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DE GRUYTER
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Marie Coppola

Gestures, homesign, sign language: Cultural and social factors driving lexical conventionalization

> At any given period, however far back in time we go, a language is always an inheritance from the past. The initial assignment of names to things, establishing a contract between concepts and sound patterns, is an act we can conceive in the imagination, but no one has ever observed it taking place... In fact, no society has ever known its language to be anything other than something inherited from previous generations, which it has no choice but to accept. That is why the question of the origins of language does not have the importance generally attributed to it. It is not even a relevant question as far as linguistics is concerned. The sole object of study in linguistics is the normal, regular existence of a language already established. (Saussure [1916: 105] 1983: 71)

The question of where words come from has a long history. In addition to the Saussure quote above, this question has also been raised in the context of child language acquisition (see, for example, Brown, 1958; 1968). The current work asks which factors influence the emergence of lexical forms and their conventionalization in an emerging language. This question is notoriously difficult to address, given that extant (spoken) languages generally have very long histories, quantified by millennia rather than by centuries. The study of spoken languages that have emerged as the result of language contact (e.g., pidgins, creoles) do not address this question directly because they have access to both the lexicons and the grammars of the existing contributing languages in contact. Further, as noted, today's spoken languages are temporally too far from their origins to be informative about the origins of their words. In contrast, sign languages are very young relative to spoken languages. A form of Turkish Sign Language used at the Ottoman court 500 years ago has been reported to be the earliest possible sign language (Zeshan, 2003). Most recently researchers have documented the emergence of Nicaraguan Sign Language (~40 years old, Kegl and Iwata, 1989), Kenyan Sign Language, around 45 years old (Morgan et al., 2015) and Al-Sayyid Bedouin Sign Language (~80 years old, Kisch, 2004), as well as others currently being studied, some of which are reported on in this volume.

Thus, the present work uses emerging sign languages as a window into the origins of lexical items, and their conventionalization. Specifically, we use two novel methodological approaches to investigate the contributions of shared

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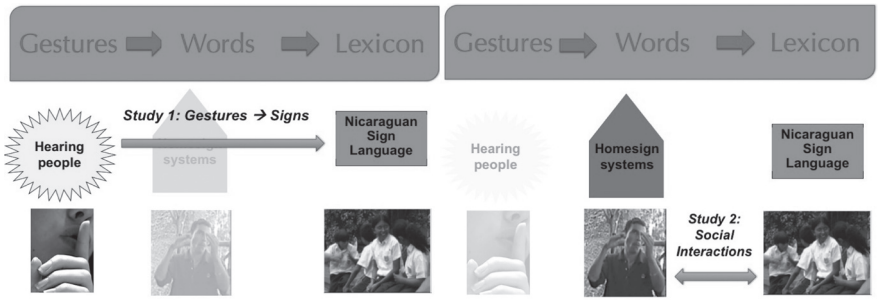
cultural knowledge (i.e., emblems and conventional gestures) (Figure 1a) and social interaction patterns (Figure 1b) to this phenomenon of how gestures become words. This chapter offers a unique account of these phenomena via almost-contemporaneous observations and documentation of Nicaraguan Sign Language (NSL), an indigenous sign language that began emerging via the natural interactions among the first members of the Nicaraguan Deaf community in the late 1970s, and detailed analyses of four homesign gesture systems used by deaf individuals in Nicaragua who are not part of this Deaf community. The next section provides brief introductions to these emerging language situations; also see the Sociolinguistic Sketch (this volume) for more details regarding Nicaraguan homesigners, NSL, and the Deaf community in Nicaragua.



Figures 1a and 1b: Study 1 (left) examines the relationship between culturally conventional gestures used by hearing, non-signing Nicaraguan Spanish speakers and the signs of Nicaraguan Sign Language (NSL) used by the Deaf community. Study 2 (right) investigates the impact of different social interaction patterns in homesign gesture systems and NSL users on the rate of conventionalization of lexical items.

The Nicaraguan Deaf community began forming in the late 1970s in multiple centers for education and training attended by Deaf people in Managua, the capital (e.g., Senghas, 1995; Senghas and Coppola 2001; Senghas, Senghas, and Pyers 2005; Polich, 2005). NSL is still developing and changing over time, as all languages do. The Deaf community now numbers approximately 1,500 signing Deaf members. The individuals who became the first members of the Deaf community, and who were the initial creators of the sign language, were likely homesigners (R. Senghas et al., 2005; Coppola and Senghas, 2010). Homesigners are deaf individuals who do not have access to linguistic input, or to a signing Deaf community. That is, they grow up in families whose members are hearing and speak Spanish (which they cannot hear), and who do not know a sign language. Homesigners in Nicaragua (and many other countries) also do not have

access to education using sign language. Thus, each homesigner creates and uses a system of gestures with their family members and neighbors, that resembles a very small, rudimentary sign language. Accordingly, homesign systems have their roots in the gestures produced by hearing speakers of Spanish (Newport and Supalla, 2000; Coppola and Senghas, 2010). These include both culturally conventional gestures[1] (also called emblems; these will be described in more detail below), as well as other gestures produced along with speech that may not be conventional. In this chapter, Study 1 examines how culturally conventional gestures contribute to the formation of lexical items in sign languages. Study 2 examines social factors that influence the conventionalization of lexical items in sign languages, specifically, the role of particular social interaction patterns.

1 Study 1: Gestures to signs

1.1 Emblems and culturally conventional gestures

Gestures are manual movements that often accompany and are tightly integrated with spoken language (McNeill 1992; Kendon 2004). Gestures may reinforce the meaning of the spoken part of the message, they may supplement it, or they may be produced without accompanying speech. Many gesture forms are ad hoc, that is, invented on the spot as needed. However, some gestures have conventional form-meaning mappings that are shared in a community or region. Authors use a variety of terms to describe such culturally conventional gestures, including *Emblems*; *Autonomous*; *Conventional*; *Symbolic*; *Lexical*; and *Quotable* (Kendon 1992, 2004; Poggi 1983, 1987; Müller and Posner 2004; Ricci-Bitti and Contento 2004; Payrató 1993). Emblems, because of these regular form-meaning mappings, are easily interpretable in the absence of accompanying speech; however, they may also be produced with speech. Ekman and Friesen (1972) define emblems as deliberate, communicative non-verbal acts that have a direct verbal translation (a word or two, or a phrase), whose meaning is known by all or most members of a group. Further, "a touchstone of an emblem is whether it can be replaced by a word or two, its message verbalized without substantially modifying

1 While this study has documented the conventional nature of such forms as they are used in Nicaragua, we do not claim here that all of these conventional gestures are unique to Nicaragua. Several of them are used in other Latin American countries (see, for example, Meo-Zilio and Mejía, 1980).

the conversation." Ekman and Friesen say only that "the person who sees the emblem usually not only knows the emblem's message but also knows that it was deliberately sent to him." In this chapter, I generally use the more neutral term "culturally conventional gesture" to refer to the forms being examined; I hope that the results reported here will serve as an evidence base for identifying emblems used in Nicaragua.

From the perspective of language emergence, emblems and conventional gestures can be viewed as "raw material" for homesign and sign language. On this view, the changes that take place as conventional (and non-conventional) gestures become incorporated into a shared community sign language can reveal humans' language-making and language-learning tendencies, and increase our understanding of how forms that are traditionally seen as non-linguistic acquire linguistic properties. This is a view outlined by Senghas, Coppola, and colleagues (e.g., Senghas et al., 2004; Coppola and So, 2005; Coppola and Senghas, 2010; Brentari et al., 2012; 2017).

Prior work has investigated how gestures become part of sign languages used by Deaf communities, as well as by village sign language communities (e.g., Marsaja, 2008; Nyst, 2007). Culturally conventional gestures may enter a sign language as lexical items, or as morphological or grammatical markers (described in more detail below). Examples include influences on number systems (e.g., as reported in *Semantic Fields in Sign Languages*, edited by Zeshan and Sagara 2016); and certain iconic gestures (Frishberg, 1975). The work described in the first part of this chapter focuses on the synchronic relationship between conventional gestures and the lexicon of an emerging language, an area that has not been documented previously. I now review some prior work describing systematic changes that have been characterized in the transition between gestures used in the hearing culture and grammatical elements in sign languages. Though the scope of this chapter does not include the developmental origins of such grammatical elements, I will argue that many of the same grammaticalization processes are evident in the gesture forms used within the non-signing hearing community, as well as in the transition from emblems and other conventional gestures to lexical items in an emerging language.

Previous research by Wilcox (e.g., 2004, 2009, among others) has discussed the developmental path of grammaticalization, beginning with gesture, and tracing how gestures may become lexical morphemes, and then grammatical morphemes. Cross-linguistically and cross-modally, certain words and gestures tend to serve as sources for these grammaticalization paths; the current work focuses on just the first part of this path, that of gesture to lexical morpheme. Wilcox (2004) has suggested two routes for how gestures may become

morphological or grammatical markers in sign languages.[2] In Route 1, a manual gesture serves as a source of a lexical or grammatical morpheme in the sign language. For example, the French gesture meaning "to go" became a lexicalized future marker in American Sign Language (ASL) (Janzen and Shaffer, 2002). Similarly, the Arab emblem indicating "Wait a moment" became a negative completive marker in Jordanian Sign Language (Hendriks, 2007). In Route 2, non-manual gesture elements, such as head movements and facial expressions, become incorporated into grammatical elements in signed languages, without ever passing through a lexical stage (Wilcox 2004; Wilcox et al., 2010). McClave (2001) argues that the subtle shifts in head position produced by hearing non-signing people in the United States became grammaticized in ASL to mark direct quotes. Pyers and Emmorey (2008) suggest that the conditional marker in ASL may have its origins in hearing non-signers' use of raised brows while producing conditional phrases in English. This chapter focuses on the process by which conventional manual gestures make the transition to lexical items; it does not address the morphological or grammatical functions of manual or non-manual gestural forms once they are part of the language.

Here we ask whether conventional gestures (emblems) commonly used by hearing Nicaraguan Spanish speakers are adopted into Nicaraguan Sign Language, and if so, whether their forms or meanings change as a consequence. The approach taken here was inspired by repeated incidents of witnessing NSL signs being produced in conversations with hearing Nicaraguan Spanish speakers who professed to be naïve to the sign language. My friend and colleague Ann Senghas and I finally realized that many of the forms we had learned as NSL signs were in widespread use by hearing Nicaraguans. After many years of field work studying NSL, I decided to document these culturally conventional gestures. Much of the prior work on culturally conventional gestures (cited above) relies on a recognition paradigm in which speakers are presented with images of conventional gestures and asked to identify or rate them (e.g., Parrill, 2008). Johnson and colleagues (1975) refined the manner of identifying a repertoire of emblems using a three-step process: emblem encoding; visual analysis of encoding; and emblem decoding.

2 Following Wilcox et al. (2010), we use the term "grammaticalization" in a broad sense "to include processes that begin not only with lexical items (the classical sense of grammaticalization in spoken languages) but also processes that begin with non-lexical material such as *visible gestures* [emphasis added] or non-lexical vocalizations including prosody and which may not have gone through a lexical stage (Heine and Kuteva, 2007; Wichmann, 2006).

The current study adds to the approach of previous work, and to the work of Johnson and colleagues specifically, in two important ways: first, it uses an elicited production paradigm instead of only a recognition paradigm (Johnson et al. used both encoding and decoding techniques, but this is relatively rare in emblem studies). Second, in contrast to the "visual analysis approach" followed by Johnson and colleagues, in which the authors used a global judgment of similarity across the motor action patterns produced by 15 informants, the gestured responses in the current study were coded in a detailed way, following the parameters underlying the formation of signs in sign languages (though, as explained later, these data are not presented here). Thus, the current work is most parallel to Morgan's (2016) study of the contributions of conventional gestures used by hearing people in the surrounding Luo culture (previously studied by Creider, 1977) to Kenyan Sign Language (KSL), another case in which gestures can be studied relatively contemporaneously with the emergence of the sign language. Though in the current work, the forms were elicited from the hearing gesturers, and compared to dictionary forms of the sign language, whereas Morgan (2016) took the converse approach.

1.2 Method

The participants were 11 hearing, monolingual Spanish-speaking Nicaraguans who have had no contact with signers of Nicaraguan Sign Language.[3] Most (9) were from a medium-sized city, and two were from a small town. Three were men and 8 were women, and they ranged in age from 18–26 years (mean age: 22.9) and had a mean education level of 1 year at university. Two hearing native Nicaraguan Spanish speakers and I collaborated to develop a list of Spanish words and phrases to elicit gesture responses. This list was intended to include both concepts that did and did not have common, culturally conventional gestures associated with them. We included words and phrases expressing a range of semantic categories and functions, which will be described in more detail below. Over the course of the study, we elicited additional familiar gesture-word associations from participants, and added them to the elicitation list. Thus, the list became quite

3 Three participants reported occasional contact with deaf individuals whose hearing loss prevents them from acquiring the spoken language around them, and who have not acquired an existing sign language. These individuals are known as homesigners, and their circumstances and gesture systems will be addressed in more detail in Study 2; also see the Sociolinguistic Sketch (this volume).

broad and contained 82 items at its maximum. Due to this procedure, and to the vagaries of fieldwork, not all items were presented to all participants. Nine items were eliminated because too few participants responded, and 8 were omitted because they were not in the NSL dictionary and their form could not be verified by other means, leaving 65 elicitation items.

I elicited gesture responses using the following simple instructions (presented in spoken Spanish): *"We have observed that Nicaraguans use their hands to say some things. I will give you some words and I would like you to show me the gestures or signs that can be used with them."* The instructions and complete list of Spanish words and phrases used in the study, along with their English translations, semantic/pragmatic category, and inclusion status is provided in Appendix A. All responses were videotaped and transcribed.

1.3 Coding

We coded each gesture form according to parameters of description drawn from the literature on sign language phonology.[4] Table 1 presents the formal parameters that were coded, as well as the reliability achieved for each parameter by independent coders. The results reported in this chapter focus on the gesture-sign relationship; however, the detailed coding of gesture forms described above also allows us to quantify the degree of conventionalization of gesture forms among hearing Nicaraguans (Coppola, in preparation), an approach that is rarely followed in the literature on culturally conventional gestures[5] (though see Nyst, 2016 for examples of detailed coding of iconic gestures produced by hearing speakers cross-linguistically).

4 The current coding scheme is relatively modest, especially with respect to handshape, and does not reflect the fine-grained distinctions made in new handshape taxonomies developed for the study of sign languages. For example, the model developed by Eccarius and Brentari (2008) contains ~150 distinct handshape configurations.

5 Nyst (2016) notes work by Sowa and Wachsmuth (2002, 2003, 2005) who use the HamNoSys annotation (Hamburg Notation System) initially developed for German Sign Language to characterize iconic gestures at the articulatory level. Bergmann and Kopp (2009) also provide the distribution of five handshapes in their dataset of the gestures used by participants while giving directions.

Table 1: Coding categories and reliability.

Parameter (and subparameters)	Reliability
Handshape	
Handshape (modified Stokoe notation)	0.94
Change of handshape (yes or no)	1.00
Number (1-handed or 2-handed)	0.90
Movement	
Direction (e.g., away from body, up and down, contact)	0.80
Type (e.g., circular, repeated, restrained)	0.80
Orientation (of palm) (e.g., toward body, toward out)	0.82
Location	0.98
Mean across categories	0.89

1.4 General characterization of responses

If every participant had been presented with all 82 elicitation items, the total number of responses would have been 902. Because not every item was presented to every participant, as described earlier, the total number of potential responses was 739. Just 34 (4.6%) of these items elicited no gesture response. Indeed, when we focus on just the 65 elicitation items that were included in the analyses, we observe that just 25 out of 637, or 4%, of elicitation items failed to elicit a gesture response overall. The number of items that did not elicit a gesture response ranged from 1 to 7 across participants, and the median was 2.5.

Thus, all together, the participants produced a total of 612 responses to these 65 elicitation items. In general, participants responded to all of the elicitation words and phrases with relative ease. Participants required occasional prompting by the experimenter to produce a gesture (27 instances total), with the experimenter prompting one participant a maximum of 8 times (the median across participants was 1.5). The ad hoc responses (those that did not match the expected conventional form) tended to be produced as quickly and effortlessly as emblems/conventionalized forms, indicating participants' high degree of comfort in using their hands to express such meanings.

Participants occasionally produced multiple responses, and some responses contained multiple gestures. In such cases, we selected for analysis the form that used the same semiotic base as the expected conventionalized form. For example, if a gesturer produced a pantomimic form depicting reaching into their

pocket and offering money to express the meaning "pay", and also produced a form resembling the conventionalized gesture meaning "pay", we selected the more conventional form for analysis. This selection process occurred for 92 out of 612 total responses or 15% (range of 4 to 15 across participants, median of 7). Participants rarely or never spoke while producing their gesture responses (even when they produced sequences of gestures), consistent with studies of hearing family members of deaf Nicaraguan children and adults who communicate using a homesign system (Coppola, 2002; Coppola, Goldin-Meadow and Mylander, 2006).

The overall gesture response rate was very high (96%). However, some classes of items appeared a bit easier for participants to produce gestures for than others (Table 2). Two categories, Object and Location, yielded a 100% response rate from all gesturers. The Object category contained the items 'rain', 'money', and 'computer', and the Location category contained the items 'outside', 'over there', and 'way over there'. Surprisingly, the Person category showed the lowest response rate (88%); participants sometimes struggled to produce gestures to refer to 'man' and 'relative' despite these being frequently discussed concepts. Note that this measure only captures *whether* a participant produced a gesture response, not the degree to which the gesture responses were similar across participants.

Table 2: Response rate for items in different semantic/pragmatic classes, in descending order. See Appendix A for the full description of elicitation items.

Type	Proportion of items that elicited any gesture response	Number of elicitation items
Object	1.00	3
Location	1.00	3
Modulator	0.99	9
Attribute	0.98	13
Function	0.97	8
Temporal	0.96	3
Action	0.95	11
State	0.94	8
Person	0.88	7
Overall	0.96	65

1.5 Analysis

To address the first research question, whether conventional gestures used by hearing Nicaraguans are adopted into Nicaraguan Sign Language (NSL), I compared the gesture forms produced by these hearing participants to the forms found in the NSL Dictionary (López Gómez et al., 1997). The National Deaf Association of Nicaragua published this first dictionary of NSL in 1997, following a series of standardization seminars that were held in the late 1980s (R. Senghas, 1997). The forms in the dictionary are quite reliable; however, it contains only about 1,000 signs. Note that the dictionary was published only about 20 years after the language began emerging in earnest in the late 1970s. Thus, some signs likely changed between then and when we collected the gesture data for this study in 2007. To identify conventional/acceptable forms for meanings that did not appear in the dictionary, or to identify forms that changed significantly since the dictionary was published, I consulted deaf and hearing informants who are fluent in NSL. Of the 19 meanings in these two categories, the NSL consultants expressed confidence in and agreement about which forms are acceptable for 11 meanings; the remaining 8 were excluded from the analysis. The items that had NSL dictionary entries (54) and the items for which the consultants felt confident about the NSL forms (11) totaled 65; these were coded according to the same parameters that were used to code the gesture responses.

1.6 Results

Despite their lack of contact with Deaf signers who use NSL, hearing gesturers in Nicaragua very often produced manual forms that are identical to those observed in Nicaraguan Sign Language signs, and these forms convey the same meanings. Figure 2 shows the distribution of the relationships between sign language and gesture forms. Ninety-two percent (60/65) of the NSL sign forms corresponding to the spoken Spanish prompts were produced by at least one gesturer in response to that specific prompt. Of those 60, 10 of the dictionary sign forms (17%) were produced by at least 80% of the gesturers who responded; 20 sign forms (33%) were produced by at least 60% of the gesturers, and fewer than half of the 11 gesturers produced the exact form for the remaining 30 sign forms (46% of the list of 65 signs associated with the elicitation items).

Only two elicitation items, *silencio* (“silence” or “be quiet”, category: modulator) and *loco* (‘crazy’, category: attribute) elicited the exact NSL sign form from every participant who produced a response. I speculate that these forms are universal among Nicaraguan gesturers and signers alike both because they

are frequently used, their forms are formationally quite simple, and also because these emblems are in use cross-culturally (they are at least shared between Central America and North America).

