use space to express agreement, despite the very recent age of the linguistic community and its reduced size. Critical sociolinguistic factors that have been considered to make this development possible are reviewed, among them: the size of the community, the age of the sign language, exposure to the language from previous generations and the gestural habits of the surrounding culture as well as its preferred spatial frame of reference. I argue that the use of a geocentric frame of reference is what influences the emergence of certain grammatical structures and allows YMSL signers to use double verb agreement constructions much earlier than what has been previously described and claimed for emerging sign languages.

1.1. The Grammatical Use of Space in Sign Languages

Of special interest in sign languages is how signers realize agreement, that is, how they express on verbs which participant in the discourse is doing what to whom (e.g., roles such as subject vs. recipient). In sign languages, a specific class of verbs, called agreeing verbs, typically use movement in space to mark an action and the starting and ending points of the trajectory usually express syntactic relations among referents (agent, patient, recipient, direct or indirect object, location, etc.)

The main aim of this paper is to describe how a verb's movement in the signing space is used by YMSL signers to interpret semantic roles (i.e., subject vs. recipient). In order to do that, I follow the methodology and theoretical issues raised in previous studies on emerging sign languages, specifically [Senghas \(2003\)](#) on Nicaraguan Sign Language (NSL) and [Padden et al. \(2009\)](#) on Al-Sayyid Bedouin Sign Language (ABSL). Both studies show that the use of verbs inflected for agreement does not appear until later generations have been using the language. Crucially, in sign languages, not every verb makes use of space for grammar or expresses agreement. [Padden \(1983\)](#) considers three verb types: (a) *Plain verbs* that can generally be inflected for aspect but not for argument (for instance, in ASL verbs such as EAT, KNOW, LOVE, REMEMBER, UNDERSTAND). Usually, such verbs are performed on the body and have a semantics oriented to the subject being the experiencer. (b) *Spatial verbs* usually imply some directionality that describes a motion and an end point (for instance, in ASL, verbs such as MOVE, PUT, etc.). Crucially, these verbs do not consider the action of an agent on a patient or an object but most commonly a movement from one point in space to another location. Finally, (c) *agreeing verbs* use directionality to make the verb agree with the arguments of the utterance. Agreeing verbs make a relevant use of space and the location of the entities that are involved in the action described. When the entities treated as arguments are present, such as the agent and the patient, the verb will be oriented towards them. For instance, in ASL, the sentence "I TEACH YOU" starts from the body of the signer (her head in this case), and the end point is in the direction of the interlocutor. However, things become more complicated when the referents are not present. In this case, empty locations in the signing space are arbitrarily and contextually linked to these referents at the discourse level. Such points in space have been labeled R-locus (short for Referential locus, or R-loci in plural) ([Lillo-Martin and Klima 1990](#); [Lillo-Martin and Meier 2011](#)). Consider for instance the sentence "Bill gives Maria a rose". If neither Bill nor Maria are present, the signer can assign an empty location to his/her right for Bill and another to his/her left for Maria and perform the verb GIVE between these two locations (from right to left in this case), hence making the verb agree with the arguments ([Klima and Bellugi 1979](#)). However, for such a grammatical system to work, noun phrases (in this case "Bill" and "Maria") should first be explicitly located in the signing space as pronouns and later referred to anaphorically in the discourse by moving the verb from and to these locations.

1.2. Establishing Pronominal Reference in Space

A common way that sign languages mark pronouns is through pointing. Many researchers consider that pointing to oneself refers to first person singular and pointing to the body of the addressee indicates second person ([Mathur and Rathmann 2012](#); [Meier and Sandler 2008](#)). Third person can also be established by pointing if the referent is present. However, pointing to referents that are not present or unknown can be problematic. For known but non-present referents, in many sign languages, and especially emerging rural sign languages, one strategy is to use metonymic pointing ([Le Guen 2011a](#)), that is, to point to an intermediate referent in lieu of the primary referent: for instance, pointing to the house of Albert to refer to Albert (independently of whether he is there or not). Such a strategy is commonly used, even in some cases for directional verbs ([Hou 2016](#)). A second strategy is to use R-loci that allow signers to assign referents to arbitrary points in the signing space. Different referents are allocated to different points in space so that most

cases of ambiguity are avoided (Meir and Sandler 2008, p. 65). As we shall see below, assigning referents in space is a crucial prelude to verb agreement.

1.3. Evolution of Space as a Means to Express Verb Agreement

While looking at verb agreement in sign languages, a cross-linguistic comparison reveals that not all languages rely on similar strategies. For some researchers (Mathur and Rathmann 2012; Rathmann and Mathur 2008), the process of verb agreement in sign languages has been interpreted as a linguistic innovation that occurs through a specific use of the signing space and the authors consider that “the cross-linguistic variation across sign languages with respect to certain properties of verb agreement can be explained by positing that the sign languages are at different points along the path of grammaticalization” (2012, p. 146). Indeed, the body of research currently available on emerging sign languages around the world points to three stages of evolution.

In the first stage, some languages do not have a class of agreeing verbs. So, in order to resolve the issue of explaining who is giving what to whom, they rely on a consistent word order using plain verbs. This is the case for ABSL, an emerging sign language used by a Bedouin community in Israel (Meir et al. 2007; Sandler et al. 2005; Padden et al. 2009). Signers do not use the signing space to express the subject and object of a transitive verb, but rather rely on a fixed word order to disambiguate the utterance, as in WOMAN GIVE MAN TAKE (Sandler et al. 2005, p. 2664). The authors conclude that “once languages have had time to accrue such mechanisms as verb agreement, marking properties of subject or object (. . .) the roles of participants can be made clear, even without consistent word order. In the absence of such mechanisms, word order is the only way to disambiguate a message linguistically” (Sandler et al. 2005, p. 2665). In such cases, a signer performs a plain verb in the signing space that can involve movement (such as TRANSFER) typically along the sagittal axis but that does not connect any argument in the signing space. Crucially, the direction of the verb’s movement is not relevant grammatically. In a sense, the verb is performed in a neutral space since it is not inflected for arguments.

The second stage is what has been called single verb agreement. In this case, the signer will mark one argument and uses his/her body as the default second argument for transitive constructions. One argument can be located outside the body as an R-locus ascribed in the signing space, making directionality relevant. Morford and Kegl (2000) compared data from homesigners and signers who are exposed to more full-fledged forms of Nicaraguan Sign Language, and they found that homesigners have a tendency to express human action from a first person perspective (Morford and Kegl 2000, p. 376). Such findings support the idea that, in the early stages of the evolution of a language, signers seem to rely more heavily on representing actions from an agent’s perspective, thus making extensive use of their own bodies. Meir et al. (2007) and Padden et al. (2010) present similar findings for two young sign languages: ABSL and Israeli Sign Language. However, despite the fact that Kata Kolok, an emerging sign language from Bali, has been used by six generations already, it does not yet have a class of true agreeing verbs (Marsaja 2008; de Vos 2012).

The final stage is the creation of double agreement verb types that rely on the use of the R-loci. As explained earlier, the R-locus strategy implies that locations around the body of the signer are arbitrarily linked to non-present referents. Such a use of the gestural space is actually common among speakers of most Western educated societies (McNeill 2003; McNeill et al. 1993), and it is thus not surprising to find it used for grammatical purposes in sign languages that arose and developed in these cultures. However, the use of abstract pointing is not a given in other societies, as people in these communities tend rather to make person reference by pointing to people’s houses or usual place of residence, and only point to existing places in accordance with their real-world locations (Le Guen 2011a; de Vos 2012; Blythe et al. 2016).

