

This volume is the first to bring together researchers studying a range of different types of emerging sign languages in the Americas, and their relationship to the gestures produced in the surrounding communities of hearing individuals.

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**EMERGING SIGN LANGUAGES OF THE AMERICAS**  
*Edited by Olivier Le Guen, Josefina Safar, and Marie Coppola*

DE GRUYTER  
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# EMERGING SIGN LANGUAGES OF THE AMERICAS

*Edited by Olivier Le Guen, Josefina Safar,  
and Marie Coppola*

SIGN LANGUAGE TYPOLOGY



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# Sign Language Typology



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## Volume 9

# Emerging Sign Languages of the Americas

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Edited by  
Olivier Le Guen, Josefina Safar and Marie Coppola

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Olivier Le Guen, Marie Coppola and Josefina Safar

## **Introduction: How *Emerging Sign Languages in the Americas* contributes to the study of linguistics and (emerging) sign languages**

In recent years, awareness of and research attention to “emerging sign languages” around the world has increased dramatically (Meir et al. 2010). This volume brings together the first set of works treating these new languages, linguistic communities, and sign systems in the Americas, including North America, Central America, South America, and the Caribbean.

One aim of this book is to provide an areal comparison between different sign languages that emerged and evolved in the same region. Few studies have looked at areal comparisons of historically unrelated sign languages (Nyst 2013; Tano and Nyst 2018) and, before this volume, none in the Americas. While emerging sign languages have been considered comparatively on a worldwide scale (de Vos and Pfau 2015), the Americas provide an interesting field for comparison.

We offer a few notes regarding the scope of this volume. First, we do not include institutionalized sign languages (such as Mexican Sign Language) in the category of ‘emerging sign languages’. Second, while there are numerous settings all over the Americas where sign languages are created and used, very few have been described. Thus, the sample presented in this volume is far from exhaustive.

This volume is, in part, the result of a Colloquium on Emerging Sign Languages of the Americas, held in Mexico City on the 10<sup>th</sup> and 11<sup>th</sup> of September 2015. The main goal of the symposium was to bring together specialists (from Mexico, Sweden, the USA and France) who are investigating emerging sign languages of the Americas. We invited them to compare both the sociolinguistic situation of these emerging languages and their grammatical features. Another purpose of this meeting was to expose new audiences to this exciting field, including the local community of linguists and the Deaf signing community in Mexico. A large majority of the participants were indeed Deaf users of Mexican Sign Language, known locally as *Lengua de Señas Mexicana* (LSM). Many came from Mexico City, and some traveled all the way from Oaxaca (some 500 km away), to learn about signing systems that sometimes differ dramatically from their Deaf community sign language. All presentations were given in spoken Spanish, LSM, or American Sign Language (ASL), and interpreting was offered between these languages so that the presentations and discussions were accessible to all participants. The colloquium also featured two deaf presenters: Ernesto Escobedo from Mexico and Lynn Hou from the USA. A hearing bilingual-bimodal member of one of the

communities described in the conference, Rossy (Rita) Kinil Canché (at the time 16 years old), a user of the Yucatec Maya Sign Language from Nohkop, presented a paper on person reference in YMSL. Most of the contributors to this volume participated in the conference and we thank them for their trust and for publishing in this volume, as well as those who sent their contributions afterward.

In this introduction, we discuss first the notion of emerging sign language, and provide a short proposal for classifying sign languages considering various dimensions, linguistic and sociological. We also discuss some issues regarding variation and comparison. Finally, we provide an overview of the various contributions of this volume.

## **A typology of sign languages and the issues of variation and comparison**

Sign languages around the world are not all similar; and for the purpose of this volume, we will propose a typology based on sociolinguistic criteria. To orient readers who may be new to the sign language literature, we begin by framing the context of emerging languages in light of more established sign languages, and by a number of dimensions that are part of a traditional sociolinguistic perspective, such as a signer's age, degree of institutionalization of the language, and geographic factors). Other factors that shape how languages emerge, and that are less rarely considered in traditional sociolinguistics of spoken languages or typology, are signers' degree of access to a linguistic community, the length of the language's history, the typical age of new signers entering the community, the ratio of deaf to hearing signers, and other factors influencing the rate of change in the language (Senghas, 2005; Nyst, 2012).

Along these dimensions, most emerging languages have shorter histories, that is, they have existed for shorter periods of time than "established" or "institutionalized" sign languages. These younger languages are also generally closer to their roots in the surrounding co-speech gestures, and are generally changing more rapidly than older, more established sign languages. Rate of change is difficult to measure and may not be uniform across all of the language's structures (e.g., lexicon, morphology, syntax, pragmatics).