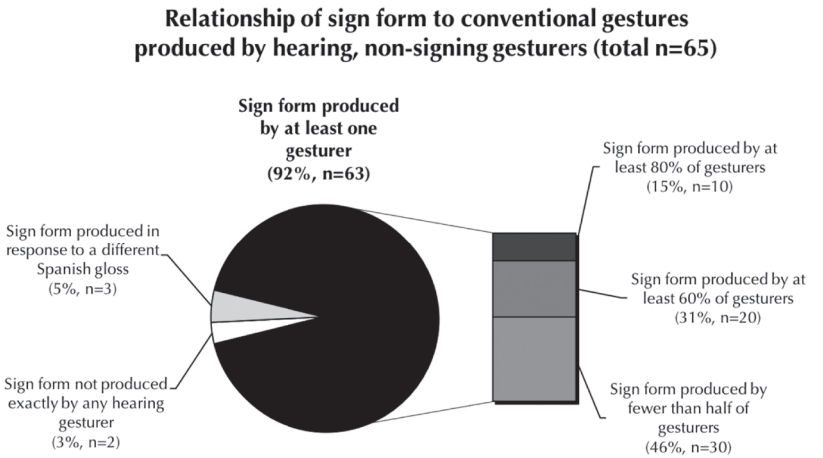


Figure 2: Distribution of gesture forms produced by sign-naïve hearing Nicaraguan participants based on overlap with NSL dictionary forms. The vast majority (92%) of NSL dictionary forms for the elicited meanings were produced by at least one hearing gesturer who has not been exposed to the sign language.

Out of the 65 NSL signs corresponding to the meanings of the elicitation items, only two NSL signs were not produced *exactly* by any gesturer for any meaning: FALL and MAN (Figure 3). For FALL, gesturers tended to produce a form with a neutral handshape, instead of the "V" handshape of the NSL sign FALL, in which the index and middle fingers are extended, pointing down, depicting the two legs of the human form. The remaining participants produced a whole-body gesture in which they mimed falling using their entire body. Although no hearing person used the 2-legs classifier-like form, of the 8 participants who produced a manual form, 8/8 participants produced the same movement and orientation on the dominant hand, and 3/8 produced a 2-handed form. For MAN, some gesturers produced a gesture (or series of gestures) indicating a man's mustache or beard. Interestingly, three of the four adult Nicaraguan homesigners studied longitudinally by the author also use the conceptual target of mustache to refer to "man" (Coppola, 2002). The NSL sign MAN appears to take as its conceptual base the broad shoulders and upper body strength of the male form (see Figure 3). However, it does not depict a physical attribute (like mustache or beard), and is

far from transparent; thus, it is unsurprising that no hearing gesturer produced it. Notably, some concepts, such as woman and man, showed little agreement among the gesture responses, despite being frequent topics of discourse.

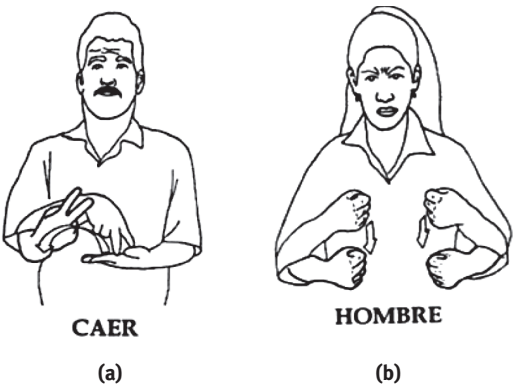


Figure 3: The NSL dictionary forms for FALL (CAER) (a) and MAN (HOMBRE) (b). Note the "V" handshape of the sign for "fall" (a).

The results reported above highlight the similarities between the forms produced by sign-naïve gesturers and the NSL forms. While many gesturers produced the exact form corresponding to the NSL sign, there was considerable variability in many of the forms produced by hearing gesturers. It is fair to say that there is a strong 'family resemblance' between many of the gesture forms and their associated sign form. Some NSL sign forms were produced by hearing gesturers in response to a Spanish prompt that differs from the meaning of the NSL sign. Examples of this type of gesture-sign relationship include the NSL sign WOMAN produced in response to the spoken Spanish prompt "you have a sexy body"; the sign KILL in response to the prompt "dead"; and the sign for SIBLING produced in response to "family". This type of "mismatch" will be discussed further in the next section.

This brings us to the second part of the research question: As forms transition from gestures to signs, do their meanings and or semantic ranges and/or shift, and if so, how? While a large proportion of gestures and signs shared a referent or gloss, we did observe some interesting shifts in meaning/reference. We explore a few examples, and what they tell us about conventionalization and grammaticalization processes, in this section.

1.7 Changes in form

As alluded to earlier, we observed changes in both form and in meaning as gestures entered the NSL lexicon. The form changes we observed with lexicalization in NSL included many of the tendencies toward arbitrariness, and away from iconicity, described in Frishberg's (1975) study of historical changes in sign form in ASL. These tendencies toward arbitrariness are manifested by systematic changes in the form of a sign; here we will discuss the following processes described by Frishberg: Displacement (e.g., centralization in the horizontal or vertical planes, see Figure 4); Assimilation/Fluidity; Symmetry (see Figure 5); and Lexical content moving to the hands (i.e., distalization, see Figure 6). As discussed by Frishberg, these tendencies "... serve to create a system of signs. Were they not present, we would find a fairly random set of gestures, without relationships between them. Rather than unstructured gestures, then, what we find [in ASL] is a regularized, interrelated, systematized set of signs which is undergoing regular, formationally based change." Surely the signs in NSL are continuing to undergo such change, as new lexical items and forms continue to be introduced into the language. The discussion here attends to the systematic changes that are already observable as gestures have become more conventionalized among non-signers. The current study capitalizes on the young age of Nicaraguan Sign Language, using the gesture forms produced by non-signers to document the intermediate stages of lexicalization evident in their journey toward becoming NSL signs.

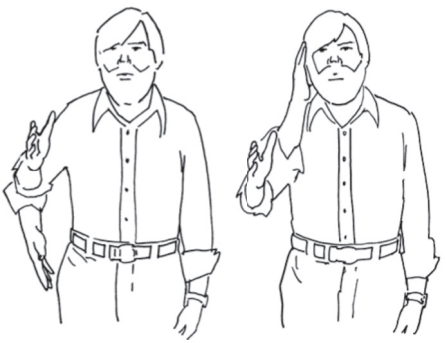


Figure 4. An ASL example from Frishberg (1975) illustrating *body displacement* (reprinted with permission). The old sign for WILL/FUTURE (a) moves upward, from the waist level, whereas the newer sign (b) shows centralization of the movement in the vertical dimension; the sign now begins at the cheek and moves forward.

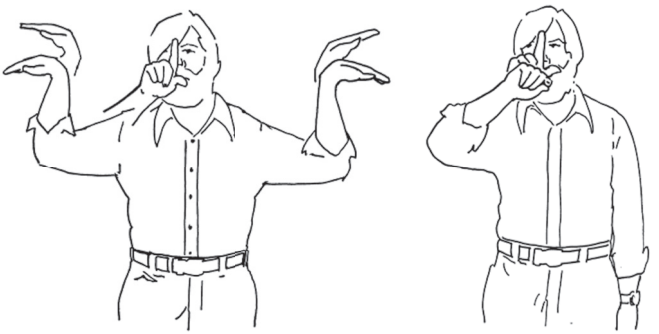


Figure 5: An ASL example Frishberg (1975) illustrating *fluidity* (reprinted with permission). The old sign for BIRD (a) was a compound of the two signs CHIRP + FLY, whereas the newer sign (b), has been shortened to just the FLY segment, reflecting the principle of fluidity. It is argued here that a similar process resulted in the simplification of the NSL sign PINCHE from two-handed to one-handed (see Figure 8).

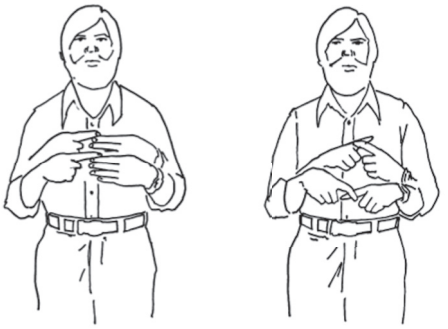


Figure 6: An ASL example from Frishberg (1975) illustrating *symmetry of hand configuration and palm orientation* (reprinted with permission). The old sign for DEPEND (a) shows a 1-handshape contacting a B-handshape with a repeated downward movement. In contrast, the newer sign (b) shows that the non-dominant hand has assimilated the 1-handshape and downward palm orientation of the dominant hand.

We consider three examples here of gestures that exemplify a subset of the grammaticalization processes described by Frishberg. We provide dictionary

images for the NSL forms and still images (and videos, where noted) of selected gesture productions, as they relate to the points discussed below.

The first example is CHILD (Figure 7). All 11 gesturers produced the same movement and orientation found in the NSL sign, as well as similar handshapes. However, we observed variation in the Location parameter for a subset of gesturers. Some gesturers produced the form much higher, much lower, or even farther away from the body, out to the side, than in the citation form in NSL, which is produced in a centralized vertical location. These gesture articulations at different heights and locations reflect the pantomimic or depictive nature of the gesturers' representation of a child, presumably corresponding to the height and/or location of an imagined child. The adaptations observed between the gesture forms and the NSL sign reflect Frishberg's principle of displacement (described above). Frishberg notes that a consequence of this formational change is a loss, or bleaching, of the semantic and indexical content of the more descriptive/iconic gesture forms.

Figure 7: The NSL sign glossed CHILD (NINO/NINA) (a) is articulated in a vertically neutral space, relatively close to the torso. While some gesture responses showed similarly neutral locations, one gesturer produced a form articulated well above her head (b), and a second gesturer produced a form that extended to the side so far away from his body that his hand went off-camera (c). For all video files, see https://www.degruyter.com/view/title/523378.

The second example is STINGY. The NSL sign for STINGY (Figure 8a) is simpler and more centralized compared to the forms produced by gesturers. Two-handed and one-handed forms were common in the gesture responses – at least two of the two-handed forms depict the notion of "the golden elbow," demonstrated by the palm of one hand tapping or otherwise indicating the bent elbow of the other arm, the hand of which is closed in a fist. The meaning of the gesture derives from the depiction of a stingy person who is unable or unwilling to bend their arm in order to reach into their pocket for their money. Here the variations in location

produced by the gesture participants (mainly in the horizontal plane, to the side of the body) become more centralized, toward the midline. This centralization appears to be simultaneous with the dropping of one hand/arm, also reflecting the influence of ease of production and pressure towards clarity and distinctiveness of forms (Slobin, 1985), as well as Frishberg's process of Fluidity.

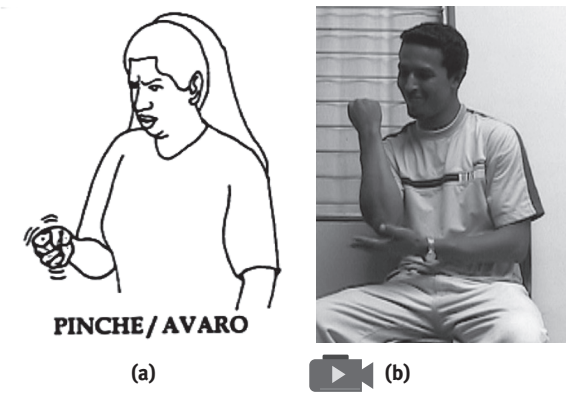


Figure 8: The NSL sign glossed STINGY (PINCHE/AVARO) (a). An example of a gesture response using two hands, that includes the closed fist of the NSL sign but also features the additional (perhaps original) component of the open palm contacting the elbow (b).

In both examples, we observed variation among gesture participants in the vertical and horizontal location of gestures. Generally, gesturers used non-neutral locations (high, low, or lateral signing space), whereas the NSL sign is produced in a more neutral location. In the CHILD example, the semiotic content contained in the location of the gesture, that is, the indication of the child's height, is "bleached". Likewise, in the case of STINGY, these grammaticalization processes have the effect of obscuring the "golden arm" source of the STINGY gesture, further distancing it from its pantomimic origins, and making it even more arbitrary. The change from two-handed to one-handed, as well as the change in vertical location, both reflect simplification of the sign form, and result in the lexical content of the sign moving to the hands (i.e., dropping the elbow component), another aspect of the transition discussed by Frishberg (1975). As in the previous example (CHILD), the centralization of the gesture, as well as the omission of the second hand, both result in a loss of semiotic information; see Coppola and Senghas (2010) for a discussion of this semantic "bleaching" in the context of indexical points becoming nominals in the evolution of Nicaraguan Sign Language.

1.8 Changes in meaning

When gesturers respond to the Spanish prompt "sibling/relative/member of one's family", they tend to produce the form that now means "sibling" in NSL (Figure 9a). That is, the same form, tracing the vein on one's arm, indicating genetic relatedness, has a wide variety of meanings for gesturers, but only a single meaning (sibling) in NSL. This shift reflects a systematic restriction or narrowing of meaning as the conventional gesture entered the NSL lexicon. In a similar vein (no pun intended), one response to the "sibling/relative" prompt was a one-handed form produced with a U-handshape with a wiggling movement of the fingers, which turns out to be the current NSL sign meaning SIMILAR (Figure 9b). The use of this form by a non-signer to indicate "sibling" reflects a metaphorical extension of the idea of sibling similarity to indicate general alikeness.

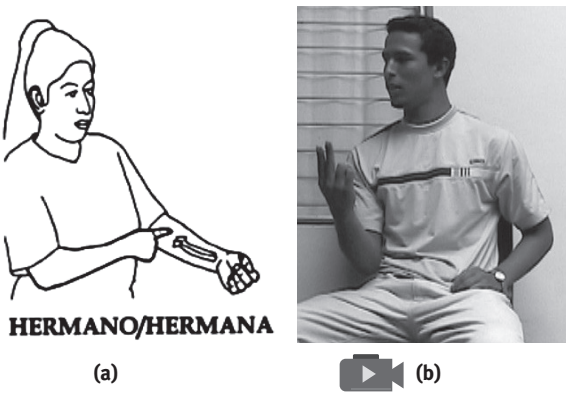


Figure 9: The NSL sign glossed SIBLING (HERMANO/HERMANA) (a) and a gesturer producing a form in response to 'sibling' whose form resembles the NSL sign SIMILAR (PARECIDO), in which two fingers are extended and alternately wiggle (b).

One large difference that drives discontinuities between co-speech gesture and emerging languages (including both individual homesign systems, village sign languages, and Deaf community sign languages, is the "density" of manual forms. That is, in a manual system that serves as a primary language (vs. gestures produced along with speech), the signs must bear the full burden of communication. Thus signs must exist in paradigmatic relation to each other instead of in relation to speech. In a paradigm, forms are systematically related to each other, and distinct from each other. One way that paradigms form is in the segmentation or separation of particular elements of a gesture or gestures, that are then recombined to express many more meanings (see Senghas et al., 2004

and Senghas, 2019 for how this plays out in the emergence of structures to express manner and path in motion events, as well as in other linguistic structures in the emergence of Nicaraguan Sign Language). These are phonological processes that we observe here, but they parallel the kinds of mechanisms that we see evidence for in the emergence of morphological and syntactic devices. For an example of how paradigms emerge and take shape in the domain of morphology, see Goldin-Meadow et al. (2007)'s analysis of how homesigning children in the US and Taiwan take the gestures they see produced by the hearing people around them and segment out different handshape and movement parameters, and begin to recombine them in productive ways that are not observed in the gestures of their hearing, non-signing parents.

This study of how conventional gestures (emblems) are adopted into the sign language emerging in Nicaragua offers an opportunity to see how such paradigms develop. In the case described above, the conventional gesture form that hearing people used to refer to relative, or a person related to one by blood, now has a much more restricted meaning, referring only to siblings. This is because the emerging sign language now takes on the role as a primary language, rather than functioning as gestures that accompany and supplement spoken language. In accord with the larger culture, the emerging language must develop terms to refer to the major kinship relations, and not only distinguish sets of individuals to whom one is or is not related by blood. That is, the users of the sign language must develop the set of kinship terms that correspond to the distinctions that are culturally relevant, including *mother, father, sibling, aunt, uncle, cousin, mother-in-law*, etc.

1.9 Changes in form illustrating the lexicalization process

We present the final example, PAY, last, because it exemplifies many of the grammaticalization processes proposed by Frishberg (1975) (see summary in Table 3). I will argue in the discussion that each participant, in a sense, represents a different stage of the lexicalization of this form. First I will describe the responses, which can be seen in the following video. One gesturer produced a gesture that pantomimed reaching into one's pocket, removing money, and offering it to another person (example A). One gesturer produced a conventionalized gesture indicating MONEY (example B), and the MONEY gesture was also incorporated into another participant's multi-gesture response that included two repetitions of the non-symmetric, two-handed gesture described in the next sentence (example C). One gesturer produced a two-handed form that matched the movement of the NSL sign, but the orientation of the non-dominant hand differed slightly from

the NSL sign, with the palm facing the body (example D). Seven out of the eleven gesturers who responded to this item produced the NSL form exactly (example E); that is, with two symmetrical index-finger handshapes, as well as the same location, orientations, and movement.

Table 3 summarizes the "progression" of different forms produced by the various hearing gesturers, beginning with a highly pantomimic production in which the participant acts out the event of paying (A). This production contains multiple segments and is very un-compact (his hand actually reaches into his pocket). This analysis serves as a kind of cross-sectional study of the grammaticalization processes operating on this gesture that is not conducted over time, but rather through analyzing the variability among gesture participants in the degree of grammaticalization of this form. In example B, the participant provides related semiotic content but does not explicitly characterize the act of paying. Example C reflects a reduction of the pantomime form described in A; this response is articulated in neutral space with more distal articulators, and reflects Frishberg's processes of fluidity and content moving to the hands.

Table 3: Summary of gesture forms produced in response to the elicitation item PAY and notes on grammaticalization processes. A video showing the forms can be viewed here.

	Description of form and number of gesturers producing this form (total = 11)	Relationship to conventional gestures or NSL signs	Relevant grammaticalization principle and notes
A	Pantomime of pulling money out of pocket and offering it (1)	Raw material for gesture/sign conventionalization.	Starting point: acting out of event; contains multiple segments, very un-compact (hand actually reaches into pocket).
B	HS:B closed, palm-up, thumb contacts fingertips rapidly (1)	Conventional "money" emblem.	Related semiotic content but does not explicitly characterize the act of paying.
C	HS:5 palm-down taps HS:5 palm-up (1)	Same location, different, symmetrical handshapes, different location, one different orientation with respect to NSL PAY.	The 'pay' component reflects a reduction of the pantomime form, even though she adds the 'money' emblem; all elements articulated in neutral space with more distal articulators. Reflects Frishberg's processes of fluidity and content moving to the hands.

Table 3: (continued)

	Description of form and number of gesturers producing this form (total = 11)	Relationship to conventional gestures or NSL signs	Relevant grammaticalization principle and notes
D	HS:U palm-down sweeps away from body across HS:U palm-toward-body repeatedly (1)	Same location, different, symmetrical handshapes, one different orientation with respect to NSL PAY.	Handshapes becoming the same reflects Frishberg's tendency toward symmetry.
E	HS:1 palm-down sweeps away from body across HS:1 palm-down repeatedly (7)	Same handshape, location, movement, and orientations as NSL PAY.	Reflects Frishberg's tendency toward symmetry for both handshape configuration and palm orientation; iconicity has been largely bleached.

In example D, the handshapes become the same, reflecting Frishberg's tendency toward symmetry (though this form, unlike the following example, retains the more iconic upward palm orientation depicting the hand holding the money). The final example, E, shares all formational features with the NSL sign and reflects Frishberg's tendency toward symmetry for both handshape configuration and palm orientation (as observed by Frishberg for the ASL sign DEPEND shown in Figure 6). An outstanding issue, given this methodological approach, is how the form came about in the NSL community context. The fact that the majority of hearing gesturers produced this form suggests that if NSL Cohort 1 signers began with this same range of forms in their multimodal input, they would have converged on the symmetrical, 2-handed, HS:1 form relatively quickly.

1.10 Prescriptive processes

Nicaraguan gesturers produced the commonly used, highly conventional forms for DRINK and EAT (Figure 10), which were the forms used by NSL signers in the earliest years of the emergence of the Deaf community. However, these are not the forms used in the dictionary, because they were deemed too iconic and gesture-like (!) during the standardization seminars held in the 1980s.