In sum, studies suggest that using space symbolically and arbitrarily with R-loci comes later in the evolution of sign languages, and single agreement verbs that use the

body as the subject seem to appear prior to the appearance of double agreement verbs. Several explanations have been put forward to explain this evolution and the appearance of agreeing verbs, especially in emerging sign languages. The first is the size of the community of signers; the more people use the sign language, the more complex and grammatically refined will it become. The second argument relates to the age of the sign language and the number of generations. In the case of emerging sign languages, evolution in the grammar is strongly linked to the number of cohorts that have been in contact, the first cohorts providing the shared symbolic environment that the subsequent generations can exploit. Linked to the previous argument, early exposure has also been considered crucial in the development of grammar, as certain periods of language exposure are essential in order to develop a more complex grammatical system. Finally, the use of space, and specifically of the frames of references, has been considered to help or to potentially restrain the emergence of certain grammatical structures. Frames of Reference (FoR) are systems of coordinates that allow to localize a referent (a figure) with respect to a ground. Three basic FoR are usually considered: (a) the intrinsic FoR in which the figure's location is represented in relation to the ground's intrinsic properties (front, back, sides). (b) The egocentric FoR in which relations between objects are calculated in relation to the speaker's (projected) point of view, that is, in relation to his left, right, front, or back. (c) the geocentric FoR (or sometimes more broadly considered within the "allocentric FoRs") in which coordinates between entities are defined by external features of the environment (i.e., neither by the internal orientation of a ground object nor the point of view of the speaker), often with the use of cardinal directions (See [Levinson \(2003\)](#) for a more detailed discussion and [Haviland \(1996, 2003\)](#), [Le Guen \(2011a, 2011b\)](#) for examples on how they are used with gestures in Mayan communities). The cultural or local preference for the geocentric FoR and its implication on gestures (as well as its correlated impact on pointing) has been suggested to go against an abstract use of the signing space and therefore the emergence of agreeing verbs in emerging sign languages ([Le Guen 2011a](#); [de Vos 2012](#)).

The present study aims to determine where YMSL is placed on the evolutionary continuum: Does it behave like many other emerging sign languages, only using a sagittal axis with no agreement or does it use space to express verb agreement? I will show that despite YMSL's young age, YMSL signers already are able to use the signing space productively with agreeing verbs. I will discuss all the hypotheses previously considered and explain how the geocentric FoR actually favors the emergence of agreeing verbs in YMSL.

2. The Yucatec Maya Sign Language

Yucatec Maya Sign Language (YMSL) is an indigenous sign language used by deaf and hearing signers in Yucatec Mayan communities with a high incidence of deafness in the peninsula of Yucatán, Mexico. The sign language used in these communities is unrelated to Mexican Sign Language (*Lengua de Señas Mexicana*, LSM) and developed outside of institutional settings, out of the necessity for deaf and hearing community members to communicate with each other. Data for this paper were collected in three communities: Chicán, Nohkop and Trascorral. The communities of study are all located within the state of Yucatán but at one to several hours drive from each other. Members of the three communities have not been in contact in the past, their sign languages emerged within recent decades and are historically unrelated. In-depth interviews with community members, including the oldest deaf signers and their families, failed to provide any evidence for historical contact between the communities. In Nohkop and Trascorral, the oldest signers are still alive and in Chicán, the oldest signer passed away in early 2020. None of them remember the presence of any other deaf people or an already existing sign language in their environment during their childhood. Despite the lack of a historical link, the varieties of YMSL from different communities exhibit an important degree of overlap in their lexicon and can be considered a similar language, a proposition that has been argued in previous work, at least for Chicán and Nohkop ([Le Guen 2012](#); [Le Guen](#)

et al. 2020; Safar 2017, 2019; Safar et al. 2018). This can partly be explained by the shared sociolinguistic background and the common gestural precursors (precisely, the extensive use of multimodal communication among speakers of Yucatec Maya). The villages differ from each other in their overall population size as well as the number and distribution of deaf people.

Chicán is a village of 720 inhabitants, including 16 deaf people who are between 19 and 69 years old. The oldest signer was in his early eighties when he passed away in 2020. In Nohkop, signers are all from a family of five siblings between the ages of 20 and 28 who grew up together and among whom four are deaf. Trascorral is home to a family of 13 siblings, six of whom are deaf and are between 11 and 33 years old. Demographic data of the three communities are summarized in Table 1 (adapted from Safar 2017).

Table 1. Overview of the communities' population.

	Chicán	Nohkop *	Trascorral
Number of inhabitants	720 (Escobedo Delgado 2012)	No exact figure (around 30)	~300
Number of deaf people	16	4	6
Percentage of deaf people	~2.4% (Escobedo Delgado 2012)	No exact figure	~2%
Age of deaf people in 2021	18–69	20–28	11–33
Gender distribution of deaf people	8 female, 9 male	3 female, 1 male	2 female, 4 male
Family distribution of deaf people	Multiple families	Siblings of one family (family of 5 siblings)	Siblings of one family (family of 13 siblings)

* Nohkop is a pseudonym for a small neighborhood of the town Chemax, chosen according to the family's wish to remain anonymous. Signers now currently live in two separate villages: Chemax and Tixhualactun.

Only in Chicán do we encounter a maximum generational depth of three generations. However, the oldest signer in Chicán, now deceased, only had hearing children and was the only deaf person of his age group. Only the subsequent generation—today between 23 and 69 years old—included a critical mass of deaf signers. Le Guen (2012, p. 216), following Kisch (2012), divides deaf signers in Chicán into seven “interactional groups”, some of which include several hearing and deaf members. There are two young deaf signers (19 and 23 years old in 2021) who were born to deaf parents and grew up in a house surrounded only by deaf people.

The deaf population of Nohkop and Trascorral is comprised of siblings within one family each, who constitute the first generation of users of their sign language. Over the past few years, the signing community in Nohkop has dissolved as deaf women have gone to live with their husbands, either in the same village but in a different household or in the husband's village. As of 2022, the oldest deaf signer had two hearing children (ten and seven years old). The second deaf girl of the family had three hearing children (twelve, eight and three years old). The youngest deaf girl had a two-year-old child. All the children are acquiring YMSL as their first language and Maya and Spanish as their second languages. It should be noted that, as of now, they are not very proficient in the sign language, at least compared to the Bilingual-Bimodal cousins of their parents. Additionally, and despite the fact that their hearing parents are native Yucatec Maya speakers, the socialization process is currently conducted almost exclusively in Spanish, based on the belief that Spanish will give them better education and job opportunities. The deaf women are married to hearing men who learned the sign language through living with their respective wives and are fluent in YMSL. In Trascorral, the women stay in the village as housewives while all deaf men go to work on the coast only coming back on the weekends.

In these communities, most people know each other and many are kin-related, thus the specific dynamics of interaction of YMSL signers conform to general cultural interaction patterns. As customary among the Yucatec Maya, people interact primarily with members of their own extended families. Deaf people do not socialize with each other based only on their shared experience of being deaf and a separate Deaf community, as in the context of national/urban sign languages, does not exist (Johnson 1991; Escobedo Delgado 2012; Macdougall 2012; Safar and Le Guen 2020; Safar 2017). This results in a situation where deaf signers from different interactional groups in Chicán have sometimes little contact with each other and exhibit some differences in their signing (Safar et al. 2018; Safar and Chan 2020).

3. Materials and Methods

3.1. Materials

The stimuli used were a set of 12 videos compiled by the Max Planck Institute for Psycholinguistics created in order to elicit ditransitive constructions with actions such as GIVE and TAKE. All the videos include three people (two women and one man or two men and one woman) who are transferring an object to one another. In most videos, only two of the three persons are conducting the action, the last one remaining still. The arrangement of the three persons varies in each video. Various types of objects are being passed around: a bulb, a flower, a book, etc., see Figure 1.



Figure 1. Stills of some of the video stimuli used in the task.

Verbs such as GIVE and TAKE were especially relevant as they can be used in ditransitive constructions, that is, with three arguments: an agent, a patient and an object being transferred. These stimuli are particularly relevant to examine whether signers are able to use the signing space to express verb agreement. In fact, these specific stimuli, or similar versions of them, have been employed in studies run in many sign languages all over the world in order to address the same question (see among others Meir et al. (2007) and Padden et al. (2009) for ABSL, Senghas (2003) and Gagne (2017) for NSL) and allow for a cross-cultural comparison of how agreement is expressed in these different languages.

3.2. Participants

A total of 23 participants volunteered to join the task (see Table 2), all from three communities studied by the author since 2009: Chicán, Nohkop and Trascorral. All experiments were video recorded with the permission of the participants.