The main types of sign languages that have been discussed in the literature include: alternate sign languages, homesign systems, village sign languages, Deaf community and institutional sign languages. This typology is based on earlier classifications proposed by Sandler et al. (2010), Padden (2010), Zeshan and De Vos (2012), Nyst (2013), and Bauer (2014), among others. Each type is presented in



more detail below. Note that not all of these emerging languages clearly fall into one type (Nyst 2012; Hou 2016; Safar 2019).

As mentioned earlier, it is difficult and problematic to use linguistic criteria alone to distinguish various “types” of sign languages as structures may arise in various sign languages and differences in linguistic features are not always correlated with either the sociologic composition of the group of signers or the degree of language complexity (Pfau and Zeshan 2016). Although some correlations do exist between the size and age of the community and linguistic structures, sociologic criteria alone do not predict language evolution as such (but see Meir et al. 2012). Furthermore, and this is particularly true of emerging sign languages, linguistic features tend to evolve rapidly (see Meir et al. 2012; Sandler, Meir, et al. 2011 for Al Sayyid Bedouin SL); thus, a typology that classifies sign languages according their sociolinguistic setting is useful to understand some dynamics of language use and their users. The criteria we take into account in this volume were first compiled by Senghas (2005) and include the following:

- The sociological context: geographic and social origin of the signers, type of interactional community (family, village), etc.
- The geographical context: rural or urban
- The size of the signing community
- The number of languages in contact
- The number of L2 signers (i.e. hearing people who use the sign language as a second language)
- The age of the language
- The context and domains of language use

Among the emerging sign languages considered in this volume are different types of homesign systems, including individual homesign systems in Nicaragua studied by Coppola and colleagues, as well as homesign systems used in a multigenerational setting, such as Zinacantán Family Homesign, described by Haviland, and “shared homesign systems” studied by Horton in Nebaj (Guatemala). Nicaraguan Sign Language (Coppola), some sign languages of the Caribbean (Braithwaite) and the sign languages on Marajó Island in Brazil (Martinod, Garcia and Fusellier) can be considered Deaf community sign languages. Finally, sign languages such as Yucatec Maya Sign Language (Safar and Petatillo Chan; Le Guen, Petatillo Balam and Kinil Canché) and some sign languages in the Caribbean (Braithwaite) fall into the category of village sign languages. Note that our volume also includes the first description of an emerging sign language in the tactile modality (Braithwaite).

Even if the typology presented below is useful for a first categorization, sign language communities vary extensively in these features, and are not always well

demarcated. An important question that is also addressed in some chapters is: What defines a “linguistic community” in the case of emerging sign languages? Put differently, what criteria are useful to categorize various kinds of emerging sign language communities and to what ends? (see also Safar 2019)

To summarize, and of course keeping in mind the issues raised already about the difficulty of discrete classifications (and which will be elaborated further here), we propose that emerging sign languages display the following characteristics: (1) They are languages with a relatively short duration of existence (usually no more than 2 or 3 three generations, i.e., linked to the presence of deaf signers). (2) They have a relatively small (initial) number of primary users, even as small as one in the case of an individual homesign system. (3) They are not institutionalized languages, i.e., no external institution is deciding on the evolution of the language. (4) Because of their state of emergence, these signs languages may exhibit high rates of change that are not observed in “established” languages that have been in existence for hundreds of years and used by a large community. (5) In many cases, especially for “shared sign languages” (Nyst 2012), the number of hearing signers is higher than deaf signers, meaning that the gestural practices that were/are used as a background for the sign language are still visible. In what follows, we describe briefly each language type.

**Established and institutionalized sign languages.** Established sign languages are linguistic systems that have been in use for a long time and have achieved stability among a variety of users. Within established sign languages, we distinguish a subtype of institutionalized sign languages, sometimes called “national” “sign languages. These are the most known and well-described sign languages in the world. These sign languages are institutionalized in the sense that the language is regulated not only by the users themselves but also through the existence of external institutions and through the presence of elements that somehow escape users, such as grammars and dictionaries (although not all institutionalized this sign languages have extensive grammars or dictionaries). These languages can be learned and taught formally in schools, even though this is not the case for all national sign languages all over the world and the degree of formalization can vary greatly. Typically, they are recognized by law as official languages of their respective countries (even though these laws are often not respected) (see DeMeulder (2015) for an overview of different types of legal recognition of sign languages worldwide). Although many institutional sign languages originated from previously institutionalized languages, i.e., the French Sign Language or Spanish Sign Language (Pfau, Steinbach, and Woll 2012), they can also show some influence from the village or Deaf community sign languages constituting the linguistic background of early signers. This was for instance, the case for Martha’s Vineyard Sign Language, which influenced some dialects of