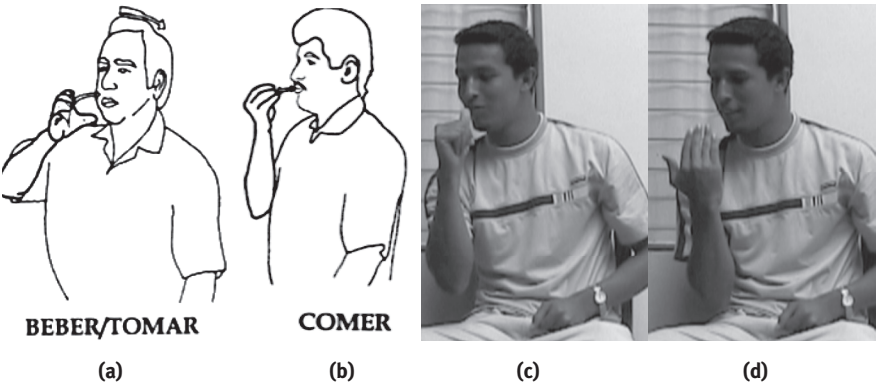


Figure 10: The NSL signs DRINK (BEBER/TOMAR) (a) and EAT (COMER) (b), compared with the highly conventionalized gesture forms DRINK (BEBER/TOMAR) and (c) EAT (COMER) (d) that were also in wide use by NSL signers in the initial period of emergence.

1.11 Discussion

One of the most striking findings of this study is that it reveals tendencies toward and processes of grammaticalization and the resulting tendencies toward arbitrariness operating on non-linguistic elements (iconic gestures) among hearing non-signers in Nicaragua. The closeness in time between the observations of these gesture forms and the emergence of Nicaraguan Sign Language permits insight into how these grammaticalization and lexicalization processes operate, particularly with respect to their time course.

The findings reported here accord with the proposal put forward by Wilcox and colleagues (2010) based on observed relationships between gestures common among hearing non-signers and the lexicons of four sign languages (ASL, Catalan Sign Language (CSL), French Sign Language (LSF), and Italian Sign Language (LIS). Specifically, they propose "that gestures in common use in the local society often enter the linguistic system of signed languages as lexical signs." These findings also support Wilcox et al.'s (2010) claim that "gestures may undergo somewhat comparable processes of changes in form and meaning (as those in grammaticalization), irrespective of whether they become integrated into a linguistic system such as LIS." They cite as an example the gesture commonly used by Southern Italians to mean 'dead', in which two straight movements become one circular movement. In a second example, they characterize the change in form between the benediction gesture (the two movements involved

in making the sign of the cross) and the gesture expressing 'dead' (one circular movement), as phonetic reduction.

Wilcox and colleagues also note that another characteristic of grammaticalization is semantic generalization (i.e., from "death" to epistemic impossibility). Note that the emerging language context offers new perspective on these processes. For example, the change in the meaning of the Nicaraguan gesture 'relative/family member' on the surface would appear to constitute a counterexample to the semantic generalization characteristic of grammaticalization to "sibling." However, a more accurate interpretation might be that this difference (from a more general meaning to a more restricted one) is a consequence of grammaticalization in the context of sparse lexical items in general, that is, tension between semantic generalization of forms and a competing need to create new lexical items in a new language.

While the synchronic perspective offered here sheds some light on how conventional gestures are recruited for sign language lexicons, some questions remain. The conventional gesture forms analyzed here could have become NSL signs in two different ways, reflecting two different time courses. Of course, this may vary across categories of semantic meaning, or even at the level of individual form-meaning pairings. The analysis presented here does not directly address the time component, that is, when the forms became fully conventionalized. Another way of asking this is: To what degree were the NSL signs conventionalized before they became used regularly by NSL signers? Specifically, the two possibilities are: 1) conventional emblems could have been adopted by signers from the uses of the "matching" NSL forms – direct importation into NSL, or 2) conventional gestures could have undergone an accelerated grammaticalization process and ended up at the same endpoint of the simplified, less iconic gesture emblem forms. This second proposal aligns with Janzen and Shaffer's (2002) argument that the gesture used in France to mean 'to go' (referred to in French as *'on se tire'*) is the original source of both the ASL and LSF (French Sign Language) forms expressing FUTURE.

The variability exhibited in the gesture forms described here represents different stages of the emergence of a conventional form, and can be considered substages of the forms' history/etymology. Different people are at different points in this process, depending on a number of factors, including, for example, frequency of the use of that gesture in various contexts. One way to distinguish these two possibilities would be to look at a larger sample of signers of Nicaraguan Sign Language to assess the variability in the form of such signs as they were produced in the very earliest stages of the emergence of the language. Study 2, described in the second part of this chapter, offers evidence that at least some lexical items were already highly conventionalized in the early stages of

the language. However, the number of participants is small and the data were not collected in the very initial stages of the language's emergence, but rather approximately 25 years after the signing community began to form.

Overall, these results are quite consistent with the findings from Morgan (2015) on the contributions of hearing Luo gesture to the lexicon of Kenyan Sign Language. She found that little from the gestural repertoire is completely lost, but that when gestures become signs, they "become more specific semantically and are subject to syntactic and phonotactic constraints" as described here for Nicaraguan gestures. In conclusion, the conventionalized gestures produced by hearing people who do not sign generally find their way into NSL; however, these forms are not always adopted faithfully into NSL.

The path from gesture to language was likely mediated by homesigners (Morford and Kegl 2000). Homesigners are deaf individuals whose limited or nonexistent exposure to sign and spoken language is not adequate for them to acquire an existing language. Homesigners across many cultures nevertheless develop a system of gestures that they use as their primary communication systems (Goldin-Meadow, 2003). In Nicaragua, the vast majority of deaf people do not have access to NSL and continue to use their homesign systems into adulthood (Coppola, 2002). Indeed, the deaf people who started the Nicaraguan Deaf community were homesigners when they met; through their interactions the language began to emerge (Senghas et al., 2005; Coppola and Senghas, 2010). Unsurprisingly, homesigners interacting with each other exploited the culturally available conventional form-meaning mappings that were being used by the hearing people around them, including their family members and friends. Of course, these forms were also available to the signers who later came to be known as Cohort 1, whose interactions formed the basis for the initial version of NSL. Present-day child and adult homesigners who have not participated in the NSL signing community also produce these culturally conventional forms.[6]

One characterization of emerging languages is that they have come out of thin air, exemplified by the title of an article about Nicaraguan Sign Language in Harvard Magazine titled "A Language Out of Nothing" (Bolotnikova, 2017).[7] The analysis presented here, as well as a number of other works that carefully compare

6 When homesigners produce NSL forms that have shifted in meaning upon adoption into NSL (such as RELATIVE becoming more restricted to mean only SIBLING), the homesigners usually retain the more general "gesture" meaning rather than the restricted NSL meaning, again reflecting the multiple layers of semiotic interpretations of sign forms, and how they are influenced by linguistic and social contexts discussed by Hoffman-Dilloway (2008).

7 Also see LeGuen et al. (this volume) for additional discussion of this point.

the visually accessible elements of multimodal communication available to deaf people who are building language systems, belies this characterization.

In sum, language creation and historical language change show similar tendencies and processes both across and within modality. For example, changes in sign languages parallel those in the grammaticalization of spoken languages (Pfau and Steinbach, 2006). Within modality, we see that Nicaraguan gestures have already undergone changes in accord with Frishberg's tendencies, presumably because they are frequently used and widely understood. The variation across individuals demonstrates that some forms are not (yet?) fully conventionalized. This analysis accords with the claim made by Wilcox and colleagues (2010) for Italian gestures, and supports Janzen and Shaffer's (2002) argument that gestures produced by hearing non-signers are a common source for lexical (and grammatical) morphemes in modern sign languages. The difference between these previous works and the current work is the greater closeness in time between the conventionalization of the gesture forms and the emergence of the sign forms, due to the relatively recent emergence of NSL. Thus, the current analysis also adds synchronic evidence for Wilcox's theory of grammaticalization in sign languages, which is based on diachronic data. Finally, these results support Wilcox et al.'s (2010: 350) suggestion that "common cognitive processes and structures underlie the development of both gestural meaning and linguistic function."

2 Study 2: The role of social interaction in conventionalization of the lexicon

Study 1 showed that culturally conventional gestures play a type of "substrate" role in seeding an emerging lexicon, though there is not always a direct mapping between the gesture forms and their meanings and the forms and meanings of the signs based in these gestures. Several factors have been hypothesized to influence the process of conventionalization of lexical items, such as community size and the degree of shared knowledge among language users. We turn now to examining the role of social interaction patterns (in particular, social network structure) in conventionalizing lexical items. Study 2a compares the process of conventionalizing lexical forms in two types of language emergence situations in which groups of people communicate on a regular basis over an extended period of time: 1) deaf homesigners and their hearing communication partners and 2) early members of the Nicaraguan Deaf community. Study 2a compares these naturalistic data and Study 2b uses a computational model to provide

additional insight into the factors driving the robustness and rate of lexical conventionalization (Richie et al., 2014). Before describing each study, we first offer some background on both types of systems.

In the literature, homesign systems have been characterized in various ways, with reference made to the availability of accessible language input or a linguistic community, level of complexity in the gesture system, number of (primary) users, and even age. Indeed, Horton (this volume) is among the first to lay out distinctions among homesigners situated in different sociocommunicative contexts. The participants in the studies reported here are all "individual" homesigners. That is, they do not regularly interact with any other deaf individuals, and they do not have regular (or indeed any) access to a community sign language, regardless of its stage of emergence. This participation in a linguistic community distinguishes homesigners from the signers of Cohort 1 of Nicaraguan Sign Language, described below. In the late 1970s in Managua, deaf students came together in two institutional contexts, an elementary school and a vocational program (Polich, 2005; Senghas et al., 2005, also see the Sociolinguistic Sketch, this volume). The first group, or cohort, of students, formed a rudimentary sign system via their interactions; these signers are referred to as Cohort 1 of Nicaraguan Sign Language. While the language had yet to develop many aspects of its structure, all of the users relied on it for communication, and the language itself emerged in the context of a linguistic community (R. Senghas et al., 2005). These conditions do not hold for any of the types of homesign systems characterized by Horton, and especially not for the individual homesigners in Nicaragua whose systems we characterize here, who do not even have access to another deaf individual in their regular communication context.

Despite the scarcity of their language input, homesigners in Nicaragua who continue to use their gesture systems into adulthood innovate a great deal of linguistic structure, which has been documented by myself and my colleagues over the last two decades, e.g., grammatical relation of subject (Coppola and Newport, 2005); pro-forms (Coppola and Senghas 2010); morphologically contrastive handshape types in adult homesigners (Brentari et al., 2012) and in a child homesigner (Coppola and Brentari, 2014); plural morphology (Coppola et al., 2013); an argument-predicate distinction (Goldin-Meadow et al., 2015); and marking of agentivity and number (Horton et al., 2015). Adult homesigners also develop lexical items in the gesture systems they use with their hearing communication partners. In a longitudinal lexical elicitation study conducted over a period of 9 years, Richie et al. (2014a) showed that while the lexical items used by homesigners and their communication partners had become more similar to each other, none of the homesigning families had fully converged on lexical

items for common objects and concepts.[8] This result is particularly striking given that each homesigner and their family members had been interacting on a daily basis for periods of time ranging between 15 and 25 years.

Many of the studies described in the previous paragraph compare the emergence and use of linguistic structures in homesign systems and Nicaraguan Sign Language. Such comparisons highlight the impact of participating in a linguistic community in which all individuals use the system as their primary language. How might being part of a linguistic community affect the process and timing of lexical conventionalization? We compared these two language emergence settings in terms of their rates of lexical conventionalization. We selected samples of individual homesign systems and NSL signing such that each would have been in use for about the same period of time. The data from the earliest NSL signers (Cohort 1) were collected in 2003, which is about 25 years after the Deaf community formed in 1978 in Managua. The data from the four mature family homesign systems were collected in 2011, by which time these homesign systems had been used in each of the four families for at least 25 years.

2.1 Elicitation Study (Study 2a)

Deaf homesigners and hearing communication partners from four Homesign family groups were included in the study. In total, these comprised four adult homesigners [3 male; aged 24 to 33 years (M=29)] and nine of their hearing family members and friends [4 male; aged 17 to 59 (M=30)]. The distribution of hearing communication partners, and their relationships to the homesigners in their families, are shown in Table 4. We compared these Homesign family groups to eight NSL Cohort 1 signers (2 males; 21–32 years, M=27).[9] The homesigners and the Cohort 1 signers were similar in age, and as noted above, each person had participated in either the family homesign system or NSL for approximately the same length of time.

The lexicon elicitation stimuli selected for comparison were 9 line drawings depicting common objects (see Figure 11 for examples). All items were familiar to the participants, and most were drawn from prior studies investigating

8 Lexical items were elicited from homesigners and their hearing communication partners in 2002, 2004, 2006, and 2011. This comparison uses the forms collected in 2011 to most closely match the length of time of use for both homesign systems and NSL.

9 We thank Ann Senghas for contributing these production data from her archive of early Nicaraguan Sign Language.

lexicalization in undocumented languages (e.g., Osugi et al., 1999), which itself was derived from Swadesh, 1971). The drawings depicted the following objects: cat, dog, cow, rain, sun, ice, egg, fish, and orange (the fruit) and were presented one at a time to each participant in order to elicit the name of each object. Participants were videotaped individually and were not allowed to see each other's productions in order to minimize the possibility that their responses would influence each other. All responses were videotaped for later analysis.

Table 4: Each homesigner serves as the center of their family's individual homesign network. Each homesign network in the current study consisted of the homesigner and 1, 2, or 3 family members. All family members are hearing and while all use the homesign system with the homesigner, none rely on the homesign system as a primary means of communication; they speak Spanish among themselves.

Family 1	Family 2	Family 3	Family 4
Homesigner	Homesigner	Homesigner	Homesigner
Mother	Mother	Mother	
Older brother	Younger brother		Younger brother
Friend	Younger sister		Younger sister

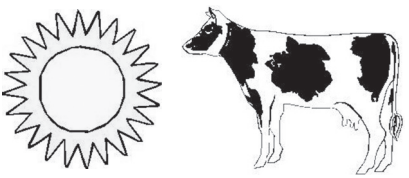


Figure 11: Examples of line drawings used as elicitation stimuli.

Each participant produced at least one gesture or sign in response to each line drawing. In line with Sandler et al.'s notion of an "iconic prototype" (2011), for the analyses presented here we used the iconic motivation for a form, rather than its phonetic realization, to categorize responses. This decision was also a practical one: the variability in the overall character of the gesture responses, reflecting different iconic motivations, would have skewed an analysis based solely in formal features. Thus, we glossed each form according to its *conceptual component*, that is, the property of the referent it encoded (e.g., we assigned the gloss HORNS to a sign that indicated horns protruding from the sides of the head of a cow). All responses could be labeled in this way, offering support for

Perniss et al.'s (2010) claim that iconicity was "an essential ingredient in the transformation of early forms of communicative interaction into the complex language systems we master today." However, as Morgan (2015) notes, both the choice of iconic motivation for depicting a referent (e.g., the salient feature for 'dog' may be *snout*, *begging paws*, or *floppy ears*) as well the ways of manifesting that choice phonologically, vary across sign languages.

2.2 Results

Each data point represents the distance between the responses produced by a pair of individuals (Figure 12), averaged across the 9 objects. For details of how this distance was calculated, see Richie et al. (2014b). The points on the right, for the homesign systems, indicate the average distance, across objects, produced by each Homesigner-Communication Partner pair (9 total). The points on the left represent the average distance, across objects, produced by every possible pair of NSL signers (because there are four NSL signers, there are six unique pairs). The distances between the NSL signer-NSL signer pairs were significantly smaller than the distances between the Homesigner-Communication Partner pairs, indicating greater degrees of conventionalization in the forms used to represent these meanings. Given that NSL and each homesign gesture system had been used for similar periods of time by the time the data were collected from participants, these findings indicate that NSL conventionalized faster than the homesign systems.

Richie and colleagues (2014a) showed that deaf homesigners slowly converge on form-meaning mappings with their hearing communication partners, but that convergence was not complete by 2011, the latest year in which this set of lexical items was elicited. This lack of full convergence is very different from what seems to have taken place in the emergence of Nicaraguan Sign Language (as described in the results and discussion sections of Study 1). These developments indicate that the NSL signers in Managua must have converged on a lexicon, at least a basic one, in less than 15 years after beginning to interact with each other. By 2011, all of the homesigners had been using their respective systems for more than 15 years, yet none of them had converged completely with any of their communication partners. What might explain this difference in rate of conventionalization between homesign and NSL? Here we consider the differences in the patterns of interaction between users of homesign systems and users of NSL. In order to determine whether social interaction patterns drive the differences we observed in the rate of lexical conventionalization between these two groups, we developed a computational model, which we describe briefly in the next section.

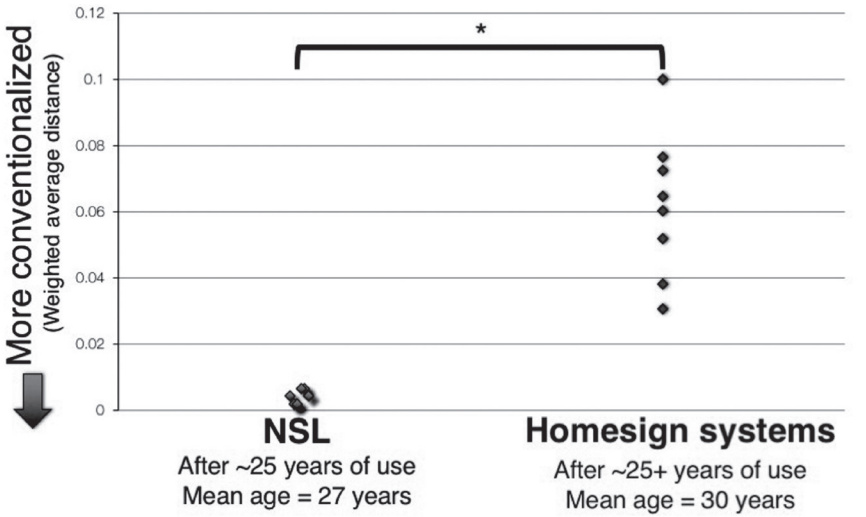


Figure 12: Average weighted distances between responses for NSL signers and Homesigners and their Communication Partners. The average distance (i.e., difference) between responses produced by NSL signers was smaller than the median distance between responses produced by Homesigners and their Communication Partners, indicating greater conventionalization among the NSL signers ($W=36$, $p < 0.01$, one-sample Wilcoxon Signed Rank test). Note that a distance of 0 reflects identical responses produced by both members of each pair.

Importantly for the present approach, these two situations, homesign and NSL, differ in one striking way (though of course other differences exist, and will be discussed later). In the Nicaraguan Deaf community, all members use NSL to communicate with each other. That is, even though not every individual interacts with every other individual, when members of the community interact, they use the shared community sign language (NSL) (as is the case with other Deaf community sign languages, Woll and Ladd, 2003; Meir et al., 2010). We call this the "richly-connected" network, or the NSL-type network. This is in sharp contrast to the homesign situation. In the homesign-type network, while each hearing family member uses the homesign system with the deaf homesigner, the hearing family members use spoken Spanish, and not the homesign, to communicate with each other. Thus, the deaf homesigner is situated at the center of a "sparsely-connected", star-type configuration, positioned as the only person who uses the homesign system as their primary language. In other words, the homesign interactive structure is one-to-many, while the NSL/Deaf community structure is many-to-many. Figure 13 depicts this salient difference in social network structure and interaction patterns that we examine closely here.

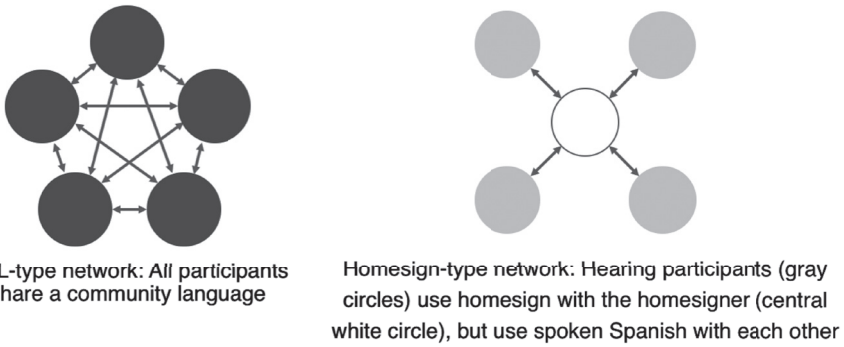


Figure 13: Members of the Nicaraguan Sign Language community are part of a "richly-connected" network, typical of most sociolinguistic settings, including in Deaf communities. In this type of network, all participants have the ability and opportunity to converse with all other participants, because they use a shared community language. In sharp contrast to this richly-connected network, in the homesign-type network, while each hearing family member and friend (referred to as "communication partners") uses the homesign system with the deaf homesigner, the communication partners use spoken Spanish, and not the homesign, to communicate with each other (note the lack of arrows connecting the light gray circles to each other). Thus, the deaf homesigner is situated at the center of a "sparsely-connected", star-type configuration, positioned as the only person who uses the homesign system as their primary language.