In Chicán, 14 people participated (7 women) between 11 and 61 years old at the time of the interview. The average age was 37.7 years old. Thirteen of the participants from Chicán are deaf and one is a CODA (hearing Children Of Deaf Adults). Two siblings born from deaf parents, aged between 11 and 16 (average age is 13), constitute the second generation. In Nohkop, 6 people participated, five women and one man between 2011 and 2021. The average age of the participants was 23.4 years old. Four of the 6 participants are siblings, all deaf. Of the two hearing signers, one is a Bilingual-Bimodal cousin who grew up with the deaf siblings and played an integral part in the construction of the sign language. The second is a CODA, daughter of the oldest deaf sibling and her hearing husband, also fluent in YMSL. Finally, in Trascorral, only three participants were interviewed since they were the only ones present or willing to engage in the task. Two of the participants are deaf, while the daughter of the oldest sister is a hearing CODA. All CODAs are Bilingual-Bimodal signers of YMSL, and they are also fluent in Yucatec Maya and/or Spanish.

Table 2. Participants data (including interactional groups).

Community	Participant	Age in 2021	Gender	Generation	Deaf/Hearing	Data Collection Year
Chicán	JCC	69	M	1st	Deaf	2011
	NCT	51	F	1st	Deaf	2013
	MICC	23	F	2nd	Deaf	2011
	CaCC	19	M	2nd	Deaf	2011
	StCC	59	M	1st	Deaf	2013
	GUC	34	M	1st	Deaf	2013
	MCH	18	F	2nd	Hearing CODA (BB)	2013
	MCC	66	F	1st	Deaf	2013
	LTP	31	F	1st	Deaf	2011
	BTP	29	F	1st	Deaf	2013
	RTP	23	M	1st	Deaf	2013
	ACC	50	M	1st	Deaf	2011
	ECC	48	F	1st	Deaf	2011
	LCC	40	F	1st	Deaf	2011
Nohkop	YKP	29	F	1st	Deaf	2011
	WKP	16	M	1st	Deaf	2011
	NKP	27	F	1st	Deaf	2012
	MKP	22	F	1st	Deaf	2021
	RKP	23	F	1st	Hearing (BB)	2014
	JSK	6	F	2nd	Hearing CODA (BB)	2021
Trascorral	CMM	33	F	1st	Deaf	2021
	MM	14	F	1st	Deaf	2021
	LMM	14	F	2nd	Hearing CODA (BB)	2021

The task was conducted with the researcher showing each video on a laptop or tablet. The computer was then closed and the participant was asked to retell the video to the camera. The video stimuli varied for movement, people involved in the actions performed,

number of men and women, and the object being passed around. Each video triggered the need to provide information about agents and objects, either to the experimenter, or to another interlocutor who did not watch the clip. Indeed, the majority of signers provided such information, even when the researcher was the only interlocutor.

3.3. Transcription and Coding

All data were transcribed using the program ELAN (Brugman and Russel 2004). Coding involved transcription and translation of each complete utterance produced by signers, and special attention was paid to the coding of pronouns and the use of space or the body to express verbal inflection. In order to code how participants retold the video stimuli using the space around them, the people in the video were coded as “Persona” using a number for each one: 1 (the one on the right of the screen), 2 (the one in the middle) and 3 (the one on the left of the screen), as shown in Figure 2. Such coding allows us to understand how signers placed each Persona from the video stimulus in the signing space or if/when they used their own body instead. In total, the total possible number of items participants could indicate was 36.

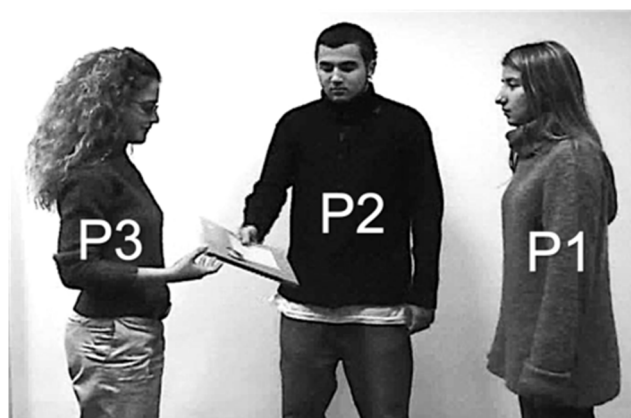


Figure 2. Coding of the “Persona” (people on the screen).

4. Results

4.1. Pronoun Marking and the Use of the Signing Space

As we saw earlier, in order to use space to express verb agreement in a sign language, one requisite is to be able to place referents as pronouns in the signing space. Such placement is essential for agreement, as the movement of an agreeing verb (such as GIVE or TAKE) will distinguish the agent from the recipient (Klima and Bellugi 1979; Meier 2002).

In the data, several strategies have been used to mark pronouns in R-loci. I will not dive into too much detail as to which handshapes were used but only mention that signers used entity classifier (see Safar (2019) for a detailed description of YMSL, and Meir and Sandler (2008)) and, in the case of one signer, buoys (see Figure 5a,b and Liddell (2003, p. 223–ff)) but the most common were pointing (see Figure 6b,d,f) and placing (see Figure 6j). The coding used in the analysis contrasts the marking of *R-locus* versus *no marking*, that is, whether the signer did or did not use the space around his/her body to indicate a pronoun.¹ Results are presented in Figure 3.

Results indicate that many signers from Chicán and Nohkop make a productive use of the signing space to indicate pronouns in R-loci: 54% of the responses in Chicán and 76% of the responses in Nohkop. In Chicán, the three second generation participants (two deaf children born from deaf parents and a CODA) all systematically used R-loci (i.e., 36 times in the task). In Nohkop, both first and second generation signers predominantly used R-loci for pronoun reference. However, none of the signers from Trascorral indicated pronouns in R-loci.

These results predict that signers from Chicán, especially second generation ones, and most of the signers from Nohkop can potentially use agreeing verbs, while none should be expected to do so in Trascorral.

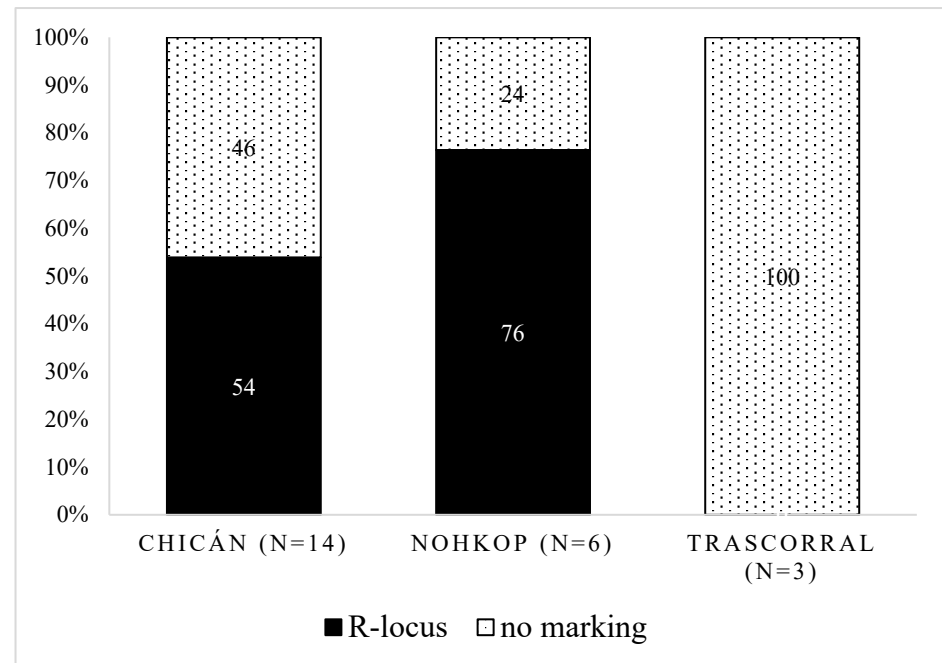


Figure 3. Total number of responses in percentages compared by communities for R-locus vs. no-marking.

4.2. The Use of Space and the Verb Classes

In many sign languages, verb classes have been described based on their lexical, morphological and sometimes semantic features, as in ASL for instance (Padden 1983). However, in emerging sign languages, established categories are not always applicable as signers may use different strategies and, more often than not, in-between verb classes. This is the reason why some authors have come up with ad-hoc categorizations, such as Padden et al. (2009) for ABSL.