ASL (Lucas et al. 2001). Many of these sign languages are also influenced by the surrounding spoken and written languages. For instance, mouthing (i.e. silently performing a movement with the mouth similar to the pronunciation of the word or the first syllable of the word) is common in institutionalized sign languages like ASL or Mexican Sign Language (Padden and Gunsauls, 2003). It is more rare, but sometimes also present in some village sign languages (Nyst 2012). Fingerspelling (i.e. the spelling of a written word from the surrounding written language using a manual alphabet) is common in institutionalized sign languages and implies that signers are competent in the written language to some degree (see for instance, Hendriks and Dufoe 2014 on Mexican Sign Language).

**Deaf community sign languages.**<sup>1</sup> These sign languages represent a special type in the sense that they constitute the stage before a sign language becomes institutionalized. The main difference from the institutionalized sign languages considered above is that deaf people from various backgrounds are grouped together in a newly-formed signing community, generally a Deaf school or a Deaf club. Because of the diversity of backgrounds, Sandler et al. (2005) propose that Deaf community sign languages may undergo a rapid structural linguistic development since signers have to build a common ground in a relatively short time. Other researchers (e.g., Senghas and Coppola, 2001; Senghas, 2003) argue that children acquiring the language leads to an observed increase in linguistic complexity. Among the documented languages of this type around the world, we can mention Nicaraguan Sign Language (Senghas, Kita and Özyürek 2004; Senghas 1995), Israeli Sign Language (Meir and Sandler, 2008), Mauritian Sign Language (Adone, 2007; Gébert et al. 2006), sign languages in Marajó Island in Brazil (Martinod, Garcia and Fusellier, this volume) and several sign languages of the Caribbean (Braithwaite, this volume).

Linguistically, Deaf community sign languages often exhibit grammatical features close to the ones used in institutional sign languages even at a very young stage of development, especially in the way signing space is used (Meir and Sandler 2008; Senghas 2003), and some of them also show specific characteristics like the emergence of a fixed word order and a shift of use of the signing space across generations of signers (Adone and Bauer 2009; Gébert et al. 2006; Senghas et al. 1997; Senghas 2003).

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<sup>1</sup> Padden (2010) uses this term to refer to what we call “institutional sign languages” here.

**Village Sign Languages.** This type of language is so named because it typically arises in the context of a village (Zeshan 2010; Meir et al. 2010) with an unusually high incidence of (typically genetic) deafness, although it is also used to refer to sign languages in use across a larger region (e.g. Inuit Sign Language, Schuit (2012) or an island (e.g. KonchriSain, Cumberbatch 2012). For this reason, other authors used the alternative labels “rural sign languages” (e.g. Zeshan and Vos 2012) or “indigenous sign languages” (Nonaka 2009). Basically, such languages are created in the presence of relatively few deaf persons and are used by a number of hearing bilinguals in a speech community that includes the immediate family members of the deaf individuals as well as multiple families and generations. Because these languages are used by deaf and hearing community members alike, they have also been labelled “shared sign languages” (Kisch 2008; Nyst 2012). Rural signing communities are often characterized by a high degree of homogeneity between deaf and hearing people in terms of occupation and education (Nonaka 2012a: 279) and a substantial extent of shared cultural knowledge and routines (Kisch 2008). The village signing communities documented across the world include: Adamorobe Sign Language in Ghana (Nyst 2007), Alipur Sign Language in India (Panda 2012), Al-Sayyid Bedouin Sign Language in Israel (Kisch 2012; Meir et al. 2012; Sandler, Aronoff, et al. 2011), Algerian Jewish (or Ghardaia) Sign Language in Israel and France (Lanesman and Meir, 2012), Ban Khor Sign Language in Thailand (Nonaka, 2007; Nonaka, 2012), Kata Kolok in Bali (de Vos, 2012a; Marsaja 2008), KonchriSain in Jamaica (Cumberbatch, 2012), Inuit Sign Language in Canada (Schuit, 2012), Mardin Sign Language in Turkey (Dikyuva, 2012) and the already extinct Martha’s Vineyard Sign Language in the USA (Groce, 1985). Finally, Yucatec Maya Sign Language (YMSL) is a village sign language from the Americas treated in multiple chapters in this volume. Note that in the case of village/shared sign languages, not all languages date back only a few generations. For instance, Adamorobe Sign Language (Nyst 2007) is reported to be over 200 years old.