2.3 Computational model (Study 2b)

We developed a relatively simple agent-based computational model that captures two fundamental aspects of the process of lexical conventionalization (Richie et al., 2014b). First, the agents must be able to store a list of form-meaning mappings. Second, the individuals must be able to learn, or modify, their lexicon as the result of communicative interactions. We used a probabilistic model of language acquisition (Yang 2002, 2004) to study the dynamics of learning and social interactions in lexicon emergence. Finally, we used the model to test the hypothesis that social interaction patterns drive the observed difference in the rate of conventionalization between homesign systems and NSL.

Our simulations of the communicative interactions of agents naming a particular object used a population of 5 agents. Agents started out preferring either the use or the non-use of each conceptual component, with random probabilities, and updated their probabilities of producing a particular gesture or sign according to a set learning rate (see Richie et al., 2014b for details of the model

and its parameters). For each simulation, we ran the simulations over 2 million communication interactions.

2.4 Results

We recorded the number of interactions required for convergence, which was achieved when all 5 agents produced the same conceptual component in their response (Table 5). Recall that conceptual components were assigned based on the iconic base of a form, so that different gesture forms invoking the idea of 'horns' to express the meaning *cow* were all coded as HORNS in terms of conceptual component, regardless of the specific handshape configuration or location used. We found a significant difference in convergence time (measured in number of interactions) between the Homesign-type model and the NSL-type model ($p < 10^{-12}$). We also found a difference between the percentage of models of each type that achieved convergence: all of the NSL-type simulations converged, whereas only 80% of the Homesign-type models converged. We interpret these results to reflect the important role of a linguistic community, in which all participants use the system as a primary language, and in which all users have the opportunity to interact with one another, in the rapid convergence on lexical items. These findings offer a potential explanation for the difference in rates of conventionalization between Homesign family groups and Nicaraguan Sign Language.

Table 5: The average number of iterations required for model convergence, followed by the percentage of simulations reaching convergence in 2 million iterations (in parentheses).

Nicaraguan Sign Language	Homesign
260K (100%)	698K (80%)

2.5 Discussion

These results represent the first comparison of longitudinal or cross-sectional empirical data of naturally emerging languages with computational models of language emergence. Furthermore, results from an experimental semiotics version of this experimental design, in which hearing non-signers organized into sparsely-connected or richly-connected networks communicate meanings to

each other in the lab using gesture only, also converge with the findings from the naturalistic fieldwork data and the computational models described here (Hall et al., 2020). As suggestive as these findings may be, we must acknowledge that a different social network structure, that is, the different interaction patterns between Homesign family groups and NSL signers, is not the only way that homesign systems and NSL signers differ. NSL signers have had the benefit of formal education, whereas the homesigners have not. Formal education has been associated with greater standardization of language forms, though this has mainly been studied in the context of written forms of language, which is not what is being examined here.

However, some differences between homesigners and NSL signers do not obviously favor NSL signers in terms of predicting more rapid conventionalization. For example, the NSL signers do not live in the same households as each other, unlike the homesigners and their communication partners, who do. Indeed, the center for special education in Managua, which served as the original magnet drawing NSL signers together, was only in session in the mornings, in accord with most public schooling in Nicaragua, including schools serving hearing children. Furthermore, in the early years of the school, all instruction was in spoken Spanish, and the deaf students were discouraged from signing in the classroom, further limiting the time available for free interaction. Another possible scenario is that the homesign family networks are small enough that each individual's preferred form can be tracked, thus obviating the need for conventionalization.

Based on the convergent findings from these different methodological approaches, then, we conclude that lexical conventionalization depends on, or is at least hastened by, typical rich socio-linguistic community structures that allow interaction among a number of users who all use the language as their primary language. While we currently don't have much comparative data because few emerging languages have been documented from such early stages, and usually with varying methods, we look forward to working with our colleagues to further illuminate the influences of these social, cultural, and communicative factors in future work. To conclude, the findings of Studies 1 and 2, taken together, suggest that conventional gestures may function as "lexical" input for homesigners who are generating a linguistic system with little linguistic input, and that social interaction patterns have a measurable impact on the degree and speed of lexical conventionalization.

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Appendix A.

Instructions and elicitation items used in Study 1, their English translations, semantic/pragmatic type, inclusion status, and result.

Spanish version: "Observamos que la gente aquí en Nicaragua usa las manos para decir algunas cosas. Voy a decirte algunas palabras y quiero que me muestres los gestos o señas que se puedan hacer con ellas."
English translation: "We have observed that Nicaraguans use their hands to say some things. I will give you some words and I would like you to show me the gestures or signs that can be used with them."
The experimenter said each word or phrase aloud in Spanish to elicit a gesture associated with that meaning. The Status column indicates whether the item was included in the analyses, or excluded ("ex: few" indicates that too few participants were presented with the item or responded to the item; "ex: unverifiable" indicates that we were unable to verify the form of the NSL sign). The Result column indicates whether the NSL sign form was produced by at least one of the hearing, non-signing participants (i.e., "attested").

	Spanish word/phrase	English translation	Type	Status	Result
1	beber	to drink	action	included	attested
2	caerse	to fall	action	included	not attested
3	caminar	to walk	action	included	attested
4	comer	to eat	action	included	attested
5	dar un beso	to give a kiss	action	included	attested
6	escribir	to write	action	included	attested
7	fumar	to smoke	action	included	attested
8	pagar	to pay	action	included	attested
9	se fue	s/he left	action	included	attested
10	terminar una relación	to break up with someone	action	included	attested
11	trabajo	work	action	included	attested
12	bueno	good	attribute	included	attested
13	casado	married	attribute	included	attested
14	pinche/avaro	stingy	attribute	included	attested

	Spanish word/phrase	English translation	Type	Status	Result
15	cuerpo bonito (sobre una mujer)	nice body (about a woman)	attribute	included	attested
16	de prisa/de repente/ rápido	in a hurry/suddenly/ rapidly	attribute	included	attested
17	gordo	fat	attribute	included	attested
18	loco	crazy	attribute	included	attested
19	medio	half	attribute	included	attested
20	mucho/lleno	many/full	attribute	included	attested
21	no hay nada	there aren't any	attribute	included	attested
22	pereza/boludo	lazy	attribute	included	attested
23	rico (dinero)	rich (wealthy)	attribute	included	attested
24	rodando	rolling	attribute	included	attested
25	adios	goodbye	function	included	attested
26	dame un chat	send me a text	function	included	attested
27	dámela	give it to me	function	included	attested
28	detener un taxi	to hail a taxi	function	included	attested
29	hablamos luego	we'll talk later	function	included	attested
30	necesito que me preste dinero	I need you to lend me money	function	included	attested
31	¿qué hora es?	what time is it?	function	included	attested
32	te llamo	I'll call you	function	included	attested
33	afuera	outside	location	included	attested
34	al otro lado	way over there	location	included	attested
35	allá	over there	location	included	attested
36	cuidado	careful	modulator	included	attested
37	¡espera!	wait!	modulator	included	attested
38	no	no	modulator	included	attested
39	ojo/observar	I'm watching you	modulator	included	attested
40	¡silencio!	be quiet	modulator	included	attested
41	tranquilo/calmate	calm down	modulator	included	attested

	Spanish word/phrase	English translation	Type	Status	Result
42	vas a ver	you'll see	modulator	included	attested
43	vení	come here	modulator	included	attested
44	vete	go away	modulator	included	attested
45	computadora	computer	object	included	attested
46	dinero	money	object	included	attested
47	lluvia	rain	object	included	attested
48	bebé	baby	person	included	attested
49	cochón	gay man	person	included	attested
50	hermano/pariente	sibling/relative	person	included	attested: other meaning
51	hombre	man	person	included	not attested
52	ladrón	thief	person	included	attested
53	mujer	woman	person	included	attested: other meaning
54	niño	child	person	included	attested
55	enfermo	ill	state	included	attested
56	está haciendo calor	it's hot	state	included	attested
57	frio	cold	state	included	attested
58	miedo	afraid	state	included	attested
59	muerto	dead	state	included	attested: other meaning
60	que mal olor	what a bad smell	state	included	attested
61	tal vez	maybe	state	included	attested
62	te quiero	I love you	state	included	attested
63	ahora	now	temporal	included	attested
64	después	after	temporal	included	attested
65	ya	that's it/already	temporal	included	attested
66	abrazar	to hug	action	ex: few	

	Spanish word/phrase	English translation	Type	Status	Result
67	gritar	to shout	action	ex: few	
68	vaca	cow	animal	ex: few	
69	que interrogantes tienen las otras personas	people are nosy	attribute	ex: few	
70	alegre	happy	state	ex: few	
71	dolor de cabeza	headache	state	ex: few	
72	frustrado	frustrated	state	ex: few	
73	preocupado	worried	state	ex: few	
74	triste	sad	state	ex: few	
75	bien vestido	well-dressed	attribute	ex: unverifiable	
76	cabezón	large head	attribute	ex: unverifiable	
77	cuernudo (te fueron infiel)	cuckold/to be unfaithful	attribute	ex: unverifiable	
78	trasero bien grande	big rear end	attribute	ex: unverifiable	
79	dame ride	give me a ride	function	ex: unverifiable	
80	pedir la cuenta	to ask for the check	function	ex: unverifiable	
81	pedir una cerveza	to order a beer	function	ex: unverifiable	
82	espiealo	I am watching you	modulator	ex: unverifiable	

Part II: **Sociolinguistic sketches**

John B. Haviland

Zinacantec family homesign (or "Z")

In 2008, I began intensive research[1] with the deaf members of a family I have known well over the roughly fifty years of my ongoing ethnographic work with Tzotzil (Mayan) speakers in the highland village of Zinacantán, in the state of Chiapas, Mexico (see Map 1). "Z"—my abbreviation for Zinacantec Family Homesign—has emerged in a single extended Tzotzil-speaking family. It has developed among three deaf siblings, their hearing sister and niece, and several hearing children in a second signing generation. According to their own accounts, the members of the family have never interacted with any other deaf people. Z does not, therefore, draw on any previous sign language, although it appears to make some use of visible gestures frequent in Tzotzil conversations among hearing household members and their village-mates. A complete bibliography of publications to date about Z appears below.

Figure 1: Map showing the location of the Z signers in Mexico.

1 Thanks are due to the editors for suggesting and providing a template for this brief sociolinguistic sketch; and to Elena Collavin for helpful suggestions.

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The *municipio* or township of Zinacantán is one of a dozen or so predominately Tzotzil-speaking communities in Chiapas, with a total population, according to the 2015 Mexican intercensus survey (INEGI 2016: 252) of just over 41,000 inhabitants, living in around three dozen small *parajes* or hamlets, the largest of which is the *cabecera* or civil and religious town center, also called Zinacantán. It is a community with a long and intense history of anthropological research, which in the modern period of ethnography since the 1960s, has ranged from economics and the ritual *cargo* system (Cancian 1965), kinship and marriage (J. Collier 1968), law (J. Collier 1973), and agriculture (G. Collier 1975), to shamanistic curing (Fabrega and Silver 1973), ritual (Vogt 1976), and gossip (Haviland 1977), to mention only monograph-length studies. There are also general ethnographies of the community (Vogt 1969, 1970), and historical treatments of colonial, post-colonial, and also post-revolutionary eras in the region (Wasserstrom 1983, Rus 2012). The Tzotzil (Mayan) language of Zinacantán is also well studied, with published grammars (Haviland 1981, Aissen 2012), a study of language socialization (de León 2005), and comprehensive dictionaries, both modern (Laughlin 1975, 2007) and colonial (Laughlin 1988).

Zinacantecs, in the last century, largely dedicated themselves to peasant corn farming, although for most modern Zinacantecs slash and burn sharecropping has given way to other trades: flower-growing and trading, transport, masonry and construction work, and, even more recently, other sorts of wage labor in Chiapas towns and cities, as well as emigration farther afield. In the case of the family where Z originated and whose simplified genealogy appears in Figure 2, the father was both a corn farmer and a truck owner, who mainly delivered building timber from the Chiapas highlands to various furniture factories in the Yucatán peninsula, while his recently deceased wife maintained the household at home in the village. The deaf children grew up without schooling, unlike their hearing sisters who attended some years of primary school, and they spent much of their childhoods either aiding their mother with childcare and domestic endeavors, or working for neighbors at such tasks as washing, cooking, and, for example, candlemaking, or repackaging commercial yarns and thread for resale to village weavers. Swelling debt and financial disasters eventually meant that the family had to leave their natal home, to become landless renters in the *cabecera* or "administrative center" of the township, where their income derives from casual labor (the father, although now in his seventies, often serves as a night watchman), re-selling foodstuffs, fruit and vegetables, charcoal etc., or backstrap-loom weaving and embroidery, and, in the case of the two deaf men, irregular contract labor in local construction.

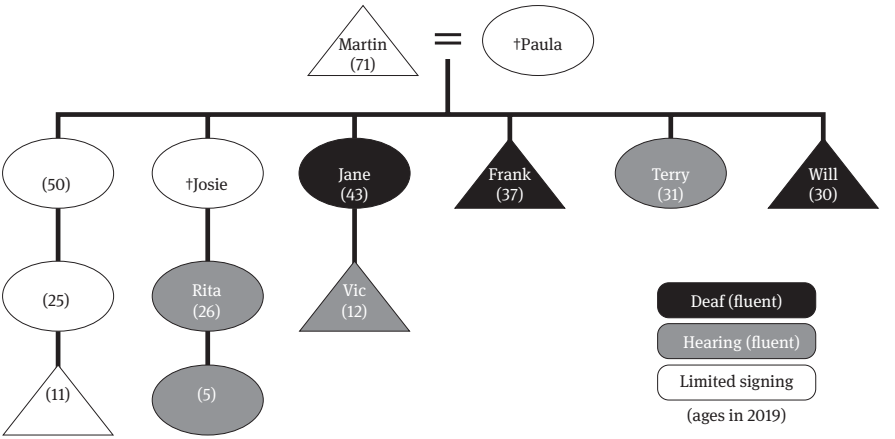

Figure 2: Simplified genealogy of the Z signers, 2019.

Z originates with Jane, born in 1976, who is, as one says in Tzotzil, *uma'*—a Tzotzil word with almost the same range of meanings as the English word 'dumb.' She is the daughter of my long-time friend Martín, whose second oldest daughter became my goddaughter at her baptism. Jane and her siblings were born and originally grew up in a smaller village on the western side of the township territory, but, as mentioned, for a variety of reasons almost the entire family moved when she was a young adult to the *cabecera* of Zinacantán. Although there are doubtless other deaf individuals elsewhere in the township (as well as in other nearby Tzotzil-speaking townships), I know of no others in either the Z family's original hometown (of around 3,000 people) nor in the somewhat larger *cabecera* where they now reside.

As the Tzotzil word *uma'*—derived from a root that suggests "hold in the mouth" (Laughlin 1975: 74)—suggests, unlike her older sisters, Jane never learned to speak. It was not until her brother Frank was born, and likewise did not talk, that the family began to suspect that both children were deaf. There followed another sister, Terry, who hears but who did not herself begin to speak Tzotzil until she was about three, and then Will, also deaf, born several years later. At some point when he was a child, one of his father's non-indigenous acquaintances (about whom I have no further information) evidently offered Frank a hearing aid. Frank quickly rejected its use, and it fell into disrepair (although he sometimes recalls and describes it).

Figure 2 shows the three deaf siblings, their hearing sister, and two further hearing native signers (a niece Rita and a nephew Vic) who grew up in this extended household with Z and spoken Tzotzil as their primary means of communication. Jane's son Vic was raised with both Z and spoken Tzotzil as his

native languages. Rita's young daughter is evidently able to understand signed interactions, but so far, she rarely attempts to sign herself; nor is she encouraged to do so. There is also a niece and her young son who have lived sporadically in the household, thereby learning some signing. The other adults in the family—the older sisters and their spouses and grown children—largely do not attempt more than minimal signing.

Z is the exclusive medium of communication for the deaf signers, and it is routinely used as well by both Terry and Rita, although mostly only in conversation with the deaf individuals. Both the parents and the other older siblings have interacted at least partially in sign with the deaf individuals over the entire course of the latter's lives, but they frequently claim to be unable to follow in detail the signed conversations between the fluent signers, and, when they feel the need, they often ask Terry or Vic for interpretation, bi-directionally. (I had the impression that Jane could at least partly lip-read the speech of her late mother, whereas neither deaf brother seemed to have developed nor been interested in such a capacity.) By contrast, Z is never used by outsiders, and, indeed, rarely performed in its efflorescent form in the presence of non-family members. None of the Z signers has attended school for more than a few weeks, and all are illiterate, although the men are able to read numbers and interpret calendars. In their work as masons, and occasionally as assistants in flower selling operations with their father's siblings, the two men sometimes travel and interact with people outside the immediate extended family. Their parents have rejected suggestions from me that the deaf brothers might earn more by joining construction crews outside the village (on the not unreasonable presumption that such crews drink up most of their wages on weekends). The parents were reluctant even to send the boys on distant selling trips, lest they become stranded and unable to return home alone. Nonetheless, in 2016 the elder deaf brother Frank (usually assisted by his younger brother Will and attended by his father, who himself had once enjoyed a distinguished ritual career as both a civil authority and in service to religious institutions) was dragooned into an official year-long *cargo* or ritual office in the Zinacantec public ritual hierarchy (see Vogt 1969, Cancian 1965). Mostly in that context, a group of Zinacantecs outside the family who were engaged in the same ritual activities had regular interactions with both men, using what amounted to nonce gestural systems to communicate with the deaf individuals.

A first generation sign language like Z is particularly compelling, especially since it has arisen in such a short time. Jane, now in her late thirties, spent the first six years of her life as the only deaf person in her community. Her deaf brother Frank was followed by a hearing sister Terry and then by Will, also deaf, born when Jane was already thirteen. Jane thus became one of Will's primary caregivers. Jane's linguistic experience, as the only deaf person in her household

(and, indeed, in her entire village) for her first 6 years, stands in marked contrast to that of Will: born into a household where his three immediate older siblings already signed. The experience of young Vic, Jane's son, was different again, as he was born hearing with a deaf mother in a household where he was surrounded by spoken Tzotzil but where most of his early caregivers communicated exclusively or by preference in the family homesign. Indeed, the proximate motive for me to begin to study Z in 2008 was that Vic, at 11 months of age, had clearly already begun to sign, even before uttering his first Tzotzil words (see Meier 2016). I made a trip to the village explicitly to ask my friend Martín if his children would work with me to teach me about their language. Although my ignorance of sign linguistics had previously made me reluctant, if not terrified, to venture into the study of Z, the challenge of working with the first—and perhaps the last—generation of a brand new language was something I as a linguistic anthropologist could not responsibly continue to ignore.

Z builds on a lexicon of invented conventional signs, supplemented by an extensive system of deictic indications, to produce highly structured, interactive, and collaborative conversation. Patterns of grammaticalized utterance structure have also emerged, with corresponding emerging grammatical categories—signed analogues of "parts of speech," for example. At the same time, variation in lexicon and apparent morphosyntax—for example, diverse patterns of use with emergent "size and shape specifiers" (Safar and Petatillo Chan, this volume)—can be observed in even this tiny sign community, along with clear metalinguistic discourses and ideologies. (See Haviland, 2011, 2013a, 2013b, 2013c, 2013d, 2014, 2015, 2016, 2017, 2019.) My own entry into the research, conducted entirely in Tzotzil and more recently in my own halting use of Z, was clearly dependent on interpretation by Terry, Rita, and more recently Vic, who also routinely serve in such a mediating role between the deaf signers and the rest of the family, not to mention with outsiders.