In the task proposed here, participants had to retell, from video clips, actions involving an object being transferred from one Persona to another. If participants marked agreement, the verb should be performed between previously established R-loci (see above) and directionality was relevant. However, not all responses were uniform and results are better analyzed considering two types of verbs: uninflected and inflected verbs. In the latter case, two options are possible, either with a single argument or with two. Thus, three cases are observed: (a) uninflected verbs, which were only performing with an in/out center movement from the body and do not agree with the pronouns given that directionality is not relevant to indicate semantic roles; (b) single-agreement verbs, which only explicitly mark the patient or direct object argument while the participant enacts the default agent/subject, and; (c) double-agreement verbs, where the verb's movement explicitly indicates the relation between agent/subject and patient/direct object in the signing space (i.e., between two R-loci). A schematic representation is provided in Figure 4. The terminology is explained in the text below and in Section 5.1.

4.2.1. Uninflected Verbs

Padden et al. (2009) who conducted a similar task in ABSL considered that these verbs (that the authors refer to in their paper as “plain verbs”) “lack the fine locational distinctions seen in verb forms used to mark motion and location and they lack person marking as well” (Padden et al. 2009, p. 388). As pointed out by Montemurro et al. “agreement is with the subject and/or object of the verb and is dependent on the previous establishment of

the referent or referents” (Montemurro et al. 2019, p. 421). In the case of uninflected verbs (see examples in Figure 5) the path movement of the verb is not determined by any R-loci previously established in the signing space and consists simply of an in/out movement that does not indicate any specific argument in space. In fact, most of the participants who used uninflected verbs did not mark pronouns in R-loci prior to producing the verb and only mentioned the subject or the object lexically (Figure 5d,g, respectively).

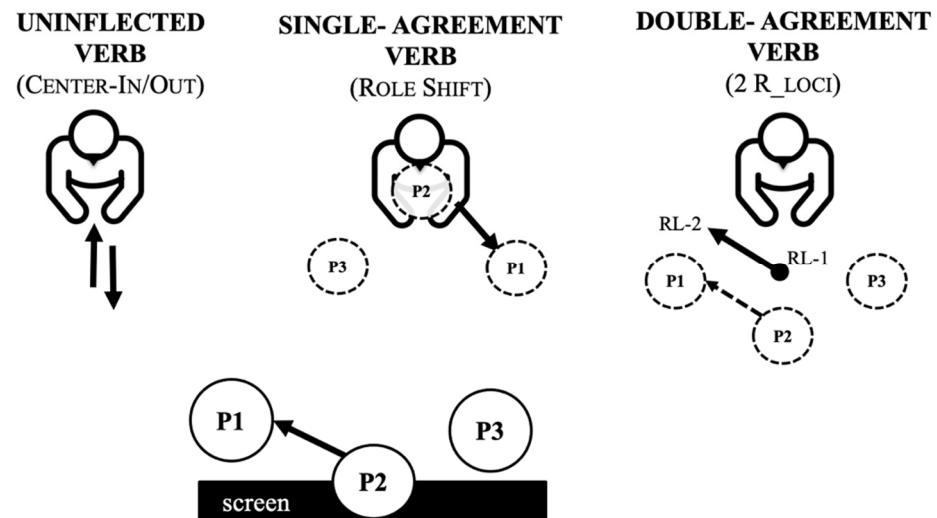


Figure 4. Representation of the three verb types used by participants in the task. The diagrams represent the signers and the signing area as viewed from above. The circles with P1, P2 and P3 indicate where the signers created R-Loci (RL) and the arrows represent the movement of the sign performed in the signing space. This representation is based on the action presented in a video clip on the screen (represented by a black line in the bottom of the image).

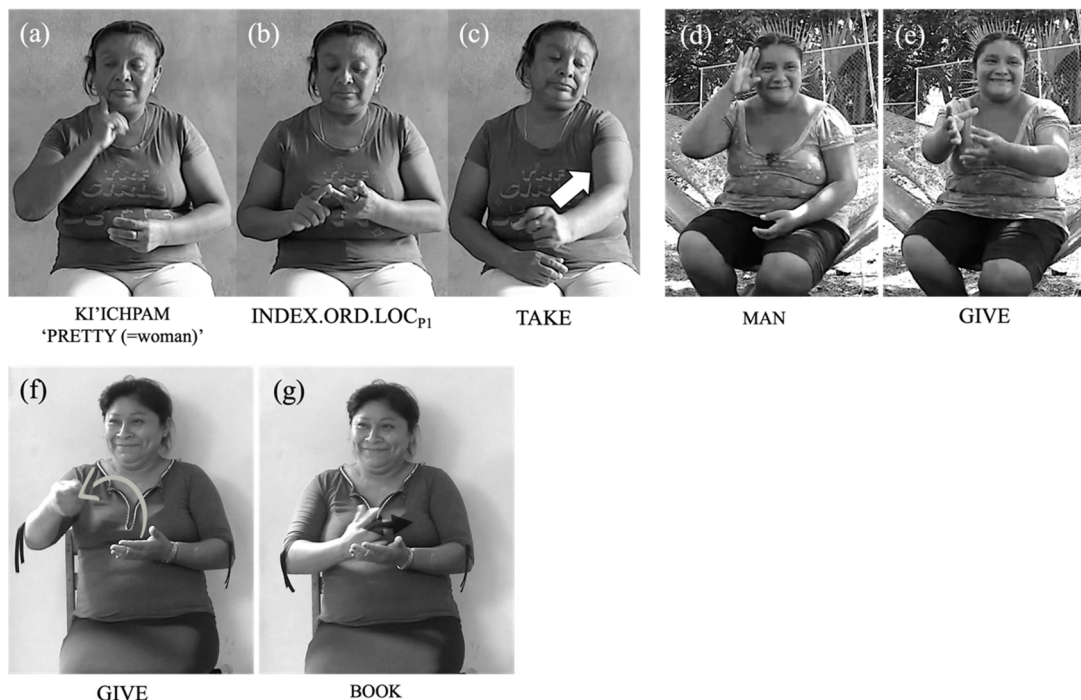


Figure 5. Examples of uninflected verbs ((a–f) signers of 1st generation from Chicán; (f,g) signer of 1st generation from Trascorral) (a–c) “there is a woman, she is on this end, she takes”; (d,e) “man gives”; (f,g) “someone gives a book”. (Note that here TAKE is a ‘backwards verb’, moving from the direct object to the subject, see Meir (1998) for a discussion).

4.2.2. Single Agreement Verbs

Single agreement verbs involve a movement of the verb that depicts the displacement of an entity in space, and one end of the path is always associated with a single argument of the verb (labeled source or goal in Meir (Meir et al. 2007; Meir 2002)).² In the case of GIVE and TAKE, the path always starts or ends at the body of the signer and the directionality of the verb reflects the path of the object being transferred. Crucially, and in contrast with uninflected verbs, in the case of single agreement verbs, the movement is usually performed in accordance with where a pronoun was placed in space in an R-Locus, i.e., either from center to the left or right or from left to right. Signers who used single agreement verbs always embodied the Persona from the video clips, that is, they used constructed action (also called role-shift or character perspective) to enact the action they are retelling. In constructed action, the signer takes the perspective or viewpoint of the giver or the recipient. This is the strategy that Meir et al. (2007) consider as “body as subject”, in which the body is the subject agreement marker but is omitted while the marked argument is the object.

Examples of this strategy are presented in Figure 6. While the verb used by the signer is TAKE, a backwards verb, that is, the movement starts from the locus associated with the object and moves toward the locus associated with the subject (which is the goal of the transfer). In single verb agreement, the subject is only implied in the construction, making it distinct from double agreement verb constructions where both arguments are explicit and located in the signing space. In Figure 6a–i, the signer embodies the woman (P2) from the video stimuli. The action is that she takes a book from P3, the man to her right. When inflecting the verb, the signer acts as if he was the woman from the video clip, and takes the book from his right. The signer from Figure 6j,k first places the Persona in the signing space in R-loci, and then uses constructed action, enacting Persona (P2) taking an object from the Persona (P3) to her left. The perspective taking is particularly clear in Figure 6k, where she exaggerates on purpose and mimics the Persona from the video (based on her own interpretation).