**Homesign systems:** This type of signed communication typically appears in families where a single deaf child is born and receives no or very limited (signed) linguistic input from the caregivers or others. In such a context, the child, along with the other members of the family, create a signed system of communication. According to Frishberg’s (1987) classic analysis, homesigns present some defining features: (a) they do not have a consistent meaning-symbol relationship, (b) they are not passed on from generation to generation, (c) they are not shared by one large group of signers and, (d) they are not considered the same over a community of signers.

The growing body of studies on homesigns show that, at least in the US, child homesigners receive limited systematic gestural input from their parents (Goldin-

Meadow 2003; Goldin-Meadow and Mylander 1984). One reason might be that there are very few quotable gestures and no systematic use of iconic gestures among English speakers in the US (McNeill 1992). This, however, is not the case in many other cultural contexts, where the gestural repertoire is much more elaborate (as is the case among many settings presented in this volume). In order to distinguish between settings where isolated deaf signers are socialized in an oralist education setting without any signed input (for instance in the US) and rural settings without access to any previously established sign language but the presence of rich gestural communication, Nyst (2012) proposes the distinction between “oralist” and “rural” homesign. Several chapters in this volume come to somehow challenge what we knew so far about homesign systems from Frishberg’s (1987) analysis. An interesting case of a homesign system in Mesoamerica is Zinacantán Family Homesign used in Chiapas, Mexico, where a whole family created an elaborate signed language to communicate even though there are only three deaf individuals (Haviland 2011; Haviland 2013a; Haviland 2013b; Haviland 2015, this volume). It is important to note that not all homesign settings are the same in terms of interactional features and linguistic complexity: Horton (this volume), in her chapter on child homesign systems, introduces the term “shared homesign” (as opposed to “individual homesign”) to describe signed communication used by multiple deaf individuals within a family, sometimes intergenerationally. Coppola (this volume) compares the degree of lexical conventionalization within individual adult homesigners and their communication partners in Nicaragua with that of signers of the first cohort of Nicaraguan Sign Language.

**Alternate sign languages:**<sup>2</sup> This type of signed language is mainly used by hearing people and has not emerged because of the presence of deaf people. Instead, these systems emerge as the result of the impossibility of or the prohibition of using spoken language in certain contexts. For instance, the Sawmill Sign Language appeared among sawmill workers in British Columbia because of the surrounding noise and the physical distance between workers (Meissner and Philpott 1975). Interestingly, its use extended to other types of communication, which were not purely work-related. Some monastic sign languages developed among certain orders (Anglo-Saxon, Augustan, Cistercian and Trappist) as a consequence of the prohibition of spoken language according to the vow of silence of the San Benedict rule (Rijnberk 1954). A similar example, situated in another part of the world, is found among Aboriginal people of Australia who developed signed languages because of the prohibition of spoken communication during periods of mourning and certain activities like hunting

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2 The term “alternate sign language” was first proposed by Kendon (1988).

or fishing (Bauer, 2012; Kendon, 1989). In North America, Plains Indian Sign Language or Keresan Pueblo Indian Sign Language were principally developed as a *lingua franca* because of the communication difficulties among tribes speaking different languages (Davis, 2010, p. 15). Plains Indian Sign Language was widely used all the way from what is now Texas to Canada. The alternate sign languages studied by Kendon (1989) in central Australia showed a strong influence from the surrounding spoken languages. The extent and manner of influence of spoken languages on alternate sign languages elsewhere appears to be quite variable, however, depending as it does upon such factors as the grammatical (morpho-syntactic) structure of these spoken languages and whether or not the alternate sign language is used among people speaking different languages, as was the case in North America (de Vos and Pfau 2015; Kendon 1989 chap. 13; Pfau 2012).<sup>3</sup>