As mentioned, Tzotzil speakers categorize the deaf signers as *uma'* 'dumb.' As in English, the word carries the further connotation of reduced intellectual capacity. There are multiple Tzotzil expressions that mean 'deaf' but they tend to characterize the growing hearing loss that people experience as they age. One such expression—the humorously critical *pak'-jol* (literally, "daubed/patched head" [Laughlin 1975: 263])—invokes the idea that hard-of-hearing people "answer sideways" because they misunderstand what other people are saying to them. (Tzotzil is heavily endowed with disrespectful and mocking epithets for disabilities of various kinds—blindness, intellectual and physical incapacities—which, like the one just cited, often combine the rich affective or positional lexical resources of the language with particular body parts.) Another epithet, equally critical, that even family members sometimes hurl at the deaf signers, perhaps

because they routinely vocalize as they sign, is *chich* which means 'foolish,' most commonly used in the context of overly talkative children. Laughlin (1975: 117) glosses the word as "extremely loquacious, saying everything that occurs to one." Given the emphasis in Zinacantec social life placed on verbal skill and dexterity, deafness is considered a severe disability, and it diminishes the social prospects of those affected. One explanation offered for the reluctance of the Z signers to sign in the presence of non-kin is expressed by the Tzotzil word *k'exlal* 'shame.' A central dilemma for both deaf men is whether, and from where, they will ever manage to find wives because of their deafness, which seems to make them undesirable as spouses. Jane, as a single mother whose child's father refuses to acknowledge him, is considered unsuitable for marriage.

A central topic of my own ethnographic research has been the attitude toward deafness evinced by the immediate family members themselves. The deaf siblings' late mother expressed concern that the infant Vic, Jane's son, would—like his mother and uncles—never learn to speak Tzotzil, and that he should not be encouraged in his acquisition of Z signing. She frequently scolded her own children when they encouraged Vic to sign at all. At a certain point, when Vic was about three, she decreed, in fact, that he should be separated from his mother and sent to live with an older aunt who had already raised her own child, and who could teach him proper Tzotzil. The resulting experiment lasted less than half a year.

More relevant to the interactions I routinely observe between the deaf signers themselves is the fact that Jane is often ignored and dismissed by her own siblings, part of the miniature sociopolitics of talk in this tiny speech/sign community (see Haviland 2013b, 2016). As I argue in the main chapter on Z in this volume, there are both social tensions as well as humor and mutual affection in the occasional alignment of the boys (and sometimes Terry) against their sister, Jane. There is an asymmetric power structure in even the tiny Z signing community, and Jane—despite being the oldest and first signer—clearly occupies a subordinate role within it, in ways and for reasons that remain an active topic of investigation. Part of the explanation, in addition to gender inequalities more widely in the community, is surely that Z has evolved rapidly in the context of the small sign-community, with at least some innovations in lexicon and grammar that have clearly left Jane behind.

Whether Z will survive the deaf individuals, something I once was hopeful about, seems ever more dubious as Vic distances himself from his mother's native language, learns to read and write in Spanish, and moves potentially ever farther from his natal speech-sign community. Although a newly created language, Z is already severely imperiled.

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Laura Horton

A sociolinguistic sketch of deaf individuals and families from Nebaj, Guatemala

Characteristics of Nebaj, Guatemala

Nebaj[1] is a municipio[2] located in the Western region of the Quiche Department of Guatemala. Nebaj is the largest of three towns in the region known as the Ixil triangle, which shares its name with the local Mayan language. The municipio of Nebaj has 106,237 inhabitants[3] (INE 2002), with approximately 70% of the population living in rural *aldeas*, or hamlets, surrounding Nebaj. The remaining population – over 30,000 people – reside within the bustling town of Nebaj. Ixiles have been in contact with other Maya groups since the 11th century (Colby and van den Berghe 1969: 40), but the town was more isolated from Guatemala City and Quetzaltenango until a paved road was constructed to Nebaj in 1942 (Stoll 1993: 11).

Nebaj and its *aldeas* were heavily affected by Guatemala's prolonged civil war which officially began in 1960 and lasted through the 1996 signing of peace accords. During the war, more than 200,000 people died or disappeared (83% estimated to be Maya) and more than 1.5 million people were displaced (CEH 2004; Sanford 2003: 149). In Nebaj, many families fled into the surrounding mountains, where they lived for months or years, to avoid the military presence in town. Many of these Ixiles starved in the mountains or were "disappeared" (García 2014; Sanford 2003; Stoll 1993). After the war, Nebaj was the focus of significant aid and intervention from both the Guatemalan government and external Non-Governmental Organizations (Stoll 2013). The town is also home to multiple grassroots community organizations that have advocated for exhumations of massacre victims buried in clandestine graves to be interred in the local cemetery, as well as actively pursuing charges of genocide in the trial of former leader General Efraín Ríos Montt for genocide committed between 1982 and 1983 in the Ixil region (García 2014, forthcoming).

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2 In Guatemala, the 22 primary administrative subdivisions (Departments) are further divided into municipios, most similar to counties in the United States (Stoll 1993; Tax 1963). Nebaj is one of 21 municipios in the Quiche Department.

3 Population estimates vary, but this one is taken from a projection of the 2002 census (INE 2002).

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Indigenous Ixil people remain the majority of Nebaj's population today (the indigenous population was estimated to be 88.6%, INE 2011). Inhabitants continue to work 'milpas,' or family-owned plots of land, where they grow corn and other crops. Many men, but also entire families, migrate to the coast of Guatemala for weeks or months each year for wage labor on plantations or *fincas*. This pattern of seasonal migration extends back to the earliest days of the Spanish conquest, when indigenous Mayas were forced to provide free labor under the encomienda system enforced by the conquistadors (Colby and van den Berghe 1969). In the late 1960s, Colby and van den Berghe (1969) estimated that 4,000–5,000 Ixiles continued to migrate to coastal plantations for wage labor each month. The migration routes from Nebaj now extend even farther, to Guatemala City and the United States (Stoll 2013; Ibáñez-Holtermann 2011). Many of the families I know have two to four adult relatives who currently live in the US or are in the process of trying to reach the US. These women and men work and send back a percentage of their wages, known as remittances, to family still in Nebaj.

On the streets in Nebaj, it is typical to encounter an eclectic amalgam of traditional and contemporary influences. While most younger women maintain the traditional red woven skirt, or *corte*, they often pair it with a t-shirt from local stores that sell American castoff clothing, and they can be seen, seated "sidesaddle" on motorcycles and scooters, driving through the center of town. In the local market, vendors sell traditional hand-woven huipils alongside stalls filled with neon-colored plastic bowls, chairs and trashcans and mass-produced backpacks that feature American cartoon characters. The language spoken on the streets and in the market is typically Ixil, a Mayan language in the Mamean branch of the language family, spoken natively by approximately 69,000 people living in the municipios of Nebaj, Chajul and Cotzal[4] (Lewis et al. 2014; Romero 2017). Nebajeños under age 30 are typically bilingual Ixil-Spanish speakers – a consequence of loosely-enforced compulsory school attendance.

4 Residents from the towns of Nebaj, Chajul and Cotzal speak three distinct dialects of Ixil that are estimated to be 70–75% mutually intelligible (Lewis et al. 2014). In a detailed study of the three dialects, Lengyel (1991) notes significant variation both inter- and intra-dialect.

Informal survey of deaf people living in Nebaj

During my fieldwork,[5] I have met seven adults and twelve children who are deaf. I have been told about an additional 9 deaf individuals who live in the urban center of Nebaj or in nearby *aldeas*. To protect their identities, all participants are identified by pseudonyms in the this chapter. Some of the children I have worked with tell me that they had hearing aids when they were younger, and one participant showed me his hearing aid, which was missing the battery. It was not clear to me who provided the students with their hearing aids. Some students indicated that they did not like the sound of the hearing aids and stopped wearing them soon after they received them. I have not observed any of the child participants in this study to currently wear a hearing aid regularly. All participants, children and adults, lack enough residual hearing to learn spoken Ixil or Spanish.

Fourteen of the deaf participants in my study have at least one deaf relative (a parent, sibling or cousin). Of the children who are deaf, three (Sara, Rosa and Andres) have an adult relative who is deaf, either a parent (Lucia) or grandparent (Andres). Six of the child participants have a deaf sibling (Jose, Juana, Rosa, Andres) or cousin (Sara, Jose, Juana, Tomas, Diego) who is approximately the same age. Two of the deaf adult participants (Lucia and Andres) are reported to have a deaf sibling as well.[6] Demographic information from an informal survey of the community, compiled between 2013 and 2017, is presented in Table 1. The local school for special education, Escuela Oficial para Educación Especial de Nebaj, is identified by the acronym EOEE. The school is described in greater detail in the following section.

Table 1: Deaf Individuals in Nebaj and Their Relationships.

Child	Deaf Relatives	Age (first interview)	School Attendance (first year of attendance)
Sara*	*mother*, Lucia; *aunt*; *cousins,* Juana, Jose	8 (2013)	local school
Rosa*	*grandfather*, Andres; *brother*, Andres	7 (2013)	EOEE (2017)
Andres*	*sister*, Rosa; *grandfather*, Andres	1 (2013)	na

5 I began working in Nebaj in the summer of 2013 and have returned each summer since for a period of 2–6 weeks. For more detail on fieldwork methods, see Horton, this volume.

6 I was told by Lucia's husband and Andres' daughter that they each have a sibling who is also deaf, but I have not met either of the siblings in person.

Table 1: (continued)

Child	Deaf Relatives	Age (first interview)	School Attendance (first year of attendance)
Tomás*	*cousin*, Diego	10 (2013)	EOEE
Diego*	*cousin*, Tomás	13 (2013)	EOEE
Jose*	*sister*, Juana; *cousin*, Sara; *aunt*, Lucia	10 (2016)	EOEE
Juana*	*brother*, Jose, *cousin*, Sara; *aunt*, Lucia	14 (2016)	EOEE
Antonio*		6 (2015)	local school (2017)
Jacinto*		8 (2015)	local school (2016)
Alejandro*		10 (2014)	EOEE (2015) local school (2016)
Eduardo▲	unknown	na	attended EOEE, 2013
Sergio▲	unknown	na	attended EOEE, 2013
Alicia	unknown	na	unknown

Adult	Deaf Relative or Spouse	Age (first interview)	Employed	Married
Lucia*	*daughter*, Sara; *niece*, Juana, *nephew,* Jose	38 (2013)	yes	yes
Marco	*brother*, Andres	na	unknown	unknown
Andres*	*brother*, Marco; *grandchildren*, Rosa, Andres	78 (2013)	yes	yes
Jairo*		29 (2013)	yes†	no
Julio*		26 (2015)	no	no
Francesca▲	*husband*, Ramon	na	unknown	yes
Ramon▲	*wife*, Francesca	na	unknown	yes
Ana▲		na	no	no
Sergio	*wife*, Maria	na	unknown	yes
Maria	*husband*, Sergio	na	unknown	yes
Miguel	*father*, Jose	na	yes†	unknown
Jose	*son*, Miguel	na	yes†	yes
Emilio	unknown	na	yes†	unknown
David	*sister*, Paz	na	yes	no
Paz	*brother*, David	na	yes	divorced

**Participant in ongoing study of homesign systems in Nebaj*

▲I have met with this person, but they did not ultimately become a participant in the ongoing study

† A group of deaf adult men who work together to transport goods between from vendors' homes and the market

Table 1 includes demographic data about child and adult homesigners from Nebaj. The children who are deaf range from 18 months to 18 years of age. Most of the child homesigners I have worked with for the past five years were between the ages of 9 and 12 years old. I have worked with some of these children and their families since 2013 and I began working with others as recently as 2016. All of the school-aged children attend a school. Most children in Nebaj begin attending school between ages seven and nine. One child participant (Andres) is too young to attend school. Several of the child homesigners (Juana, Eduardo and Sergio) no longer go to school regularly, either because they are too old or do not want to attend. Four of the homesigners (Sara, Antonio, Jacinto and Alejandro) go to local elementary schools near their homes (typically within walking distance). As far as I have been able to tell through informal conversations with their parents, they do not receive any special services at school and attend classes with other hearing students.

Four of the homesigners attend the same school together, the local school for special education (EOEE), described below. Currently the four regular attendees are: Rosa, Jose, Diego and Tomás. Rosa just began attending EOEE in 2017, after sporadically going to her local school for two years. Juana, Jose's sister, used to attend EOEE regularly from 2013 through 2017, but she stopped wanting to go to school in 2017, preferring to stay home and help her mother. Diego and Tomás are now almost too old to continue going to school at EOEE. Tomás, who used to attend daily now only goes to school 3–4 days each week and sometimes stays home or works in his father's sewing shop.

There are at least fifteen deaf adult homesigners in Nebaj. I have met eight of the adult homesigners, and have been told about seven additional adult homesigners. In Table 1, I present additional demographic information about each of the adult homesigners, including their marital status and whether they are employed. Most of the adult homesigners I have worked with did not attend school, but approximately half are employed and half are married, in some cases to other deaf people. I discuss the integration of deaf adults into the larger community further in a later section of this chapter.

Formal education and literacy in Nebaj

School attendance is widespread across Guatemala, however, a recent survey estimates that 29–35% of people in the municipio of Nebaj are illiterate (INE 2014), and until recently many teachers at the 477 local schools were monolingual

Spanish-speaking ladinos.[7,8] As such, all classes in the schools in town were taught almost exclusively in Spanish, although the majority of students enter as monolingual Ixil speakers.[9] Today there are more teachers who are Maya, bilingual speakers, and Ixil is offered as a course in later elementary years.

As noted in the previous section, the deaf children I work with who attend regular schools do not receive interpreting services and they do not attend the same schools, so they are the only deaf student in their class and sometimes in their school. Even at the EOEE school, where several deaf students are enrolled, interpreting services are not provided, though some teachers are aware of LENSEGUA[10] and supplement their verbal instructions with signs. The deaf adults I have worked with have very low literacy skills, although some can write their names. Few of the deaf adults in Nebaj attended school, and some family members reported that this was because of their hearing loss.

The Escuela Oficial para Educacion Especial de Nebaj (EOEE)

The deaf students at EOEE sign with each other and also with other hearing students at the school, which enrolls any student with a disability. The number of students at the school varies substantially from year to year; in 2013, there were nine deaf students, seven of them male. In 2014, this number dropped to five deaf students, four of them male, and in 2015 and 2016, there were four deaf students, three of them male.

7 Ladino is the term used in Guatemala to refer to people who do not identify as indigenous. Ladinos typically speak Spanish and adopt Western styles of dress. They may or may not speak Ixil, but communicate predominately in Spanish. Historically, they are "mestizo," of mixed European and indigenous descent (Stoll 1993; Colby and van den Berghe 1969).

8 Based on a report published in 2008, Nebaj had 477 schools of various levels including pre-primary, primary and basic. There were 1,307 teachers and 43,879 students at the time of the report (de la Cruz et al. 2008).

9 Stoll (1993) suggests that immediately prior to the US-backed coup in Guatemala in 1954, revolutionary movements were leading to more indigenous school teachers. I do not know whether teachers at schools in the more rural aldeas surrounding Nebaj are more likely to be indigenous and speak Ixil, the experience of a Spanish-only classroom is based on a personal communication with a resident of Nebaj (Informal Interview, September 2017).

10 In the only published survey of Guatemalan Sign Language, Parks and Parks (2008) report that in Guatemala City, the association for the deaf, ASORGUA, uses the acronym LENSEGUA (Lengua de Señas de Guatemala). The International Organization for Standardization (ISO) uses GSM (ISO 639–3) as the official acronym.

Deaf students who attend EOEE are in the same class, and have been together in this class for at least three years. Prior to this, older deaf students were in a class together and one or two deaf students who were younger were in a different class with other hearing students. This was partly in an effort to address disciplinary issues between two deaf students who were siblings and partly based on the ages of the students. As mentioned above, there are illustrated dictionaries of LENSEGUA at the school, but none of the teachers surveyed at the school indicate that they know LENSEGUA and they report that they do not use the language when communicating with deaf students. While the deaf children who attend the school are familiar with the manual alphabet of LENSEGUA, I have only observed them using the alphabet sporadically in the classroom, primarily during interactions with teachers. The teachers report that they do not know all of the letters in the manual alphabet.

To provide instruction, teachers use the white boards at the front of the classroom, where they write sentences for students to copy into workbooks. Teachers frequently supplement instructions with manual signs and deictic gestures towards the board or other visual aids in the classroom (Figure 1c). These visual strategies to support the deaf students (who comprise approximately half of the class) are provided somewhat inconsistently, but the teachers frequently approach the deaf students separately to provide additional spoken instruction in Spanish or Ixil, supported by pantomiming an example of what the students need to do to complete the activity.

Deaf students rely on their peers as well, imitating what they are doing or copying their work directly, after they see that the teacher has stopped providing instructions. However, it is not always the case that deaf students are the ones copying hearing students. Since some of the deaf students have been attending the school long enough that they are intimately familiar with the routines of the classroom work and know what to do with very little prompting from the teacher, they often begin working on a writing activity before the teacher has finished giving instructions. This prompts hearing students to copy the work of deaf students once the teacher finishes her lesson.

Although the deaf students primarily interact with each other, they also actively engage with the other students in their class and at the school during recess and snack times. The hearing students use some of the same manual signs they observe deaf students using with each other, but the interactions between deaf and hearing students are abbreviated and punctuated by frequent misunderstandings and clarifications. The male deaf students play marbles and card games together during recess periods, leading to lengthy signed conversations and arguments.

Figure 1: Photos from the EOEE school. (a) LENSEGUA manual alphabet, posted above the door to the school kitchen (upper left), (b) a teacher indicating to students that they should look at their notebooks and copy down words from the board (upper right), (c) a classroom (lower left) and (d) the courtyard where students spend recess (lower right).

Guatemalan Sign Language and Deaf people in Nebaj

Based on informal conversations with all of the deaf people I have met and their hearing relatives, deaf people in Nebaj have minimal or no exposure to Guatemalan Sign Language, abbreviated as GSM or LENSEGUA. The first school for the deaf in Guatemala was founded in 1946. Based on a survey from 2008, there are ten schools for the deaf across the country. Three of these schools use an oral teaching philosophy, focused on teaching their students spoken Spanish. The remaining schools use a philosophy termed "total communication", including oral training and teaching in sign. I have not been able to visit any of these schools, they are located in Guatemala City, Huehuetenango, Quetzaltenango and other towns at least a half day from Nebaj by bus (Parks and Parks 2008: 8).

The Asociación de Sordos Guatemaltecos (ASORGUA, the national association for the Deaf) has published two illustrated dictionaries of LENSEGUA (De Leon 2001; Bámaca et al. 2008), and there are copies of these volumes at the EOEE school. Teachers at EOEE refer to these dictionaries sporadically, and some years the manual alphabet of LENSEGUA has been posted at the school (see Figure 1a). In the classrooms, teachers use some signs that are illustrated in the LENSEGUA dictionary, but also use signs that are local, and familiar to the students at the

school. These signs do not appear in the dictionaries of LENSEGUA, but are familiar to all of the hearing teachers at the school. When I asked acquaintances in Nebaj who do not have regular interactions with deaf people, they also recognized these gestures and could explain their meaning. For example, a sign that involves pointing to one's eye to indicate that the student should pay attention to or look at something (see Figure 1b).

Deaf-hearing interactions in Nebaj

In terms of communicative interactions between deaf and hearing people, the microcosm of the EOEE school appears to generalize to the larger community of Nebaj. In the school, deaf students freely interact with other hearing students but also engage in longer exchanges with each other where possible. Deaf people in Nebaj do not generally appear to seek the company of other deaf people over family and neighbors who are hearing.[11] One exception to this is a group of deaf men who work together in the local market to transport vendors' goods from their homes to market stalls. When working in the market, the deaf men have abbreviated signed conversations with hearing customers and vendors and are able to negotiate their responsibilities and errands with relative ease. I have observed the group of deaf men to have lengthy conversations with each other, involving teasing and what appears to be rapid, fluent signing.

Gestural exchanges between deaf and hearing Nebajeños is not limited to people who interact regularly, or to adults. I have observed interactions between deaf and hearing people, both adults and children in public and private spaces. Roberto, one of the deaf students at the EOEE school, used to work as a *lustrador*, or shoe shiner, in the central park in town. One day, while shining a customer's shoes, Roberto had an extended conversation with the man. Although he was hearing, the customer did not hesitate to engage with Roberto using improvised signs and also by acting out parts of his story.