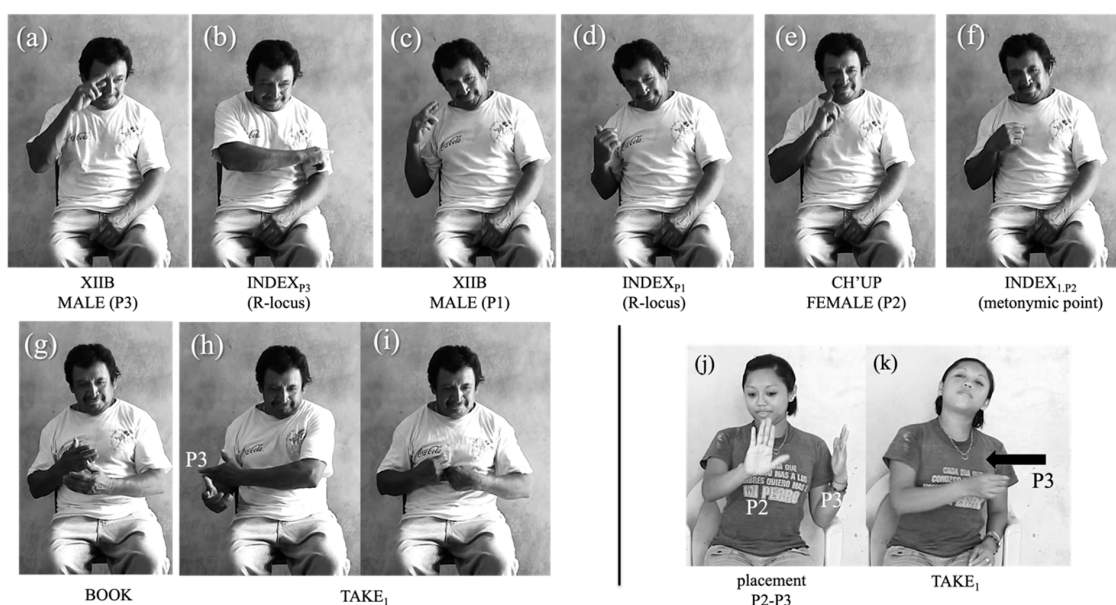


Figure 6. Responses using single agreement verbs ((a–i) signer of 1st generation from Chicán; (j,k) signer of 1st generation from Nohkop) (a–i) “there is a man here, a man here (and) a woman where I am, from P3 I take the book”; (j,k) “P2 and P3 are thusly placed, from P3 I take the book”.

4.2.3. Double Agreement Verbs

Double agreement verbs agree with two arguments, their source argument and their goal argument. In sign languages, this process usually implies the creation of two R-loci in the signing space and agreement is performed with a movement of the verb from one R-

locus to the other (i.e., between arguments). Although double agreement verbs are common in most Deaf Community sign languages that are adopted by schools and interpreters, they are noticeably absent in emerging sign languages, as pointed out for instance for ABSL (Padden et al. 2009) or Kata Kolok (de Vos 2012). In the data presented here, verb agreement constructions with two arguments independent of the signer's body were used by the YMSL participants from first and second generations.

Figure 7 presents an example of such a construction performed by a second generation signer from Chicán. The signer first creates R-loci that arbitrarily assigns the NPs ("the man" and "the woman") to empty locations in the signing space (glossed P1, P2 and P3). She then mentions the object being transferred, in this case a book (BOOK-SASS). Finally, she moves the verb in the space between two R-loci previously assigned to P2, the woman and P3, the man, semantically assigning the role of giver to P2 and of receiver to P3. In contrast with single argument constructions, her body is not involved and the movement of the verb marks the agreement with the two arguments located in the signing space.

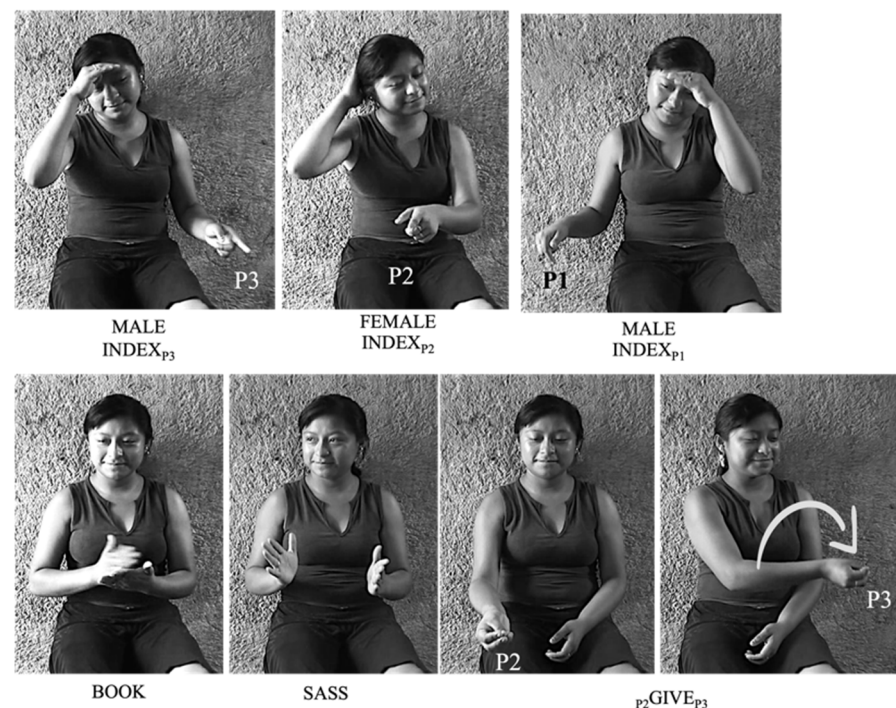


Figure 7. Second generation signer from Chicán using double agreement “There is a man here, a woman here, (and) a man here, the woman (P2) gives the book to the man (P3)”.

4.2.4. Comparison between Communities

Results of the comparison between the types of verbs used in signers from different communities are presented in percentages in Figure 8. Interestingly, we observe that YMSL signers used double agreement verb constructions much earlier and more extensively than what would be predicted from previous research on emerging sign languages (Padden et al. 2009).

In Trascorral, as predicted by the analysis of the pronouns (or lack thereof in this case), signers relied on an uninflected verb strategy. Their response is comparable to what the majority of ABSL signers did in a similar task (Padden et al. 2009). In the case of Nohkop, all signers used verb agreement. Most of the constructions used (almost 80%) were single agreement verbs, but a fourth of the responses were double agreement verbs. A closer analysis reveals that three of the signers from Nohkop used exclusively single agreement construction, while the other three alternate between single and double agreement constructions.

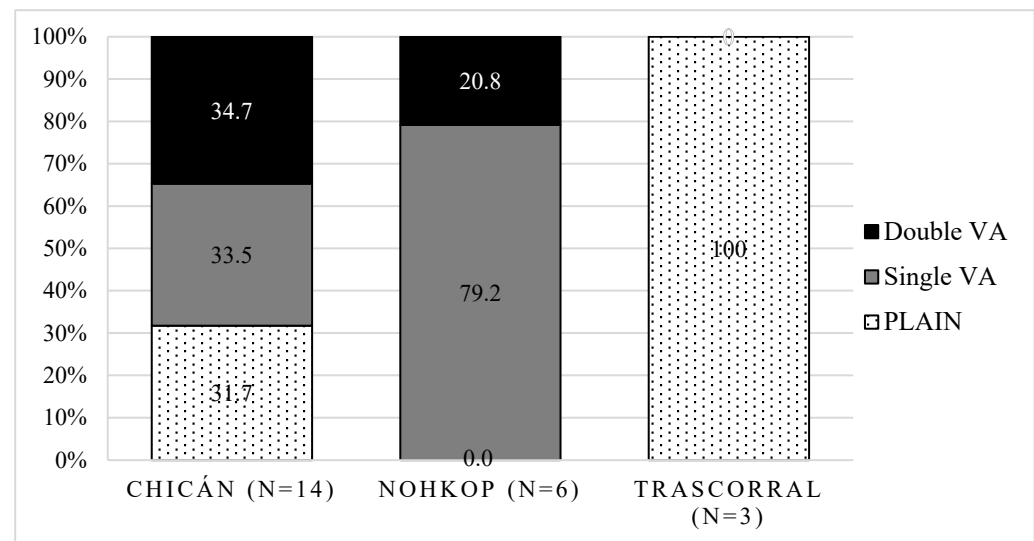


Figure 8. Results of the strategies used by the participants in the task separated by community (in percentages).