**Variability in interaction patterns.** In some cases of emerging sign languages such as YMSL, which have developed in geographically proximate villages or small towns, signers do not always interact among each other. The same occurs in Chatino sign language used in Oaxaca, Mexico (Hou 2016; Hou 2018; Mesh 2017). Although they do live in the same village, signers (conforming to cultural norms in the surrounding communities) primarily communicate with members of their own family, hence the linguistic community is very different from what could be expected in institutionalized or Deaf community sign languages. To some extent the same happens in Chicán where YMSL is in use. Other authors (Zeshan et al. 2013; Escobedo Delgado 2012) have proposed the label “Chicán Sign Language” but this term is based only on geographical limits. A closer analysis of the ways signers interact in this village reveals important intracommunity variation (Le Guen 2012, Safar and Petatillo Chan, this volume; Safar et al. 2018) that calls into question the degree of homogeneity of the language across the community of Chicán. More surprisingly, the analysis of several kinds of data shows that linguistic structures used by signers from certain “interactional groups” (Le Guen 2012) in Chicán resemble structures used by signers in Nohkop, with whom they never had direct contact, more than the signing of other “interactional groups” of their own village (for instance strategies of number expression, Safar et al. 2018). To analyze similarities and variation in emerging sign languages, it is important to understand the sociocultural context of these communities: In Yucatan, for instance, patterns of interaction are more linked to kinship rather than hearing status (Le Guen 2012; Safar 2019).

Table 1 (inspired by Senghas (2005: 464)) summarizes and provides an overview of the characteristics of the sign languages examined in this volume.

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<sup>3</sup> We would like to thank Adam Kendon for this comment.

**Table 1:** Summary of some of the sociolinguistic conditions under which signed communication systems emerge. BB refers to Bilingual Bimodal.

Situation (name)	Number of people	number of generations	number of years	Learner's age at first exposure	Input to current learners	Hearing status of interlocutors	Context for transmission to new generations
homesign system (individual)	1	1	individual lifespan	n/a	co-speech gesture	hearing	no deaf learners
Zinacantec family homesign system	3 deaf (dozen hearing)	2	individual lifespan	birth	co-speech gesture, older homesigners	hearing and deaf (BB)	family home
Nebaj shared homesign systems	7 adults, 12 children	1 or 2	individual lifespan	birth	1 <sup>st</sup> generation signing	Hearing and deaf	family home, school
YMSL (Chicán)	17 deaf (300 BB)	3	84	birth	2 <sup>nd</sup> generation signing	deaf and hearing (BB)	mutigenerational family home, rural indigenous
YMSL (Nohkop)	4 deaf (30 BB)	1	26	birth	younger siblings signing	deaf and hearing (BB)	family homes, rural indigenous
Marajó Island sign language	30 deaf	1	individual lifespan	birth	co-speech gesture	deaf and hearing (BB)	family home, school
Providence Island Sign Language	17	several	individual lifespan	birth	co-speech gesture	deaf and hearing (BB)	family home, school
Bay Islands Sign Language	11	3	100	birth	2 <sup>nd</sup> generation	deaf-blind, deaf, hearing	family home
Nicaraguan Sign Language	50 in the first cohort, 1500 to date	2 (biological generations)	42	5 (school age)	fluency of language models varies by context	deaf, some hearing	school and urban communities

## Advances in studies about emerging sign languages

The study of emerging sign languages is relevant for various reasons and at various levels. A first reason, many times invoked, is that emerging sign languages give us clues to *understanding language creation*, from a broad perspective (the origin of human language), from a modality-specific perspective (the origins of sign languages) but also from a more sociocultural and local viewpoint. How human language emerged is a question that has been debated for many centuries, yet there are many different theories and still no definitive answer. One main reason is that we do not have any records of how the first humans started to communicate. A fascinating aspect of emerging sign languages is that they provide us with some observations about the emergence of human languages, especially since comparable cases cannot be investigated for spoken languages (see Meir et al. (2010) for a discussion of how emerging sign languages represent “natural laboratories” to explore the question of language emergence). What is particularly interesting and different from spoken languages, is that these young sign languages do not directly inherit features from previously existing languages (unlike pidgins or creoles). That is, they are not derived from prior signed languages and neither are they signed versions of the surrounding spoken languages. In the absence of an already established sign language in these communities, deaf signers, along with their deaf and hearing interlocutors have to basically “invent” a new system of communication. Although the conditions of emergence of the first human languages greatly differ, observing the evolution process of young sign languages can nevertheless give us some ideas regarding the human capacity to create language.