11 This situation is similar to Maya communities described by Johnson 1991 (in Yucatan) and Fox Tree 2009 (in Nahualá, Guatemala) where they observe a general lack of Deaf solidarity. This is partly attributable to the social structure of the Nebaj community, in which the family is typically the most central unit of social interaction, similar to other Maya communities (Gaskins 1999). See Friedner (2014) and Kusters (2014), however, for alternative constructions of deaf communities in Bangalore, India (Friedner) and the Adamorobe village in South-Ghana (Kusters).

Deaf employment and social integration in Nebaj

Some deaf adult men in Nebaj are employed, with many working in the local market to transport goods from vendors' homes to their market stands. Many of the deaf men also have families with children (see Table 1). The deaf adult women primarily stay at home, although one works outside of Nebaj doing seasonal farm labor and one occasionally works outside her home making tortillas and doing laundry. Three of the deaf women have children, although one is unmarried and one is divorced.

Attitudes towards deafness and signing

Hearing parents are reluctant to speculate about the possible source of their children's deafness when asked directly. Even in families with multiple generations of deafness, some adults I spoke with did not assume that a grandchild's deafness would be related to his grandfather's deafness. In other ethnographic accounts of Maya communities in Guatemala, researchers have commented on the taboo against discussing childhood illness and disability (Fox Tree 2009: 329).

In conversations with local hearing people in Nebaj, some suggested to me that children are born deaf because something bad happened during the pregnancy or when the child was young. Parents of deaf children express concern that their children will not be able to find a job when they grow up, or could be injured, for example, if they are near a road and are not able to hear an oncoming car. Additionally, some of the people I talked with in Nebaj did not refer to deafness as a lack of hearing, but a disinclination or inability to speak, using the phrase "no tiene boca" (they have no mouth). They often insist that a person can hear, but chooses not to speak and instead communicates with their hands.

Deaf Nebajeños are thus integrated into the larger social fabric of the community, although this varies significantly by age and gender, as well as whether the family lives in town or in a more rural *aldea*. The number of related deaf individuals in Nebaj would indicate a genetic trait for deafness in some of these families, though this has not been confirmed. In ongoing work Horton (forthcoming) is examining the role of multiple generations of signers in contact within a family versus children who sign together at a local institution, like the EOEE school, on the emergence of sublexical/morphophonological structure and lexical richness in these shared homesign systems. The chapter in this volume on shared homesign systems from Nebaj presents an analysis of the lexicons of some of the child signers in this sample, with particular attention to iconic strategies used for denotation as well as the role of deictic signs and emblems from the surrounding hearing community.

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Josefina Safar and Olivier Le Guen

Yucatec Maya Sign Language(s): A sociolinguistic overview

Introduction

Yucatec Maya Sign Languages (YMSLs) are indigenous sign languages used by deaf and hearing signers in Yucatec Maya communities with a high incidence of deafness in the peninsula of Yucatán, Mexico. They are 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. So far, four signing communities with multiple deaf members have been identified: Chicán, Nohkop, Trascorral and Cepeda Peraza. The communities of study are all located within the state of Yucatán but at one to several hours drive from each other.[1]

Figure 1: Location of the YMSL communities.[2]

1 See http://ymslproject.org/map_no_Kopchen.html for an interactive map of the YMSL communities.

2 Moroz, George (2017). Lingtypology: easy mapping for Linguistic Typology. Online: https://CRAN.R-project.org/package=lingtypology. Thanks to Calle Börstell for plotting this map.

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In the peninsula of Yucatán, the YMSL project team[3] encountered some other villages with one or two deaf individuals, but it is not unlikely that further larger, yet unknown, signing communities exist in the region. The sign languages of Trascorral and Cepeda Peraza have only recently started to be investigated (Safar and Petatillo Chan, this volume; Safar, forthcoming), but a number of previous studies have been carried out on sign languages in the village of Chicán (Johnson 1991; Shuman 1980; MacDougall 2012; Fox Tree 2009; Le Guen 2012; Escobedo Delgado 2012) and Nohkop (Safar et al. 2018; Safar, in press). However, in-depth linguistic descriptions of YMSLs are still lacking.

Note that some previous publications alternatively refer to YMSL as Chicán Sign Language/*Lengua de Señas Chicana* (Escobedo Delgado 2012; Zeshan et al. 2013), Meemul Tziij (Fox Tree 2009) or Nohya Sign Language (Shuman 1980). The question of whether we are dealing with regional varieties of one common Yucatec Maya Sign Language or with distinct languages in each community is controversial and difficult to answer (see Le Guen et al. this volume; Safar 2017 for discussion). Members of the four communities have not been in contact in the past, their sign languages emerged within the last 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, Trascorral and Cepeda Peraza, the oldest signers are still alive and in Chicán, the oldest signer passed away in early 2020. None of them remembers the presence of any other deaf people or an already existing sign language in their environment when they grew up. In rural Yucatán, people traditionally travel little, transport options are limited and contact between villages is scarce if people are not kin-related. Fox Tree (2009) postulated the existence of a prehispanic, pan-Mayan sign language complex across Mesoamerica, but there is no solid evidence – neither from historical sources nor from people's memories – to sustain his claim.

Despite the lack of a historical link, YMSLs from different communities exhibit an important degree of overlap in their lexicon and beyond (Le Guen, this volume; Le Guen 2012; Safar 2017; Safar et al. 2018; Safar, in press). This, we argue, can partly be explained by their shared sociolinguistic background and their common gestural precursors (precisely, the extensive use of multimodal communication among hearing Yucatec Maya).

As for sign language "types", YMSL is best described as a village sign language or "a constellation of family sign languages" (Hou 2016 for San Juan Quiahije Chatino Sign Language). Given that, in the case of YMSL, criteria such

3 http://ymslproject.org

as intergenerational transmission, linguistic complexity or language contact are very hard to pin down, the YMSL context challenges traditional sign language classifications such as "homesign" or "village sign language" (Safar 2017). YMSL's sociolinguistic landscape forms "a multi-layered network of different villages, families, generations and overlapping deaf and hearing spaces" (Safar 2017).

Deafness in rural Yucatán

We will shortly outline the demographic composition of four YMSL communities: Chicán, Nohkop, Trascorral and Cepeda Peraza. 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 14 and 67 years old. The oldest signer was in his early eighties when he passed away in 2020. In Nohkop a family of five siblings grew up together, four of them are deaf and between 17 and 24 years old. Trascorral is home to a family of 13 siblings, six of whom are deaf and between 9 and 27 years old. In Cepeda Peraza, there are ten deaf community members from different families, who are between 28 and 47 years of age. Demographic data of the four communities is summarised in the table below (adapted from Safar 2017).

	Chicán	Nohkop[4]	Trascorral	Cepeda Peraza
Number of inhabitants	720 (Escobedo Delgado 2012)	No exact figure (around 30)	~300	~700
Number of deaf people	16	4	6	10
Percentage of deaf people	~2.2%	No exact figure	~2%	~1.4%
Age of deaf people in January 2020 (approximately)	16–67	17–24	9–27	28–47
Gender distribution of deaf people	8 female, 8 male	3 female, 1 male	2 female, 4 male	4 female, 6 male
Family distribution of deaf people	Multiple families	Siblings of one family (family of 5 siblings)	Siblings of one family (family of 13 siblings)	Multiple families

4 Nohkop is a pseudonym for a small neighbourhood of the town Chemax, chosen according to the family's wish to remain anonymous.

In Chicán and Cepeda Peraza, the high incidence of deafness most likely has a genetic reason and it has been investigated by geneticists. In both villages, many people are kin-related to each other and most deaf people have the same family name (Collí in Chicán, Chi or Ek' in Cepeda). In Nohkop and Trascorral, the origin of deafness is unknown, but it is likely to be different, given that deafness only occurs within one family. In Chicán, government programs and NGOs have carried out audiometry and distributed hearing aids to the deaf people, but deaf people do not use them and explain that they do not correspond to their needs (Dikyuva et al. 2012: 319; MacDougall 2012; Safar 2015). Cochlear implants have not been introduced to the communities. In Cepeda Peraza, a hard-of-hearing girl, who was around three-and-a-half years old at the time the mother was interviewed in 2017, has received hearing aids and her mother considered surgery for the girl to receive a cochlear implant.

All YMSLs are young languages, with a maximum generational depth of three generations in Chicán. The oldest signer in Chicán, who died in his early eighties and only had hearing children, was the only deaf person of his age group. Only the subsequent generation – today between 47 and 67 years old – included a critical mass of deaf signers. As it has been pointed out in the literature, defining "generations" in village sign language communities is far from straightforward and more fine-grained categorisations, which are well-informed by ethnographic research, are necessary (Kisch 2012). Le Guen (2012: 216) divides deaf signers in Chicán into seven "interactional groups", some of which include several, some no hearing members. There are two young deaf signers (16 and 20 years old in 2020) who were born to deaf parents and grew up in a house surrounded only by deaf people. It is important to keep in mind that even though the communities of study can be considered "family villages" (Le Guen 2012: 211), where most people know each other and many are kin-related, the specific dynamics of interaction of YMSL signers conform to general cultural interaction patterns. As customary among the Yucatec Mayas, people interact primarily with members of their own extended families. Deaf people do not socialise 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; Le Guen 2012; Safar 2017). This results in a situation where deaf signers from different interactional groups in Chicán have very little contact with each other and exhibit some differences in their signing (Safar et al., 2018; Safar and Petatillo Chan, this volume).

The deaf population of Nohkop and Trascorral is comprised by siblings of 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 went to live with their husbands, either in the same village but in

a different household or in the husband's village. In 2020, the oldest deaf signer has two hearing children (eight and five years old). The second deaf girl of the family has three hearing children (ten, six and one year old). The youngest deaf girl has a hearing baby of 11 months. All the children are acquiring YMSL as their first language. The deaf women are married to hearing men who learned the sign language through living with their wife.

In Cepeda Peraza, deaf people are distributed across five families: four pairs of deaf siblings and two young men who are the only deaf members of their families.

Languages

The main spoken language in the communities of study is Yucatec Maya, which is part of the Mayan language family. Yucatec Maya has the status of an official national language in Mexico and with around 800,000 speakers (INEGI 2010) it is one of the most widely-spoken indigenous languages in the country. Speaking Yucatec Maya is a primary index for identification with Yucatec Maya culture: people do not refer to themselves as being 'Maya' as an ethnic label but rather through language, as speakers of *maaya t'aan* or just *mayeero* 'speakers of the Maya language'.

Today, the influence of Spanish is growing and hearing community members are becoming increasingly bilingual in Yucatec Maya and Spanish (or trilingual in Yucatec Maya, Spanish and YMSL). Yucatec Maya remains the primary language of socialisation within the families, but Spanish is the dominant language in public domains, most crucially education, and children and teenagers can sometimes be observed speaking Spanish to each other. There are regional differences with regard to bilingualism and in Cepeda, parents use Spanish with their children much more than for instance in Chicán or Nohkop.

Yucatec Maya is primarily used in face-to-face settings, it lacks a written tradition and is characterised by a high use of multimodal communication (see Le Guen et al., this volume). Even though language conservation policies have attempted to establish a written standard form for Yucatec Maya, its use is restricted to specific contexts (e.g. universities) and the majority of the population (if literate) uses Spanish for written communication.

In all four communities, sign language is used in all private domains of village life. Deaf children are socialised in YMSL and acquire the sign language naturally in interaction with other deaf relatives or peers. Most hearing people in the community are competent signers, with varying degrees of fluency, depending on their proximity in kinship and their amount of interaction with deaf people.

As there is no formal teaching of YMSL, the only way of acquiring the language is through exposure and contact with other signers. The most skilful hearing signers are CODAs (Children Of Deaf Adults), younger siblings or peers. But even community members who only sporadically interact with deaf people are able to communicate with deaf people using sign language. Visitors from outside (e.g. people from other village who come to do trade), rely heavily on their gestural repertoire and often consult hearing relatives as interpreters. However, these "interpreting" situations are rather spontaneous and informal, continuous and planned interpreting does not exist (Pacheco, forthcoming).

The sociolinguistic situation of YMSLs – just like other village sign languages – is radically different from urban, national sign languages: The majority of language users are hearing L2 signers, who co-created a sign language together with a minority of deaf signers. This can occur even when the total number of deaf signers is very small. For instance, in the case of Nohkop, there are only four deaf signers who grew up with their grandmother after their mother had passed away. The grandmother has only very limited signing skills and the sign language developed between the siblings and their peers. In addition to the four deaf siblings, there are around 30 hearing signers in the extended family and neighbourhood (cousins, peers, neighbours, spouses and children of deaf women).

Spoken Yucatec Maya and YMSLs are in intense contact and specifically the conventional gestures used by Yucatec Maya speakers have an important impact on the emergence of YMSLs.

Cultural characteristics

YMSLs emerged spontaneously in settings where several deaf people were born into Yucatec Maya communities. This means that deaf signers of YMSLs share a cultural background with hearing Yucatec Maya. It also implies that the four communities of study exhibit similar sociolinguistic and cultural traits, which contributes to linguistic similarities between YMSLs from different locations (Safar 2017; Le Guen et al., this volume). In rural Yucatán, the extended family typically lives together on one family compound. Traditionally, it is a patrilocal society: after a couple gets married, they settle at the compound of the man's family. Today, we can notice a tendency towards neolocalisation, i.e. the founding of a new, independent household after marriage, which leads to changes in traditional family structure and patterns of socialisation. In Nohkop, because the first three deaf children were girls, the community dissolved in the last years,

leaving only the male deaf member and his hearing brother living with their grandmother.

As all over Mexico, both Catholic and Protestant religion have been adopted in Yucatec Maya communities. In Chicán, the population is divided into a Catholic and a Protestant part (see Escobedo Delgado 2012: 378). Cepeda is a predominantly Protestant community. The annual cycle in Yucatec Maya communities is structured by the harvest and a sequence of religious rituals and ceremonies – both traditional Maya and Christian ones.

Yucatec Maya men traditionally engage in a particular form of slash-and-burn agriculture, corn farming and the cultivation of crops (e.g. pumpkin, beans) on their *milpa* (corn field), hunting and apiculture. The women take care of the house, grind maize at the mill and prepare food, look after the children and the domestic animals (pigs, chickens, turkeys). Additionally, men and women also produce artefacts such as hammocks and embroidery. Today, new forms of income have emerged and many people commute or permanently move to nearby cities (commonly to Merida from Chicán and to Tekax from Cepeda) to seek employment. Men usually work in the construction business and women as housekeepers and babysitters. In Cepeda, several hearing men have migrated to the US over the last decades to make a living there and regularly send back money to their families (up to now, no deaf community member has left for the US). Within traditional Yucatec Maya community structures, deaf and hearing had equal professional opportunities and deaf people were not disadvantaged in terms of work. Nowadays, under the pressure of radical economic and demographic changes and the impact of globalisation, deaf community members face a new situation. Even though several deaf Yucatec Maya took on jobs outside their home villages, a change in location imposes new challenges and barriers in terms of communication and equal access (see the section on education).

Attitudes towards deafness and sign language

In their spoken language, the Yucatec Maya refer to deaf people as *kóok* (deaf), *toot* "mute" or, more commonly, using the Spanish loan *(sordo-)muudo* – the latter term is considered pejorative by Deaf communities in Spanish-speaking countries, but in the Yucatec Mayan context it does not carry any negative connotations. A common paraphrase in Yucatec Maya for 'deaf' is *mina'an ut'aan* '(those who) do not have words/voice'. Interestingly, when talking about the signed communication of deaf people, Yucatec Maya speakers use the verb *e'es* 'to show, to demonstrate' instead of *a'al* 'to say' (Le Guen 2012: 212). To say 'sign language', hearing people usually employ the Spanish loan *seenyas* 'signs'. In

YMSL, deaf people refer to themselves as HEAR-NEG/(SPEAK-NEG) 'does not hear/(does not speak)'. In Chicán, when translating an utterance from a deaf person from sign to spoken Yucatec Maya, speakers use the reportative evidential *bin* "so they say" instead of the quotative *k-* used to cite direct speech. This seems to reflect the idea that a process of translation is involved when quoting an utterance from another modality.

One crucial characteristic of the sociolinguistic environment of YMSLs are the positive attitudes of the Yucatec Maya towards deafness. As several authors have observed (Le Guen 2012; Johnson 1991; Escobedo Delgado 2012; MacDougall 2012; Safar 2017), deafness is not considered problematic in the Yucatec Maya context and deaf people are not discriminated against. This ideology is not restricted to deafness but forms part of a broader cultural understanding of difference and diversity. The Yucatec Maya consider that children are born just the way God created them and they should be accepted as they are. As a consequence, people do not view deafness as a disability but rather a trait of a person (Le Guen 2012: 212) and "a normal phenomenon" (Escobedo Delgado 2012: 378). In Cepeda, where Protestantism is prevalent, we encountered similar positive attitudes but slightly different explanations, which are more influenced by Christian values of benevolence and tolerance. In the communities of study, deaf people are included into society and fulfil similar social roles as hearing people do: they marry deaf or hearing partners, have children, pursue jobs and are assigned tasks within the community. They are viewed as competent members of society and are appreciated for their individual skills. A young deaf man in Cepeda, for instance, is regularly contacted by the municipality of Tekax to take visitors to some nearby caves because locals agree that he can guide the way better than anyone else in the village.

It is noticeable that deaf people are described as "strong-minded" by hearing people, as they often express their thoughts and emotions very directly (whereas Yucatec Mayas usually tend to favour indirectness, see Le Guen 2018). Such a behaviour might not be a character trait but more likely the result of a restriction in language socialisation practices that did not apply equally to deaf people as to hearing people, especially considering that hearing parents are usually not very proficient signers.

In Chicán and Cepeda, deaf people's marriage rate is somewhat lower than among the general population, but people are reluctant to provide an explanation for this situation. In Cepeda, only one deaf man is currently married, but several others have boy- or girlfriends.

Positive evaluations of deafness are strongly interlaced with the perception of sign language as an effective, pleasant and effortless means of communication. As Le Guen et al. (this volume) demonstrate, the Yucatec Maya make extensive

use of multimodality and are not reluctant to employ their hands, bodies and faces to express themselves. Community members acknowledge that deaf people are intelligent and can understand everything as long as it is communicated in an accessible modality, i.e. in sign language (Safar 2017). YMSL, in turn, is perceived as a fully-fledged means of communication, in which even complex topics can be discussed (Safar 2017). In Chicán and Cepeda, Jehovah's witnesses have attempted to teach villagers LSM, but people rejected these interventions, explaining that they did not feel the need to learn another sign language (Safar 2017; MacDougall 2012; Escobedo Delgado 2012: 378).

Education

What crucially distinguishes deaf from hearing Yucatec Maya are their opportunities in terms of education. Education taught in sign language is not available and deaf people attend regular hearing classes, sometimes relying on hearing peers as tutors, but in fact, sitting through their school career without being able to actively participate.[5] Apart from two young deaf people in Chicán and two in Cepeda, who finished secondary school, deaf YMSL signers received only basic schooling. In Nohkop, none of the deaf siblings attended school. While formal education and literacy is generally low among the older generation (45 and older) in rural Yucatán, the imbalance in professional opportunities is growing among deaf and hearing Yucatec Maya of the younger generation (see also Nonaka 2012 for Ban Khor Sign Language). Due to these barriers in access to education deaf community members are monolingual in YMSL and cannot read Spanish, which becomes an increasingly important requirement in the labour market. In the education system, deaf Yucatec Maya face double discrimination as deaf and as indigenous people (Poy Solano 2011).