In the case of Chicán, conflated total responses do not show if some signers were more consistent in the verb construction types used than others. For this reason, Table 3 presents the results of Chicán signers considering consistency in individual responses. Three groups emerged based on their preference. Group 1, composed of four signers from first generation, chose to a great majority (95.8%) uninflected verb constructions. Group 2, composed of six adults from the first generation, chose predominantly single agreement verb constructions, but did alternate during the task with other strategies. Finally, group 3 composed of 4 signers, 2 deaf signers from the second generation, a deaf adult from the first generation and his daughter, a hearing Bilingual-Bimodal signer from the second generation, exclusively used the double agreement strategy.

Table 3. Results of individuals from Chicán grouped according to the main strategy used in the task.

	GR.1 (N = 4)		GR.2 (N = 6)		GR.3 (N = 4)	
	#	%	#	%	#	%
Uninflected	46	95.8	7	9.9	0	0
Single VA	1	2.1	55	77.5	0	0
Double VA	1	2.1	9	12.7	48	100

Comparison of the results from the three communities presents an unexpected picture. Some YMSL signers only used uninflected verbs, behaving as signers from first generations of other emerging sign languages. This is the case for signers from Trascorral and Group 1 from Chicán. However, many signers also from first generations used single verb agreement strategies. This is the case for many signers from Nohkop and Group 2 from Chicán. Finally, and even more surprisingly, in Nohkop and Chicán, some signers from first and second generations (although systematically in Chicán in the latter case) were able to employ double agreement verb constructions, making grammatical use of the signing space.

5. Discussion

Results show that YMSL signers, even from first generations, are able to use single and, crucially, double agreement verbs, challenging the prediction of the evolutionary path hypothesis. How can we explain such early use of space to express grammatical categories such as verb inflection in YMSL? I will review previous arguments put forward to explain

the evolutionary path towards the emergence of agreeing verbs, and I will propose that, in the case of YMSL, the use of the preferred frame of reference in the surrounding culture is what seems to motivate a specific use of space among signers.

5.1. Limitations of the Studies

While results indicate clear tendencies, it is important to consider some of the limitations of this study. First, the small number of participants is problematic in order to make overarching generalizations. However, this is not an obstacle that can be overcome as the number of deaf signers is limited in each community and in some cases (such as Trascorral for instance) there was a noted unwillingness of some participants to take part in the experiment.

A second limitation is that this task is not an everyday activity for signers. However, it is noteworthy that clear patterns arose from the signers' responses and that very fact is a confirmation that the task was not completely misunderstood, hence validating the results.

A third limitation is the low number of bilingual-bimodal signers. The inclusion of just a few of them was due to the exploratory character of the task, but a more systematic study should be run in the future to explore this population in more detail.

Finally, the task conducted was not a comprehension task as in [Senghas \(2003\)](#), so the results only show the tendency for production and not comprehension. This will also be the object of a follow-up study.

5.2. An Evolutionary Path

Studies conducted on emerging sign languages have been particularly helpful to determine an evolutionary path that seems to begin without the existence of verb agreement expressed in space and how it appears late in the life of the sign language ([de Vos and Pfau 2015](#); [Meir et al. 2010](#)). Among the emerging sign languages documented to date, the most relevant studies for our issue at hand were conducted on the following languages: Nicaraguan Sign Language, Al-Sayyid Bedouin Sign Language, Kata Kolok and Inuit sign language. Seminal work on ASL and Auslan as well as Danish and Israeli sign languages describe the use of space for agreement, which motivated later studies in village communities. Table 4 provides some background information that will be used for comparison in the next subsections.

Table 4. Characteristics of various sign languages for cross-cultural comparison; based on [de Vos \(2012, p. 424\)](#), ([Meir et al. 2007](#); [Sandler et al. 2005](#); [Aronoff et al. 2005](#)), ([Senghas 2003, 2005](#); [Coppola 2020](#)), ([Schuit 2012, 2014](#); [Schuit et al. 2011](#)), [Engberg-Pedersen \(1993\)](#), [de Beuzeville et al. \(2009\)](#) and [Liddell \(2003\)](#).

	Total Number of Signers	Number of Generations	Age of the Sign Language (Aprox.)	Preferred FoR	Use of the Signing Space for Agreement
Kata Kolok	46	6	120?	Geocentric	NO
Al Sayyid SL	125	3	70	Geocentric?	NO
Nicaragua SL	800	3	25	?	NO-YES
Inuit SL	>40	1	60	Geocentric	YES
YMSL	16/4	2	80/20	Geocentric	YES
Israeli SL	10,000	3	90	Egocentric?	YES
Danish SL	5000	2	200	Egocentric?	YES
ASL	250,000– 500,000	more than 8	200	Egocentric	YES

The use of space to express grammatic categories, specifically agreement, has been explored in these languages but, more importantly, very similar tasks have been conducted with signers, making a cross-cultural comparison possible. Such an attempt based on published materials is proposed in Table 5.

Table 5. Cross-linguistic comparison of verb agreement, based on [de Vos \(2012, p. 424\)](#), ([Meir et al. 2007](#); [Sandler et al. 2005](#); [Aronoff et al. 2005](#)), ([Senghas 2003](#); [Senghas et al. 2004](#)), ([Schuit 2012, 2014](#); [Schuit et al. 2011](#)), [Engberg-Pedersen \(1993\)](#), [de Beuzeville et al. \(2009\)](#) and [Liddell \(2003\)](#).

		Plain Verb (In/Out Movement)	Agreement (Use of the Signing Space)	
			Single Agreement Verbs	Double Agreement Verbs
Kata Kolok				
Al Sayyid SL				
Israeli SL	1st Gen.			
	2nd Gen.			
	3rd Gen.			
YMSL	1st Gen.			
	2nd Gen. Deaf & BB			
Inuit SL				
Nicaragua SL	1st cohort			
	2nd cohort			
Danish SL	Older signers			
	Younger signers			
ASL, Auslan				

Table 5 indicates that recently created sign languages in small communities tend not to display agreement and even less double agreement marking, as is the case for ABSL ([Meir et al. 2007](#); [Padden et al. 2009, 2010](#)), Kata Kolok ([de Vos 2012, p. 129](#)), the first two cohorts of NSL ([Senghas 2003](#); [Senghas et al. 2004](#)) and the first two cohorts of ISL ([Padden et al. 2010](#)). Interestingly, the development of Danish sign language also follows a similar pattern ([Engberg-Pedersen 1993](#)). On the other end of the spectrum, later generations of signers and older sign languages, such as ASL or Auslan, for instance, make use of all three verb types. However, [de Beuzeville et al. \(2009\)](#) remind us that the use of double agreement verbs, although available, remains quite rare in everyday use (around 20% of all verb occurrences; see also [Bauer \(2014\)](#) for similar findings in Yolngu sign language in Australia).

A review of the literature indicates that the evolutionary path seems to be a robust tendency cross-linguistically. YMSL already has signers from the first generation who are able to use all three verb types, albeit not systematically, in the task. At first glance, YMSL seems to be an exception, but [Schuit \(2014\)](#) documented the use of verb agreement in Inuit sign language (IUR) also from first generation signers. What factors might contribute or restrain the early use of the signing space for agreement in emerging sign languages? Several explanations have been put forward: the size of the community, the age of the sign language, the early exposure to language.

5.2.1. Size of the Community and the Critical Mass of Deaf Signers

The appearance of agreeing verbs has been suggested to be connected with the size of the community of signers, especially the deaf individuals: the more (deaf) signers a community has, the more complex and refined linguistic messages ought to be. Senghas, in her review of the cases of ABSL and NSL, considers that “a language would develop more slowly within a small community” ([Senghas et al. 2005, p. 464](#)).

Table 4 shows that languages with up to 125 deaf signers still might not have developed a double agreement verb type. Israeli, Danish or American sign languages with signers in the thousands are more likely candidates. However, Chicán has 16 deaf signers (the maximum number of signers was 19) and Nohkop only 4 and yet, both communities

display some use of double agreement verbs. Size of the community and the number of deaf signers alone cannot explain the emergence of agreement in space, at least not in the case of YMSL.