Crucially – and this is another outcome of emerging sign language studies and one of the important contributions of this volume – because sign languages can emerge in a variety of different (geographical, cultural, etc.) settings, the documentation of emerging sign languages not only gives us clues as to how far the *human propensity for developing language* goes, but also about the *importance of the surrounding sociolinguistic context*. On the one hand, results from recent studies point to the idea that a natural human language, and specifically a sign language, should have a basic linguistic structure (see for instance Sandler 2017). On the other hand, as evident from the existing body of studies on emerging sign languages as well as the chapters of this volume, not all emerging sign languages exhibit the same linguistic structures. For instance, while Al-Sayyid Bedouin Sign Language (ABSL) took three generations to develop reported speech (Sandler 2017: 74), this feature is present even among the first generation of signers of



Yucatec Maya Sign Language (YMSL) of Nohkop, a language that has existed for no more than 22 years. Although some skeletal structure might emerge “naturally” as the result of the capacities of human cognition and the will to communicate propositional content (see Levinson 2006), the surrounding context as well as the sociological constitution of the signers’ community might have a crucial influence on the development of the language itself (Meir et al. 2012; Safar 2019; Nyst 2007).

From an ontogenetic perspective, we still know relatively little about how deaf children create language with reduced linguistic input, when they are not exposed to a sign language and cannot hear the surrounding spoken language. A number of studies have shown that child homesign systems exhibit structure at multiple linguistic levels: lexical, morphological, morphophonological, and syntactic (see Goldin-Meadow 2003; Volterra and Erting 1990; Bates and Volterra 1984; Coppola and Brentari 2014). Considering emerging sign languages informs our understanding of how deaf children and their interlocutors create new linguistic systems (Goldin-Meadow et al. 2009; Benazzo 2009; Senghas and Coppola 2001; Morford and Goldin-Meadow 1997). We do not know very much about how complex such homesign systems can become with maturation, that is, when homesigns are used by a deaf individual into adulthood (see Carrigan and Coppola 2017; Morford 1996; Coppola and Newport 2005; Coppola, Spaepen and Goldin-Meadow 2013). One contribution of this volume on this issue, in particular, Horton’s and Haviland’s chapters, is to expand the types of homesign systems studied and include those with multiple deaf individuals who interact intergenerationally.

Another crucial contribution of the study of emerging sign languages is that some of their features *challenge assumptions regarding previously studied sign languages and enrich language typology in general* (de Vos and Pfau 2015; Zeshan and de Vos 2012). Although they constitute linguistic systems equally functional to spoken ones, sign languages are too rarely included in linguistic typologies in spite of the fact that they often show unique linguistic features (with notable exceptions such as Velupillai 2012), that are not present in spoken languages (see Sandler and Lillo-Martin 2006). For instance, one feature that is omnipresent in the visual modality and highly constrained in the oral one is simultaneity.<sup>4</sup> While a feature like simultaneity is available for any signed language, it is not maximally exploited in every sign language. Another example is classifier constructions that were previously assumed to be universal in sign languages (Emmorey 2003; Pfau, Steinbach and Woll 2012a: 158), but are, in fact, not present in some shared

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<sup>4</sup> In simultaneity in spoken languages, see the discussion on ideophones and expressive morphology in Dingemanse (2011).

or village sign languages, as demonstrated by Nyst (2007). Many emerging sign languages also show atypical features rarely or never described before for spoken languages and/or institutional sign languages, such as the absence of third person pronouns (de Vos, 2012a) or the use of typologically unusual counting systems (Zeshan et al. 2013; Safar et al. 2018). Within a typology of sign languages themselves, emerging sign languages have developed new and unprecedented ways of making use of the signing space. At the syntactic level, directionality in the signing space for verbal agreement is not obligatory for certain verbs in Kata Kolok— which is very different from the type of spatial agreement found in many institutionalized sign languages (de Vos, 2012a).

The authors of this volume aim to examine the visual behavior of the surrounding communities in which the (emerging) sign languages arise, at the same time considering the sign language’s linguistic properties, and to find out which criteria support and/or constrain the form of the emerging sign language. Such an approach does not impose a division among types of sign languages (e.g. institutionalized vs. emerging, urban vs. rural), or on modalities (spoken vs. signed) and allows us to examine the development of linguistic structures in the sign languages. One important observation that drives this approach is that deaf communities and their sign languages usually share, in many domains, similar cultural conceptions as the surrounding hearing communities. Even if we can talk about “Deaf cultures” in the case of institutionalized and community sign languages (Padden and Humphries 2006), in many emerging sign languages (especially village sign languages and rural homesigns), deaf and hearing people closely resemble each other in terms of values, lifestyles, and conceptions of the world. Indeed, they may be more similar to each other than, say, deaf people from the USA and Bali. Such a claim goes much beyond sociological or identity features, but turns out to have deep repercussions in certain domains that are fundamental to human language and that are deeply shaped by cultural conceptions, such as space and time (Levinson 2003; Kendon 1993; Le Guen 2012; Bender and Beller 2014). Deaf people, even in large deaf communities, are not isolated from the surrounding hearing communities they live in, and their sign languages often reflect observable conventions of general visual communication used among hearing people, especially in the expression of space and time.