YMSLs and language endangerment

As other village sign languages (and as many spoken minority languages) YMSLs are vulnerable to extinction (Safar and Webster 2014; Webster and Safar 2019). The sign languages of Chicán and Nohkop were classified as *severely endangered*

5 Two deaf teenagers attended a special education centre in Tekax once a week, but this school caters for students with all types of disabilities and the teacher knows only some basic LSM signs and the manual alphabet.

by UNESCO's Atlas of the World's Languages in Danger.[6] The main reason for this precarious situation lies in the decrease in birth of deaf children and in the ongoing dispersion of deaf signers (who migrate for work or move to another village with their husbands). So far, we observed only superficial language contact with LSM: some younger signers know the manual alphabet or occasionally use signs for particular lexical domains that are only partly lexically encoded in YMSL, such as colours or week days. One deaf young woman from Chicán took LSM classes (which were paid for by the family she works for in Merida), got in contact with the Mexican Deaf community and is now married to a Deaf man from Merida. She is bilingual and code-switches between LSM and YMSL. Recently, her deaf brother also moved to Merida and started working in the same business as his brother-in-law. When the siblings return to Chicán, they use YMSL with their family. So far, LSM has not had any strong impact on the structures of YMSL, but with signers' increased mobility and access to communication technology and social media, social networks and contact with the Mexican Deaf community are facilitated and we cannot predict how this will affect YMSLs in the near future. YMSLs are not officially recognised by law, but the National Institute for Indigenous Languages (Instituto Nacional de Lenguas Indígenas: INALI) supported the activities of the Yucatec Maya Sign Language Documentation Project. As an effort of language documentation and preservation, two dictionaries were compiled: one print version for YMSL of Chicán (Escobedo Delgado, in prep.) and one online dictionary including signs from Chicán and Nohkop (http://ymslproject.org/index.html#voc).

6 http://www.uclan.ac.uk/research/explore/projects/sign_languages_in_unesco_atlas_of_world_languages_in_danger.php (22/11/2018)

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Emmanuella Martinod, Brigitte Garcia and Ivani Fusellier

Sign languages on Marajó Island (Brazil)

About Marajó Island

Marajó Island (in the state of Pará in Northeast Brazil) is the world's biggest river island (see Figures 1 and 2 below). Its capital city, Soure (24 488 inhabitants), is located within a rural area where people earn their living from fishing, agriculture or farming. For instance, the buffalo is a culturally important animal as it produces quality meat and milk. Marajó buffalo cheese is a well-known specialty in the North of Brazil. As for the demography, inhabitants are descendants of mixed ancestry of indigenous people living in the Northeast of Brazil and white Europeans (known as *caboclos*).[1] Most of the population only work sporadically. Work is perceived as a way of satisfying family needs, but most people do not appreciate being bound to a profession because freedom is seen as a significant value in this traditional way of life (Ayres 1992: 143; Serre 2002).

Figures 1 and 2: Map of the Marajó Island.[2]

1 See Moran (1974) or Parker (1982) for a basic background of this notion and Ayres (1992) or Tiphagne (2005) for more detail.

2 Images from Google Map (https://maps.google.com/). Date of download : 18th November 2017.

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History of the deaf community and local sign languages

Martinod (PhD in progress) conducted two periods of fieldwork (August 2015 and March 2017). During this time, she collected data from the local sign languages (SLs) and conducted interviews with ten deaf people and ten hearing people (eight adults and two children of a deaf mother).[3] The information below comes from observations made during the fieldwork, interviews and bibliographic research in the library of the Soure annex of the Federal University of the State of Pará (UFPA)[4] where previous research on deaf people's education in Marajó is archived.

Since sign languages on Marajó are not recognized by the government, they have no official names. For convenience, we use the term *Marajó SLs* although our analysis focuses on some of the signers from Soure.[5]

The deaf people on Marajó had, until the last decade, lived relatively isolated lives among their hearing families, using homesign systems exclusively within the family circle. Since 2007 a deaf community is gradually emerging, and individual homesign systems come into contact with each other due to an initiative by the UFPA annex. The first study of deaf people of this area and their SLs was conducted in 2006 by Thianny Brito from UFPA. Brito lists fifty deaf individuals in the area. A more recent subsequent survey lists thirty deaf individuals living in Soure.[6] Following Brito's work, social gatherings had been arranged for these deaf individuals by two local disability associations,[7] leading to the formation of a deaf community in Soure. The consolidation of this emergent community was aided by the creation of communal spaces hosting various activities (e.g. games, embroidery courses), thanks to a collaboration between the UFPA and the two mentioned associations.

Some of the deaf people (six out of ten) went to school until the equivalent of the last year of middle school (about 13 years old). This year should be completed with a special exam, but none of them could pass it so they left school. They spent these schooling years in classes they could barely comprehend. Indeed,

3 Metadata has been provided in our chapter (Martinod et al., this volume).

4 *Universidade Federal do Pará.*

5 We suppose there is a lot of individual and regional variation on the island since the existence of deaf communities in other cities has been reported.

6 2010, Brazilian Institute for Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística)*.

7 *Associação de Pais e Amigos e Deficientes de Soure* (APADS) and *Amis Marajó*.

teachers were not trained to teach deaf children and did not use any SL.[8] Several deaf adults explained that at the time they went to school they stayed in the back of the classroom and simply wrote what was written on the board without understanding anything. In a study of the literacy skills of five Sourense deaf students during the Brazilian equivalent of Grammar school and Middle school (aged 7–12), Ramires (2012) showed that none of the participants was able to master the alphabetic system through reading or writing. Another study (Do Socorro 2012) emphasized the urgent need for schools of the city to adapt to deaf students in terms of teacher training.

The associations organizing activities for the deaf stopped in 2012 due to lack of resources. To our knowledge, at least four deaf women who formed the strongest connections and could socialize freely, continued to meet regularly outside the association framework, thereby reinforcing the contacts between their individual SLs. The others seemed to return to the isolated conditions they lived in before 2007 living with their hearing family and communicating with them through familiolects that remain poorly studied for the moment.

We observed that the frequent population movements and the tendency of hearing families to protect their deaf members keeps preventing the community from strengthening through frequent meetings. This has also been confirmed by a teacher working in one of the associations for the deaf (APADS). Hearing families indeed often go on extended family visits to other areas of the island. This is a part of the Brazilian culture where family remains an important kernel in people's life, whatever their age or their social status. If a member of the family happens to be disabled, the family is expected to take care of him (Marques 2010).

The Marajó context does involve adult deaf signers who are not a part of a stable signing community. SLs produced in such sociolinguistic conditions are rarely studied, therefore requiring specific categorisation. Given the conditions on Marajó, we now consider these SLs as *partially integrated adult homesigns*. This term comes, in part, from the distinction made by Nyst et al. (2012: 268) between child homesign and adult homesign in a rural context.

Influence of an institutional SL: LIBRAS

Until recently, the national Brazilian Sign Language (LIBRAS) had little presence in the area of Marajó. The UFPA initiated weekly LIBRAS courses in 2016 for deaf

8 A Brazilian Portuguese-LIBRAS interpreter began to work in Dom Alonso school (Soure) in 2017. At this time she is the only interpreter for three deaf students who attend different classes.

and hearing people. These courses can also have a positive impact on literacy as they use a handbook where images of signs are presented next to their equivalent word in Brazilian Portuguese. We observed the case of a deaf woman who used this book to improve her Brazilian Portuguese reading and writing skills.

LIBRAS also started to be used in one of Soure's schools (see footnote 8). This led some deaf adults to be willing to come back to school in order to increase their level of education. Unfortunately, we observed that some of them do not completely understand the SL the interpreter uses because their LIBRAS proficiency is low.

Attitudes towards the deaf and local SLs

Martinod's observations and interviews with hearing and deaf individuals show that attitudes towards the local SLs are quite negative. Hearing people consider the institutional LIBRAS the only *real* SL. The simple fact that nine of the ten hearing people interviewed refused to use the local SLs in front of the researcher tends to confirm this. This is why hearing people encourage the deaf to learn LIBRAS when possible. The deaf assimilated this view and often have a poor self-esteem unless they learn LIBRAS. The LIBRAS courses initiated in 2016 are provided by a hearing interpreter whose assistant is deaf. Considering that most of the students are hearing people, usually teachers, this situation might discourage deaf people to attend the course and increase their sense of inferiority.

However, judging from our observations deaf people seem to progressively become a part of the current Marajóara life. They often briefly interact with hearing people, mostly for work purposes: some occasionally work as baby-sitters or housekeepers. In addition, the Dom Alonso school in Soure hired in 2012 a deaf dance teacher. This contributed to change people's perception on deafness. That being said, career opportunities for deaf people remain very limited because of their low level of education. This remains true even if we take into account the overall economic and cultural context of the island.

In 2015 and 2016 an awareness-building activity for the preservation and promotion of Marajó SLs was initiated, following post-doctoral research conducted by the director of the Soure annex of the UFPA, Maria Luizete Carliez, in France at the University Paris 8. Workshops and courses were proposed to UFPA teachers and students by SL linguists, sociologists and philosophers. The aim of these activities was to encourage the use of local SLs and consider them in the education of the deaf. Nevertheless, the survey conducted in 2017 by Martinod allows us to think that the local SLs could continue to develop in the most remote areas of Soure while LIBRAS will increase its influence downtown.

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Ben Braithwaite

Sociolinguistic sketch of Providence Island Sign Language

Providence Island is located in the Western Caribbean, around 200km off the coast of Nicaragua. Part of Colombia's Archipelago of San Andres, Providence and Santa Catalina, it has much in common historically, socially and linguistically with the English Creole speaking Caribbean. An indigenous sign language has been used by deaf and hearing people in Providence since at least the second half of the nineteenth century.

Figure 1: Map of Providence and San Andres.

One of the first rural sign languages to receive substantial attention from linguists, Providence Island Sign Language (PSL) was first described by Washabaugh, Woodward, and DeSantis (1978), and then in a series of publications by

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Washabaugh (Washabaugh 1979, 1980a, 1980b, 1981, 1985, 1986a, 1986b) and Woodward (Woodward 1978b, 1979, 1982, 1987).

Unusually for such a small community, two distinct genetic causes of deafness have been identified in Providence, one associated with Waardenburg Syndrome, the other autosomal recessive and non-syndromatic (Lattig et al. 2007). Non-syndromatic deafness may well have been brought to Providence by settlers from the Cayman Islands, where genetic deafness is known to have been extremely common (Doran 1952). Lattig et al. (2007) also identify some cases of deafness which appear to be idiopathic or isolated.

The total number of deaf people in Providence seems to have remained fairly steady over the last few decades. Washabaugh (1986a: 9) reported 20 deaf people in a total population of around 3,000. Thirty years later, Lattig et al. (2007) report seventeen deaf people, though the total population has increased significantly over the same period, to around 5,000. This increase has largely been a result of migration from mainland Colombia. Currently, there are deaf people of all generations, including at least one child under the age of 10, living in villages around the island.

The total number of hearing signers is not known. Woodward (1978b) carried out a survey of 28 hearing people living in two villages. He found that 16 of the 28 reported fair to excellent signing ability. 11 people reported their signing ability as 'poor' signing ability and one reported "none." Recent fieldwork suggests that while there are still hearing signers, there may be fewer than before, and that this may be connected to the introduction of Lengua de Señas Colombiana (LSC) and special education.

The spoken languages of Providence are English Creole and Spanish. Spanish is the official language of education, including in the special school established in 1999 and attended by several younger deaf people. Hooker O'Neill De Carreño, (2016) found that Creole-speaking family members in San Andres and Providence would often switch to Spanish when addressing deaf relatives. Most deaf people in Providence have some literacy in Spanish and English, and several younger people make fairly regular use of both languages on social media.

The first special education programme for deaf children was established in 1999. The special education teacher at the school used LSC, not PSL. Even those who went through this programme, seem to have a preference for PSL. During fieldwork, the author observed that many of the family members of younger deaf people seem to have quite limited signing abilities, and some family members had negative attitudes towards signing. These attitudes may have been influenced by the introduction of special education, speech therapy, and the availability of audiological services. Some younger deaf people have hearing aids, and at least

one has had hopes of getting a cochlear implant. Some younger deaf people have also received some speech training, from speech therapists based in San Andres.

Deaf people in San Andres use LSC, and it seems that none know PSL, though several know of its existence. Improved transport infrastructure has meant that there is much more contact between Providence and San Andres than when Washabaugh and Woodward were writing. Deaf people from both islands move between them, though there remains very limited contact between them. One younger deaf man has spent a considerable amount of time away from Providence, in mainland Colombia, and, as a result, has had some sustained contact with the LSC-using members of the Colombian deaf community.

Washabaugh argued that PSL was not a "mature" sign language, that it lacked "the conventionality and rule governedness we have come to expect of complete, mature human languages" (Washabaugh, 1986a: 74). It is possible that, with the significant advances that have taken place in the field of sign language linguistics since Washabaugh was writing, it might be possible to find evidence of grammatical patterning which were not previously apparent, and to reassess such claims. For instance, Washabaugh was unable to find consistent word order patterns, but a better understanding of the ways in which non-manual markers interact with word order may reveal patterns which he missed.

There is no official recognition of PSL, and prospects for the future are very uncertain. With such a small deaf population, the language is bound to be extremely vulnerable. The influx of people from mainland Colombia, and the prospect of genetic counseling following recent research into the etiology of deafness make the disappearance of deafness within the foreseeable future quite likely. The influence of LSC through the education system, and contact with the wider Colombian deaf community, including on the neighbouring island of San Andres, present additional threats to the continued use of PSL.

The resumption of research on PSL provides the prospect at least of language documentation, and a small grant was recently approved to support a documentation project. There is enthusiasm for this work from within Providence, among deaf and hearing people. The loss of cultural and linguistic heritage is already an issue of considerable concern to the Creole-speaking population of Providence, where Spanish has made considerable inroads, and PSL is clearly another important aspect of that heritage.

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Kristian Ali and Ben Braithwaite

Bay Islands Sign Language: A sociolinguistic sketch

The Bay Islands is a group of islands belonging to Honduras in the Caribbean Sea. Located between Utila and Guanaja, Roatan is the largest of the islands. With a population of just over 62,000 – though reports suggests 100,000 (2014), it lies 40 miles off the Honduran coast. Roatan is ethnically very diverse, with black islanders, white islanders, Mestizos,[1] Garifuna,[2] and several other groups. Within the towns of French Harbour and Jonesville on the southern coast of Roatan, a sign language has been used in the visual and tactile modalities by hearing, deaf, and deafblind villagers for at least three generations.

Figure 1: Location of the main islands of the Bay Islands.

We refer to this previously unresearched language as Bay Islands Sign Language, henceforth BISL, since the language appears to be indigenous to the Bay Islands,

1 By far the largest ethnic group in Honduras, the Mestizo people have European and Amerindian heritage.

2 The Garifuna people, also known as Garinagu and Black Carib, have West African and Amerindian heritage.

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and is in use in both Roatan and Guanaja. Other sign languages are used in the Bay Islands, including ASL and Lengua de Señas Hondureña (LESHO) as well as a number of homesigning situations, and some BISL signers are also familiar with some of these other codes.

BISL emerged due to a high incidence of deafblindness in the communities of French Harbour and Jonesville, a result of Usher Syndrome, which causes a person to be born profoundly deaf and then to gradually lose their vision later in life. Deafblindness has been present in these communities for at least 100 years. The oldest deafblind person we currently know of was born in 1895 and died in 1988 in Jonesville. She had two younger siblings who also had Usher Syndrome and a son with Usher Syndrome who married a woman with Usher Syndrome from French Harbour. That woman had three sisters also with Usher Syndrome. They had two children who both have Usher Syndrome and are still alive today. One was adopted as a baby and brought to the USA, where he still lives. The other grew up in Jonesville but lives in French Harbour. The simplified family tree in Figure 2 shows the distribution of Usher Syndrome across the related communities in French Harbour and Jonesville. From the family tree we can see that deafblindness is not limited to close family. Two grandchildren of the uncle of the deafblind sisters from French Harbour also have Usher Syndrome and are still alive today in French Harbour. Another of the four deafblind sisters married a deaf man and moved to Guanaja where they both still live. In all, there have been at least 11 signers with Usher Syndrome across three generations (not counting 13 in the diagram below, who never learned BISL), as well as many more hearing signers, and deaf signers without Usher Syndrome. Only four deafblind signers are still alive, aged between 51 and 73.

There is evidence that the language was transmitted intergenerationally. The deafblind man who grew up in Jonesville (12) was adopted by hearing and sighted relatives but often signed with his deafblind parents (4,5) as well as his deafblind grandmother (1) and great aunt (3) who lived nearby. His father was exposed to signing by his deafblind mother and her deafblind siblings. The other two deafblind people in French Harbour (10,11) grew up in contact with the four deafblind sisters (5, 6, 7, 8) and a deaf neighbour (without Usher Syndrome).

It is important to note that the family tree shows the distribution of Usher Syndrome and not the extent of the signing community. The boundaries of the signing community extend far beyond the deafblind signers. The hearing members of these tightknit communities signed with the deaf and deafblind members to varying degrees of competency, though the language seems to have been largely restricted to the white islander populations. Many older hearing people from both villages recall signing regularly in the past, though some no

longer use the language much, as a result of deafblind friends, neighbours and relatives dying or moving away.

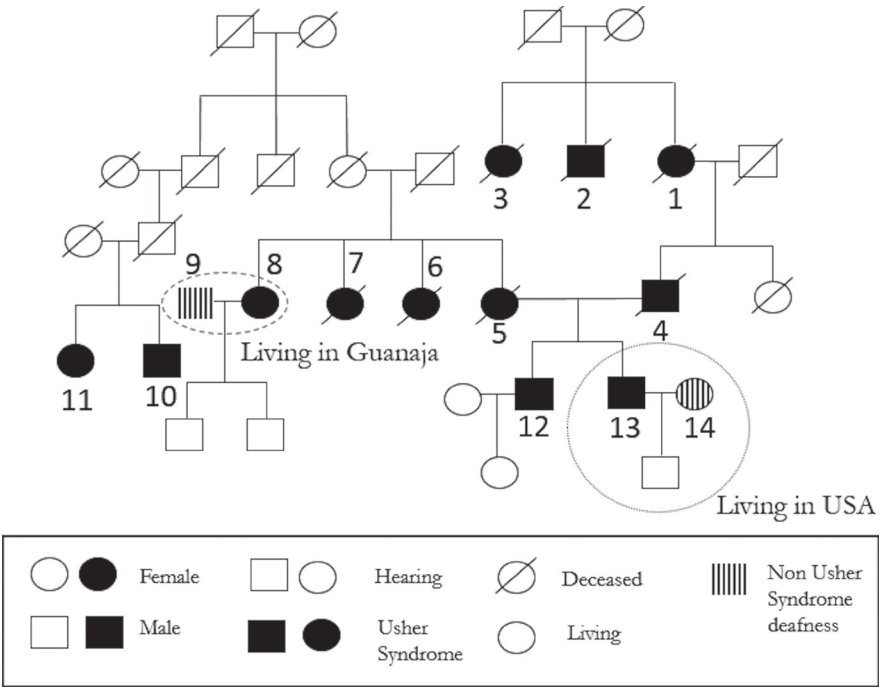

Figure 2: Family tree showing Usher Syndrome in the communities of French Harbour and Jonesville.

The language is signed in both the visual and tactile modalities, depending on the sightedness of the interlocutors. When addressing a blind interlocutor, one or both hands are usually in contact. Because some of the deafblind signers have some vision, they may be able to perceive language visually, depending on lighting conditions, and similar factors. It is normal to touch the addressee's face and body, or to bring the addressee's hand into contact with one's own face and body. Further research is required to determine the extent to which consistent conventions have been established in the same ways that have been reported for other tactile sign languages (Checchetto et al. 2018; Edwards 2014; Mesch 2001). When addressing a sighted interlocutor, signing may be purely visual, though we have noticed that tactile signing is quite often used, even when the addressee can see.

The one deafblind BISL signer who received some formal training in English reading and writing when he was young (12 on the family tree) often traces words

on the interlocutor's arm, particularly when addressing someone with limited signing competence. The same signer also makes some use of written Spanish. There is now a school for children with special needs in French Harbour but there are not yet any institutional measures in place to educate deaf children.

The language is not likely to remain in use much longer. The youngest deafblind signer is 51 years old. There are no younger people who have Usher Syndrome as far as we know. There are younger deaf people living nearby, but the language is not being passed on to them. Some have learned LESHO or ASL through missionary organisations, others have only homesigns. There are hearing signers as young as 20 years old, who have used it since they were very young, but they are unlikely to continue to sign once the last deafblind signer has died or once they have fallen out of physical contact with them. Since the last deafblind signer who grew up in Jonesville (12) now lives in French Harbour, many of the older hearing signers there have fallen out of contact with him and have not used the language much for many years. A huge increase in immigration from the mainland has greatly changed the demographics of Roatan. At the same time, many white Islanders have moved away to North America. These demographic changes make it quite unlikely that there will be any future cases of Usher Syndrome. A small documentation project is underway by the authors with the aim of creating a corpus of natural and elicited data and a lexical database. The oral history of this unique language is also being documented.