5.2.2. The Age of the Sign Language and the Number of Generations

When considering the age of the language, the number of years of existence of the language per se is not what counts but instead the number of generations. [Senghas et al. \(2005\)](#) point out that in a stage of NSL where signers already have regular contact with each other, perspective-taking (single agreement construction) tends to become more differentiated and is extended to the patient in addition to the agent role. The authors conclude that the kind of input deaf children receive has an influence on the complexity of expressing grammatical relations and marking perspective. One reason proposed is that children or new cohorts of signers build on the linguistic structures constructed by the previous generations. The authors are careful to point out that “no single age cohort can progress through the developmental stages in the order necessary to create a language in a single pass. Consequently, language genesis requires at least two cohorts of the community in sequence, the first providing the shared symbolic environment that the second can exploit” ([Senghas et al. 2005](#), p. 304).

This proposal has more explanatory power and seems to support the data from YMSL. Although signers of first generations do use single and sometimes double agreement constructions, it is notable that Chicán deaf signers from the second generation used double agreement constructions systematically in the task. Still, the generational hypothesis fails to explain why YMSL signers were able to develop double agreement verbs since the first generation. It appears that just having successive generations of signers might not be enough either, as demonstrated by ABSL with three generations or Kata Kolok with six.

5.2.3. Early Exposure to the Language

Early exposure implies that certain periods of language exposure are crucial in order to develop a more complex grammatical system. Various studies have shown that native learners display superior performance to early and late learners in their knowledge and use of agreement ([Emmorey and Reilly 1995](#); [Newport 1990](#)). However, Meier suggests that some linguistic structure might be harder to acquire: for instance, Turkish children master verb agreement around the age of 2.0 while ASL deaf children only around 3.0 ([Meier 2002](#), p. 126).

Early exposure definitely contributes to the successful development of new sign languages and the refinement of their grammatical structures, but cannot be the main explanatory criteria in the case of YMSL as signers did not learn from previous sign languages. However, exposure to gestural habits from the speakers of the surrounding community might have an effect on how to use space, as I will argue below.

5.3. *The Impact of the Geocentric Frame of Reference and the Semiotic Jump towards an Abstract Use of Space*

I will argue that the preference for the geocentric frame of reference, especially through its use in gestures among speakers of Yucatec Maya in the surrounding culture, facilitates a cognitive and semiotic jump for signers towards a more abstract use of the signing space under certain conditions. Such analysis also put emphasis on the idea that some linguistic habits of the surrounding community can be a seed for the emergence of the sign language (e.g., [Kocab et al. 2022](#)), namely the gestural habits of the speakers of Yucatec Maya.

5.3.1. Looking at Signing Space in Terms of Frames of Reference (FoR)

A study conducted by [Senghas \(2003\)](#) with various cohorts of Nicaraguan Sign Language signers compared the production and comprehension data of spatially modulated verbs of first and second cohort signers. The author concentrated her analysis on whether signers used a rotated or an unrotated representation of events (see also [Gagne 2017](#)). That

is, if presented with a video stimulus where a woman is giving a cup to a man to her right, will the signer produce the movement of the verb to his/her own right or to the left side of his/her body? A movement to the left would correspond to an unrotated representation and a movement to the right to a rotated one (Senghas 2003, p. 518). Senghas finds that while first cohort signers accept both a rotated or an unrotated layout for expressing spatially modulated verbs, second cohort signers all consistently apply a rotated representation which also limited their acceptance of the event depictions accordingly. Such innovation restrains the way signs can be produced and, in doing so, also limits what the signs can mean, and hence makes grammatical references more specific.

However, a different reading is possible taking into account spatial Frames of Reference (FoRs). In this interpretation, the rotated perspective would correspond to the egocentric FoR while the unrotated perspective to the geocentric. A schematic representation is proposed in Figure 9.

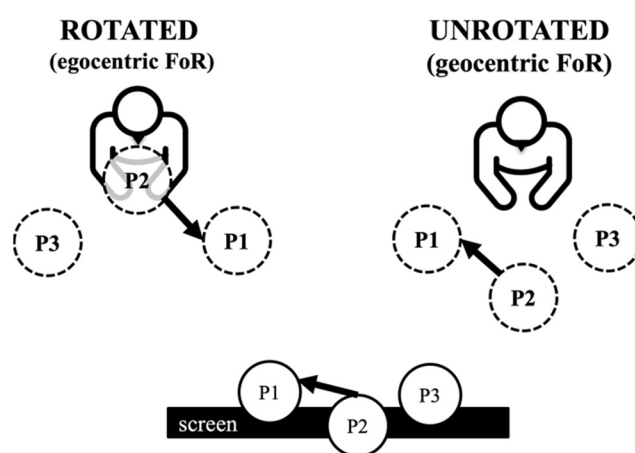


Figure 9. A new reading of Senghas (2003, p. 518)’s proposal in terms of spatial Frames of Reference. The diagrams represent the signers and the signing area as viewed from above. The circles with P1, P2 and P3 indicate where the signers created R-Loci (RL) and the arrows represent the movement of the sign performed in the signing space. This representation is based on the action presented in a video clip on the screen (represented by a black line in the bottom of the image).

In the case of the rotated perspective strategy, the point of reference to locate entities is the signer’s point of view in considering the stimulus in video. Basically, this means that the signer takes the perspective of one of the characters in this video and reproduces the movement from his/her perspective. Such a strategy implies a mental rotation from the stimulus and means that if the person in the video clip gives an object to the person on her right, the signer will produce a sign oriented to his/her own right. This use of space relies on the use of an egocentric Frame of Reference. For the unrotated perspective, one explanation is that the signer reads the same spatial arrangement but based on a geocentric frame of reference, meaning that the movement is not taken as being to the “right to the person in the stimulus” but, say, “north of the person” or “towards the door (in the real world)”. Although it might be highly counterintuitive for speakers of languages that heavily rely on egocentric FoRs (such as English or Spanish), this is actually the most common way to use space in locating objects in space in rural and non-Western communities around the world (de Vos 2012; Bauer 2014; Levinson 2003).

5.3.2. The Condition of Truth in the Use of Space

Schegloff (1984) notes that sometimes, in daily conversation, U.S. English speakers from the West Coast point to places in the real world but indicate these entities in a somewhat random manner, since the orientation of their pointing does not correspond to the actual location of the places they are mentioning. McNeill (2003) looking at the same issue among English speakers in Chicago, considers that what is at stake is the morality of

pointing and how much intersubjectivity is involved as well as the speakers' willingness to negotiate meaning. If English speakers from urban settings are able to point randomly to real places in the world without consequences, this is not the case in other cultures. Among speakers of Yucatec Maya (but also in many other settings, see Bauer (2014) de Vos (2012) or Haviland (1993), *inter alia*), one is entitled to point towards real entities and places in retaining their actual orientation (Le Guen 2011a). Doing otherwise is considered lying, hence, the significance of the "condition of truth".

Among geocentric coders (i.e., language users that prefer to use geocentric FoRs in locating objects in space), the cultural tendency to maintain real orientation is prevalent and has even been described in spontaneous narratives by Haviland (1993) among Tsotsil speakers from Mexico and in stories from deaf signers of Kata Kolok by De Vos (de Vos 2012, p. 268-ff). In these cases, it is noteworthy that direction and orientation are important and foregrounded. For instance, in the story of a shipwreck reported by Haviland, the orientation towards the sea is a crucial element and, in a narrative reported in De Vos' work, the path taken inside a tunnel cannot be modified as it implies going one way and not the other. In both cases, when the speaker changes location and orientation, (s)he will always locate the elements of the story according to their actual orientation and not based on his/her point of view at the place and time of the narration.

While culturally prevalent, speakers and signers do not always stick to these principles, specifically when they judge that the spatial location or orientation of the entities is not that crucial (or that it can be backgrounded) and the story can be told in a more abstract spatial setting, usually relying on an intrinsic frame of reference (in which both cardinal directions and the signer's point of view are irrelevant). In such narrative contexts, both entities are located with respect to one another and not according to their real-world orientation (a fact also acknowledged in De Vos' data). Such differentiation in the use of space is crucial and understanding how truth conditions can be cancelled by the signers provides one key to explain why they are able to make a semiotic jump towards placing entities in the signing space in an abstract manner.

In the task used in his study, the setting, the people involved and the actions performed are not familiar, habitual and, crucially, not localizable in real space. As a result, it is not surprising to see signers treating it as the kind of narrative that can be freed from the spatial condition of truth. I argue that this condition is one significant argument to understand why the use of the signing space in an abstract way is possible and can give rise to an agreeing verb class. However, this criterion is not the only thing that can trigger an abstract use of space, since signers have built upon the use of allocentric localizations habitually used by Yucatec Maya speakers when talking and gesturing about spatial arrangements.