While the use of space has been a crucial concern of sign language linguistics (Meir and Sandler 2008), the local conception of space and the identification of a preferred frame of reference has not (at least before the comparison with emerging sign languages from places other than Europe or the USA) been investigated. This simple fact is revealing in itself. The metaphorical use of signing space for narrative construction, referent tracking, person reference and verbal inflection in sign languages has long been taken as a universal linguistic feature for a

visual language (see Meir and Sandler 2008 for a discussion on this point). The investigation of emerging sign languages has revealed that this is not necessarily so (De Vos 2012; Bauer 2014), and that languages can have complex linguistic systems and yet lack this particular use of space (in which arbitrary pieces of space are used to refer to entities in the world, the so-called R-Loci). Such recent findings raise the question of why this is the case. Research suggests a relationship between the Frames of Reference (FoR)<sup>5</sup> (Levinson 2003) used by a culture or language (i.e., egocentric or geocentric) and other features of the language (Brown and Levinson 2000; Levinson 1996; Li and Gleitman 2002). Le Guen (2011a) notes a correlation between the preferred FoR and pointing strategies in spoken as well as signed languages. The basic idea is that the more an egocentric FoR is used, the more metaphorical pointing (i.e., an arbitrary relation between a piece of air and a referent) will be allowed. On the other hand, in settings where a geocentric FoR is preferred, the “morality of pointing” (McNeill 2003) will be restricted to real places and spaces, consequently limiting the relevance of metaphorical pointing, and consequently, the use of the signing space to establish relations between events and entities in the world. This hypothesis has been supported by recent studies that looked at the grammatical use of space in emerging sign languages (de Vos 2012; de Vos in prep.; Nyst 2007; Bauer 2014), although in many cases the preference for a specific FoR in the surrounding spoken language has not been sufficiently described.

In sum, the preferred FoR of the hearing communities and the local conception of space has some influence on the grammatical use of the signing space in sign languages and determines, to some extent, linguistic strategies for verbal inflection, pointing strategies, etc.

A similar argument can be made for the expression of time. As with space, the local conception of time is directly inscribed into the emerging sign language. In many cultures and languages around the world, space has been taken as a base to metaphorically express time (Bender and Beller 2014; Bender et al. 2012; Boroditsky 2000; Boroditsky and Gaby 2010; Majid, Gaby and Boroditsky 2013). In most Indo-European languages, time is conceived of and expressed as a line, the past located behind the ego and the future in the front. Such a metaphor is

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<sup>5</sup> A FoR allows one to locate distant entities (i.e., different from the body of the speaker/signer) either egocentrically, on the basis of one’s own (projected) point of view (e.g. my house is on the left side from the road looking towards the sea), or geocentrically, based on external features of the environment (e.g., my house is on the North of the road, or on the side of road where the mountain is). A third FoR exists, the intrinsic FoR, which allows one to locate entities among themselves as long as one has an intrinsic orientation, e.g. my house is located in front of the church entrance.

also produced visually in speakers' gestures (Cooperrider, Núñez and Sweetser 2014; Calbris 1990; Casasanto and Jasmin 2012). In order to talk about time, many sign languages productively use this timeline (see Pfau, Steinbach and Woll 2012b): the space in front of the signer refers to the future, and the space behind the signer expresses the past. Alternatively, many sign languages also make use of another timeline extending in front of the body from the signer's left to the signer's right side. Sign languages that emerged in cultures with a different representation of time also inherited the local conception of representing time metaphorically (Meir and Sandler 2008; Kendon 1993). This is the case in Kata Kolok (de Vos, 2012a), Yucatec Maya Sign Language (Le Guen, 2012b) and Warlpiri alternate sign language (Kendon 1993), which only distinguish the now and the not-now (and not between past and future). This fact forced the respective sign languages to elaborate different strategies to linguistically distinguish the past and the future.

The metaphorical spatial representation of time can also be reversed: In Urubu Ka'apor Sign Language (Ferreira-Brito 1984), the space in front is used to express the past and the space behind a signer expresses the future. Although there is no known documentation of Tupi-Guarani speakers' gestures, this conception of time is not unique and has also been documented in the gestures of Aymara speakers in the Andes (Núñez and Sweetser 2006). We can therefore assume that the front-back localization of future and past in Urubu Ka'apor Sign Language may have its origins in hearing people's linguistic and gestural habits. In sum, the way time will be visually expressed in an emerging sign language has to do directly with the usage of space for the conception of time in the surrounding gesturing culture.