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Marie Coppola

Sociolinguistic sketch: Nicaraguan Sign Language and homesign systems in Nicaragua

Nicaraguan Sign Language (NSL) emerged from the newly formed Deaf community in the late 1970s. The Deaf community formed as a result of the expansion of two centers for special education and vocational training in the capital city of Managua (Polich, 2005; Senghas, Senghas and Pyers, 2005). The national deaf association, ANSNIC (Asociación Nacional de Sordos de Nicaragua) was formally organized in Managua in 1986 and, with the support of the Royal Swedish Association of the Deaf, purchased a house (Polich, 2005). In Nicaragua, the language is referred to as "Lenguaje de Señas Nicaragüense"; forms of the language have also been referred to in the literature as "Lengua de Señas Nicaragüense" and "Idioma de Señas Nicaragüense" (Kegl and Iwata 1994, Kegl, Senghas and Coppola, 1994).

This sketch will also provide information about the nature and context of individual homesign systems used by deaf children and adults in Nicaragua. Homesigners are deaf individuals who have not acquired a spoken language (due to their deafness), nor had sufficient contact with a Deaf community in order to acquire an existing sign language. They nevertheless develop gesture systems, called "homesign" or "señas caseras", that they use as their primary means of communication (Coppola, 2002).

Demographics and deafness

Nicaragua has a population of 6 million, and a total area of 130,000 km^2 (about the same size as Greece). The overwhelming majority of the population resides in the western half of the country, with much of the urban growth centered in the capital city of Managua (World Factbook, 2019). Reliable figures regarding the number of deaf people in Nicaragua are difficult to come by; estimates of the occurrence of significant hearing loss (greater than 30 dB) among children enrolled in public, non-special education schools are between 18 and 20% in some areas (Saunders et al., 2007). The authors note that the etiologies of deafness in Nicaragua differ from those in wealthy, industrialized nations; these include poor perinatal health care, infectious causes, gentamicin (antibiotic) exposure, and hereditary hearing loss. Local explanations commonly given for an individual's deafness include

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prenatal accidents (e.g., falls, scorpion bites), accidents related to the major earthquake that occurred in Managua in 1972, and child or maternal illness.

According to a census conducted in 2009 in which 179,138 households were visited, people with hearing loss constituted 10.1% of the disabled population in Nicaragua (12,783 people) (JICA, 2014). This figure likely includes many non-signing deaf people. The census also reports that 41% of people with disabilities have no formal schooling (JICA, 2014) and 49% are unemployed (JICA, 2014). However, figures on education and employment are unavailable for deaf people as a subgroup.

It is quite rare for deaf adults to have deaf children; thus, a very small number of deaf children in Nicaragua experience regular contact with a deaf signing relative (parent, sibling, or extended family member). Most deaf individuals begin learning NSL when they enter school. The Nicaraguan Ministry of Education lists 25 cities with centers for (general) special education, and there are a handful of private schools serving deaf children (see later section for more details and a map). However, the deaf individuals who are among the 41% of the population living in rural areas (World Factbook, 2019) do not have access to special education. Indeed, even deaf individuals living in urban areas often do not attend school or have access to a signing community.

As mentioned in the introduction, the deaf community began to form in the late 1970s in the context of two educational vocational programs aimed at deaf children and young adults (Polich, 2005; Senghas, Senghas and Pyers, 2005). There was no previously existing deaf community or sign language in Nicaragua; thus, the first group of deaf people to form this community did not learn a sign language from older signers. Rather, the deaf individuals who participated in these programs brought with them the gestures they used to communicate with their families, also known as homesigns. The homesigns themselves were idiosyncratic and likely varied considerably across individuals in terms of their structure and complexity. However, within a relatively short time, the deaf signers converged on a rudimentary sign language, which served as the language input for deaf children who subsequently entered these programs.

Thus, researchers characterize the transmission of the language in terms of "cohorts," or waves, of children and adults who enter the community via an established program or through contact with the Deaf association. Signers who entered the signing community before 1983 are considered Cohort 1; those who entered between 1984 and 1993 are Cohort 2, those who entered 1994–2003 are Cohort 3, and so on. These designations are purely for purposes of analysis, and do not correspond to signers' identities or actual patterns of interactions in the community (i.e., signers interact freely across these groups, especially after they have completed school). Deaf adults often marry each other, and usually have

hearing children, who are bimodal bilinguals (users of both NSL and spoken Spanish); such individuals are also known as codas (children of deaf adults). Gagne (2017) reports on codas' acquisition and use of NSL.

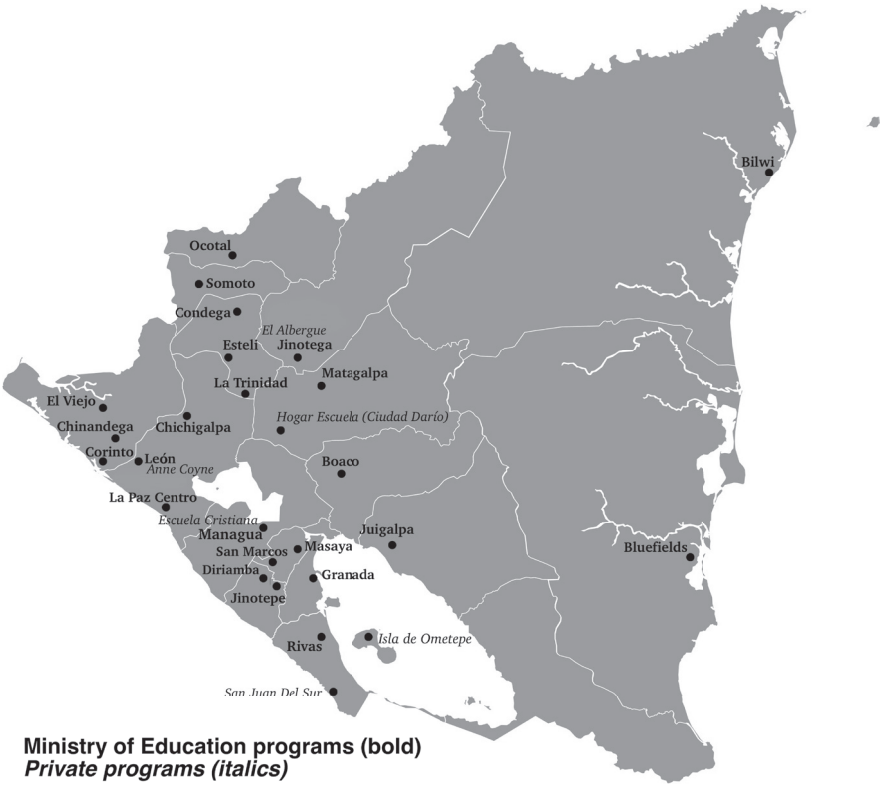

Figure 1: The locations of schools for special education in Nicaragua; cities with public schools are labeled in **bold** and private programs serving deaf children are labeled in *italics*.

Language use

The sign language began to coalesce around 1978, making it approximately 40 years old. As noted earlier, the original centers of language transmission were the center for special education in Managua, the vocational school (now closed), and the Deaf association in Managua, as well as the other affiliated Deaf associations that began to spread out from Managua. Managua, the capital and largest city, has the largest Deaf community. Other deaf population centers include Estelí,

León, Matagalpa, Masaya, San Marcos, Jinotega, Granada, Chinandega, Somoto, Ocotal, and Bluefields. NSL has since spread to other cities, generally through the establishment of classrooms for deaf children, as well as the movement of deaf adults from Managua to outlying areas. NSL signers in the earliest stages of the language's emergence had very little contact with signers of other sign languages. The international support from Sweden resulted in limited contact with Swedish Sign Language; much later in the development of the language (after around 2010), the internet and social media facilitated contact with American Sign Language videos. Nicaraguans, both deaf and hearing, tend not to travel much outside of the country, thus limiting in-person contact with users of other sign languages.

The dominant spoken language in Nicaragua is Spanish; however, many indigenous languages are also spoken (including Miskitu and Sumu), and the majority of these speakers live on the Atlantic Coast (Eberhard et al., 2019). Many deaf individuals know some Spanish; this knowledge, as well as the general increase in literacy[1] in NSL, has been facilitated by the increase in deaf teachers and teacher assistants in elementary classrooms (Gagne and Coppola, 2020). Hearing Nicaraguans are generally quite open to using their hands to communicate with deaf people regardless of their knowledge of NSL or their previous experience communicating with deaf signers and homesigners. Indeed, Coppola's chapter (this volume) characterizes some of the conventional gesture resources available to hearing non-signers.

Culture

Nicaragua is one of the poorest countries in the western hemisphere (The World Factbook, 2019). Underemployment is high; among those employed in the formal economy, 31% work in agriculture, 18% in industry, and about 50% in service occupations. The country is predominantly Christian (50% Catholic, 33% Evangelical), and 59% of the population lives in urban settings (The World Factbook, CIA, 2019). Multiple generations of families tend to live together, or close to each other, and family relationships are highly valued and relied upon. Deaf people, like their hearing counterparts, often struggle to find adequate employment, even when they have completed their primary (required) or

1 The notion of literacy in a sign language that does not have a written form encompasses conceptual knowledge about language, as well as metalinguistic skills, including the ability to use the language effectively in different contexts and registers (Cummins, 2006).

secondary education. The relatively recent emergence of the Deaf community and sign language, as well as access to education, mean that skilled jobs are only available to deaf people under the age of about 45; indeed, the vast majority of deaf people are unemployed, or work informally (e.g., selling food or goods on the street, or as domestic workers). As noted in the next section, however, opportunities for higher education and better job prospects for deaf people have been increasing in recent years.

Education

NSL is recognized by the government as the natural language of deaf children, and is being increasingly used in deaf classrooms. However, there is simultaneously an increase in the application of the policy of "inclusive education", whose intended goal is to educate deaf children alongside their hearing peers, with appropriate supports (e.g., interpreters, signing teachers, specialized teaching assistants). Unfortunately, a lack of awareness of best practices in educating deaf children, as well as a lack of financial resources and pedagogical expertise, often compromise effective implementation of this policy in Nicaragua (Donovan, 2015) and elsewhere (e.g., Goico, 2019). In many inclusive education scenarios, deaf children may be physically present in the classroom, but their lack of access to the communication of their teachers and classmates severely restricts their learning.

Outside of Managua, the availability and size of deaf classrooms in public elementary schools varies, as does the availability of Deaf signing teachers (Figure 1). There are 25 public schools of Special Education located in the municipalities of Managua, San Marcos, Jinotepe, Diriamba, Nuevo Amanecer Community (Diriamba), Masaya, Granada, Rivas, León, La Paz Centro, Chinandega, Chichigalpa, El Viejo, Corinto, Boaco, Juigalpa, Matagalpa, Jinotega, Estelí, La Trinidad, Condega, Ocotal, Somoto, Bluefields and Bilwi. As is the case in many schools serving typically hearing children, the school day lasts approximately 3.5 hours. In recent years, Deaf signing teachers have increasingly been offered paid teaching positions; however, many teachers are hearing and have only rudimentary signing skills. Javier López Gómez, the president of the National Association of the Deaf, notes that some of these programs only offer education through third grade (La Prensa, 2010).

There are also currently at least five private schools/programs that serve deaf children in Nicaragua: the Escuela Cristiana de Sordos Isaías 29:18 (the Christian Deaf School) in Managua, El Albergue in Jinotega, run by Mayflower Medical Outreach (mayflowermedical.org), the Hogar Escuela in Ciudad Darío, operated

by Catholic nuns (Hermanas de la Caridad de Santa Ana), the Ann Coyne School for the Deaf in León, and Los Pipitos in San Juan del Sur, funded by the Nicaragua Children's Foundation. A deaf education program in Ometepe is run by a sister-city project partnership with a US city (Bainbridge, WA), and there are likely other small programs. There is no centralization of information about educational or vocational programs for deaf people.

Until relatively recently, deaf education was limited to elementary school (i.e., 6th grade level). Many students would repeat grades until they were about 16 and then they would "graduate" from elementary school. Two high school programs now operate in Managua (one called Bello Horizonte). Estelí has had a secondary school program for the last few years, serving approximately 4 students per year. Another secondary program in Ciudad Darío has served approximately 25 students a year since 2012; these students come from many communities across the northern region of Nicaragua. It is common for deaf and hearing students to complete high school by attending classes all day on Saturdays for several years. The number of deaf people studying at the university level, or having completed a post-secondary degree, is now around 25. The number of deaf people pursuing post-secondary education has increased dramatically recently (mostly in Managua and Estelí); however, these students represent a very small proportion of the deaf population. (For comparison, the rate of university attendance among the hearing population is approximately 3% of the total population (Olivares, 2011).) Above the elementary school level, all classes are taught by hearing teachers in spoken Spanish, with interpretation into NSL. Access to interpreting services at the university level is difficult to achieve, and some groups of deaf students decide to pursue the same degree programs in order to minimize interpreting costs, which in many cases are paid by the students and their families. In 2010, ANSNIC had registered 20 trained interpreters nationwide (La Prensa, 2010).

The percentage of deaf people who enter programs for special education appears to be the highest in the capital city of Managua, where the school for the deaf is relatively well known. Managua's overall population is approximately 970,000, with a school-age population (ages 5–14 years) of 190,718 (World Factbook, 2019). The World Health Organization estimates that 1.6% of children between the ages of 0 and 15 years in Latin America and the Caribbean have disabling hearing loss (WHO, 2018). This rate would translate to 3,051 deaf students of school age living just in Managua. Given that an absolute maximum of 300 deaf students attend educational programs in Managua, these estimates suggest a rate of school attendance for deaf children in an urban environment of approximately 3%. Looking at the numbers on a national level, an estimated total of 1,040 deaf children attend school in Managua and across the country. Based on a total of 1,179,703 children between the ages of 5 and 14 years across Nicaragua,

the estimated total deaf school-age population would be 18,875. These figures suggest that approximately 5% of deaf children in Nicaragua attend school. These are far smaller percentages than suggested by the census data reported for disabled people more generally (59%, according to Table 10 in JICA, 2014). Note that the lack of access to education is particularly problematic for deaf children, whose access to a sign language often depends on an educational setting in which sign language is used.

Technology and oralism

There is no national screening program aimed at identifying children with hearing loss, nor early intervention services targeting deaf children. Hearing aids, cochlear implants, and speech training are relatively infrequent due to poverty and a general lack of medical, technological, and clinical expertise (Madriz, 2009). A very small number of families have traveled to the US to receive assistive technology. International non-profit organizations often donate hearing aids to deaf individuals, but these are rarely used on a consistent basis: batteries die quickly and are expensive to replace; the high humidity damages delicate electronics; and speech therapy with trained professionals is scarce.

Such resources are available in a small number of locations. For example, Mayflower Medical Outreach (MMO, www.mayflowermedical.org), a US-based non-profit organization, operates modern Ear, Nose, and Throat (ENT) clinics in Jinotega and Estelí (both about 2.5 hours from Managua). This organization also operates the Albergue, a facility that provides lodging, meals, health care, and access to education in both sign and spoken language to about 25 deaf children and young adults (previously described in the Education section). They also support a permanent ENT doctor in Jinotega and an audiology technician in Jinotega and Estelí and provide continuing education for ENT doctors in Managua, Jinotega, Estelí, and surrounding areas. MMO recently began a hearing screening program for all first graders in Jinotega, and also launched an Audiometry Training and Certification Program – both of these programs are the first of their kind in the country.

Linguistic status and language activities

Nicaraguan Sign Language *(Lenguaje de Señas Nicaragüense)* is considered a "Deaf community SL" (see the introduction, this volume) because of its origins in a small number of educational and vocational institutions that served as a focal

point for interactions among deaf individuals in the mid-to-late 1970s. NSL is one of the official languages of Nicaragua. Table 1 summarizes the laws related to the rights and well-being of people with disabilities in Nicaragua (JICA, 2014). The language does not appear to be endangered, given that the number of users continues to increase, and the geographic areas in which it is used continue to expand. However, transmission of the language does depend on the institutional context of education, because of the low incidence of inherited deafness and consequently rare transmission of the language within families.

Table 1: Nicaraguan laws related to people with disabilities (especially deaf people).

Law	Year passed	Summary
Law 202	1995	Rehabilitation of people with disabilities; obligates employment equality and accessibility of media (television). However, both provisions were extremely vague and not enforced.
Law 675, *Nicaraguan Sign Language*	2009	Nicaraguan Sign Language is the official language of Deaf people in Nicaragua.
Law 763, *Rights of disabled people*	2011 (updates/replaces Law 202)	Sign language should be the language of instruction for deaf children.

A number of institutions are concerned with the rights and well-being of the Nicaraguan Deaf community. The National Association of the Deaf, (Asociación Nacional de Sordos de Nicaragua, or ANSNIC), maintains a physical headquarters in Managua and offers NSL classes, academic support, vocational training, and interpreter training. The national disability association (Federación de Asociaciones de Personas con Discapacidad, or FECONORI http://www.feconori.org/) also advocates for disability rights more generally. Since 2010, a number of new interpreter associations have appeared in Managua; some are church-based. Manos Unidas (now known as Signs and Smiles (signsandsmiles.org)), a non-profit organization founded by the author, promotes equal access to language and education for deaf people. Current projects include development of a smartphone app, *Señas y Sonrisas* ("Signs and Smiles," Manos Unidas (2019)), to encourage literacy in NSL and Spanish among deaf individuals in Nicaragua and their families, particularly those who live in rural areas where no special education is available.

Prior research on Nicaraguan Sign Language

Judy Kegl, a linguist then based at the Massachusetts Institute of Technology (MIT), began investigating the language in 1986, made the first videorecordings in 1987, and published the first scientific report of NSL (Kegl and Iwata, 1989). Ann Senghas began to research NSL in 1989, completing her dissertation in 1995. Since then, a number of deaf and hearing researchers from many countries have led and contributed to research on NSL and related topics.

Laura Polich's book "*The Emergence of the Deaf Community in Nicaragua*" (2005) offers a historical perspective on deaf education in Nicaragua, and work by Richard Senghas and colleagues (Senghas, 1997; Senghas and Monaghan 2002) offers an anthropological view of this new deaf community. R. Senghas, A. Senghas, and Pyers (2005) characterize the earliest stages of the emergence of the community and language, and include summaries of detailed empirical work showing that the youngest signers in the community propel the language's most dramatic grammatical innovations, including introducing systematicity in the use of space in verbs (Senghas, 1995; Senghas and Coppola, 2001; Senghas, 2003).

Previous work characterizing the emergence and change in the structure of Nicaraguan Sign Language includes referential shift (Kocab et al., 2015) and the emergence of temporal language (Kocab et al., 2016). Prior work that carefully evaluates the relationship between the gestures produced by the hearing, non-signing individuals who surround the deaf community includes Senghas et al., 2004 (segmentation of manner and path) and Brentari et al., 2012 (use of handshape for grammatical contrasts). Other work has focused on the relationship between language and other cognitive abilities, for example Pyers and Senghas (2009) on mental verbs and theory of mind; Pyers et al. (2010) on spatial language and spatial reorientation; and Martin et al. (2013) on the relationship between language experience and mental rotation.

Prior research with Homesigners in Nicaragua

Examples of the linguistic structure present in Nicaraguan homesign systems include the grammatical relation of subject (Coppola and Newport 2005) and plural marking in child and adult homesigners and their hearing communication partners (Coppola et al., 2013). Coppola and Brentari (2014) offers a rare longitudinal case study of a child homesigner's use of handshape to mark grammatical distinctions. A relatively surprising finding is that even after interacting regularly over decades, homesigners and their hearing family members do not significantly share the gesture system. Carrigan and Coppola

(2017) found that signers of American Sign Language who had had no previous exposure to homesign systems in Nicaragua nevertheless scored higher than the homesigners' everyday communication partners on a task in which they had to match a homesign sentence presented in a video with an event (e.g., "a man pushes a chair").

A number of articles have both characterized aspects of the linguistic structure of adult homesign systems and further compared homesigners with successive cohorts of NSL signers in order to understand the impact of having a linguistic community on one's language development. These phenomena include: the conventionalization of lexical items (Coppola, this volume); the development of points into locatives and nominals (Coppola and Senghas, 2010); using handshape to express morphophonological and morphosyntactic contrasts (Brentari et al., 2012); contrasting arguments and predicates (Goldin-Meadow et al 2015); marking agentivity and number (Horton et al., 2015); and the noun-verb contrast (Abner et al., 2019).

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Subject Index

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