5.3.3. A Cultural Habit of Allocentric Localization

Most readers might be familiar with locating two entities in the real world using their projected point of view on a scene, locating them to the left and right (e.g., "Leaving the faculty building, I parked my car at the right end of the parking lot"). Such a conception of space relies on an egocentric FoR from which relations between external entities are made based on the speaker/signer's transposed point of view. However, in many cultures, speakers or signers prefer to use a geocentric FoR and explain that "the well is to the south-side of the palm tree". In more extreme cases, such as among the Yucatec Mayas, an indication can be reduced to a verbal cue, such as a manner deictic, and it is a gesture oriented according to the real-world orientation that provides the relevant spatial information, as in the following statement *le áasulero máa bey yanika'*? (accompanied by a waving gesture towards the north) "isn't the Azulero (a shop) located like this (=on the north side)?"³

Yucatec Maya speakers have a habit of using an allocentric perspective when locating two entities with respect to one another. To do so, they place both entities in the gesturing/signing space but, instead of using their point of view, they rely on external anchors, such as cardinal directions or salient elements in the world. In such types of locative

constructions, the body is not considered, not even the projected point of view, so the use of the left and right becomes irrelevant. What is central however, is the positioning of the entities according to their real-world orientation. Consequently, speakers make use of the symbolic space all around their body, locating the entities either in front of them, on each side of the body or even behind them (see [Le Guen \(2011b\)](#) for examples).

In order to illustrate this strategy, consider the following example in Figure 10 where a deaf signer from the second generation in Chicán was asked to perform a task similar to the one used in [Le Guen \(2011b\)](#). In Figure 10, the signer is facing East and the array she has to describe is located on the other side of the village. The signer was asked to locate the water tank with respect to the *comisaria* (the local administrative office). From where she is sitting, the arrangement stands to her back. She first mentions both entities using NPs and then places them in the signing space. However, her placement is not random, nor does it rely on her projected point of view (using an egocentric FoR), and she correctly locates the water tank south of the soccer field (where the *comisaria* is situated). Such a strategy uses the signing space symbolically but also respects the requirement of the truth condition exposed above and is performed with a geocentric FoR.

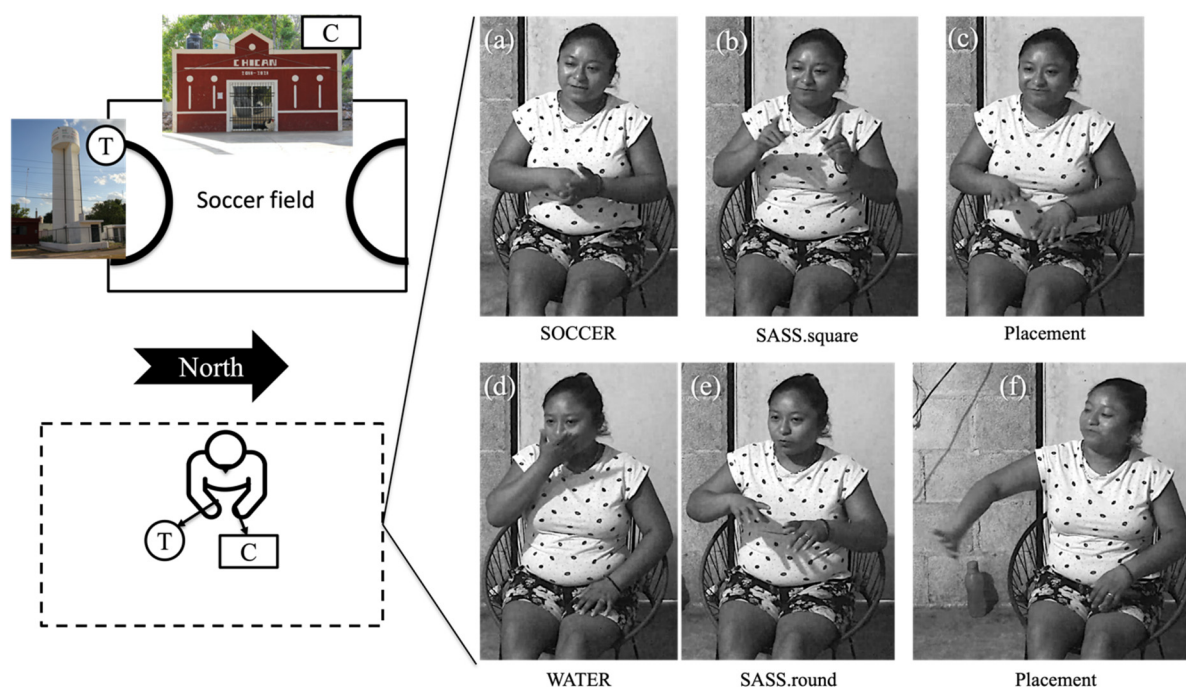


Figure 10. Spatial localization using the geocentric FoR, in placing the entities in the signing space according to their real-world orientation (on the left are diagrams that represent the array of objects and the signers and the signing area as viewed from above). “The soccer field (=comisaria) (a,b) is here (c), and the water tank (d,e) is there (=south of the *comisaria*) (f)” (Deaf signer from second generation of Chicán).

This same task was conducted with all the deaf signers in Chicán and results show that signers use the space around their body quite like Yucatec Maya speakers. When asked to locate two entities distant from their current location (but within their village), the great majority of signers placed them in the signing space according to a geocentric FoR, that is, according to their real-world orientation (see [Tuz Baas forthcoming](#) for more detail).

5.3.4. Towards an Arbitrary Use of the Signing Space

The explanation I propose is that signers behave like Yucatec Maya speakers in their use of space for spatial localizations. Signers also locate spatial arrangements based on their real-world orientation, using the signing space symbolically. However, when it

comes to agreement, speakers have an oral language to express these relations. Because YMSL is a visual medium, signers can recruit the spatial localization strategy and, putting on hold the truth conditions, they can now assign arbitrary points in the signing space to unknown entities (i.e., creating pronouns) and establish relations between them (i.e., marking agreement with the verb's movement). Such recruitment of local norms for the use of space in the surrounding culture seems to be a better explanatory factor as for why signers were able to use the signing space symbolically even since the first generation of deaf signers.

6. Conclusions

Results from this study support the three stages of evolution from the use of un-inflected verbs towards the emergence of a more grammatical use of space with single agreement and then double agreement verbs. However, the striking element in the present study is the early appearance of agreement in space in YMSL as compared to other emerging sign languages that have been documented to date. The proposed explanation is that the use of a geocentric Frame of Reference and the habits of Yucatec Maya speakers to use the gesturing space symbolically is what steers deaf signers towards a more arbitrary use of the signing space. Deaf YMSL signers from the first generation also habitually locate entities in the space around their body respecting real-world orientation. The hypothesis is that they rely on this habit and extend it to the creation of R-loci and verb agreement constructions in the signing space. As pointed out by [Meier \(2002\)](#) and [Senghas et al. \(2005\)](#), second and subsequent generations of signers usually improve on and systematize the language, and this is clearly what second generation YMSL deaf signers are doing in employing double agreement constructions systematically in the task. While this explanation holds for the early emergence of agreement in YMSL, it might not directly apply to ABSL or Kata Kolok, for instance, and each group follows its own specific pace, with various local constraints on the language.

Documenting and taking into account the surrounding culture proves fundamental to understand emerging sign languages' linguistic structures, although it is too often overlooked. The YMSL data shed light on an issue sometimes ignored, that is, the potential richness of first generation signers and homesign systems, as well as the importance of the cultural setting and gestural habits of the surrounding culture in which a new sign language emerges.

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Conflicts of Interest: The author declares no conflict of interest.

Notes

- ¹ Results for the use of buoys were collapsed with the no-marking strategy as it only accounts for one participant.
- ² Different authors refer to syntactic roles such as subject and direct or indirect object, and others prefer semantic roles like agent and patient or source and goal. For our purposes here, these terms are used interchangeably.
- ³ For a more detailed discussion, see [Le Guen \(2011b\)](#) who describes in detail the integration of spatial gestures in speech based on the geocentric FoR among the Yucatec Maya.

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