Finally, most sign language research has focused only on deaf signers, based on the reality of urban Deaf communities in institutional settings, where deaf signers constitute the vast majority of the signing community. In contrast, the great majority of signers in village/shared sign languages are hearing speakers of the surrounding spoken language, i.e. *bimodal-bilingual signers* (Emmorey et al. 2008). Too often researchers have only directed their attention to deaf signers, led by the assumption that they are the rightful and native users of the language. In the context of some village sign languages however, the situation is very different since hearing people, who often represent the majority of signers, play a very distinct role within the signing community. Recent studies show that bimodal-bilingual people (mainly the ones closely related to deaf people) also play a decisive role in the creation and development of the language (Bauer 2014; Nyst 2013; though see Carrigan and Coppola 2017). Although they play a crucial role in language use, maintenance and evolution, they are often ignored in studies analyzing the creation of emerging sign languages. If we can agree that

deaf signers have not been exposed to an already established visual, i.e. signed, linguistic system, bimodal-bilinguals do have a linguistic system to draw from, i.e. their spoken language(s). Because in “shared signing communities” (Kisch 2008; Nyst 2012) deaf and hearing people are in close interaction, the latter can also transmit linguistic structures, metaphors, etc. to the deaf signers. In the study of emerging sign languages precise studies and empirical data are still missing to understand to what extent bimodal-bilinguals contribute to the emergence and evolution of sign languages.

While many studies have been looking at the linguistic particularities of these emerging languages (de Vos and Pfau 2015; Zeshan and Vos 2012), the majority examined the surrounding context of emergence almost exclusively from a sociolinguistic perspective and in lesser proportion in terms of their linguistic structures (but see for instance Padden et al. 2009). Very few studies are concerned with the impact of multimodal communication among the surrounding hearing population on the development of the emerging sign language. This volume focuses on this question, among others. The lack of studies on this matter is due to several reasons. Documenting a language is a hard task in itself and focusing on the language description can be challenging enough. Also, sign linguists, especially those with experience studying institutionalized sign languages in the US or Europe, might also have a bias towards ignoring gestures and not properly taking into account visual communication of hearing people in their analyses (see Nyst, Sylla and Magassouba 2012). In urban, institutionalized sign language settings, deaf people are often segregated from the surrounding society and for a long time, sign languages were not considered to be “proper languages” and rather only denoted as “gesticulation” in a derogatory way (until the work of Stokoe 1960; see also Petitto 2014). A strict separation was made between sign languages as full linguistic systems and gestures as non-linguistic/unsystematic (see e.g. Kendon 2008; Branson and Miller 2007; Goldin-Meadow and Brentari 2017), following McNeill’s perspective, in which gestures are primarily considered as “spontaneous creations of individual speakers, unique and personal. (...). They are free and reveal idiosyncratic imagery of thought” (McNeill 1992: 1). As a consequence, a great number of studies look at gestures from a psychological standpoint, and tend to consider them mainly as reflections of the mind and not as integrated in a linguistic message (see Cooperrider 2017 for a review). New studies show that many gestures do follow specific rules and can be considered part of the linguistic system, especially in rural settings e.g. in Mesoamerica or Asia, where they are used very systematically and to a greater extent than in many

WEIRD<sup>6</sup> cultures (Floyd 2016; Le Guen 2011b; Enfield 2009). Several chapters of this volume directly deal with this issue.

Another related factor that led to overlooking the role of the visible behavior of hearing people in the development of emerging sign languages is the perceived limited influence of gestures on institutionalized sign languages. In the study of institutionalized sign languages, gestures are mainly seen as remote etymological features of current signs, and the focus has been on how gestures (taken as non-linguistic features) got grammaticalized (Wilcox 2005; Wilcox 2009; Pfau and Zeshan 2016). Some recent work has considered gestures in the study of institutionalized sign languages, although many focused mainly on cognitive aspects, iconicity and language acquisition (Baus, Carreiras and Emmorey 2013; Perniss, Thompson and Vigliocco 2010). The influence of the linguistic and sociolinguistic context of emergence of these new sign languages needs to be accounted for (a point already made by Russo and Volterra 2005).

## Content of this volume

This volume is constituted by seven chapters, all original contributions by a total of thirteen authors. Additional to these chapters, following the line of Zeshan and DeVos (2012), authors have also provided short sociolinguistic sketches (seven in total) of the various languages they examine.

**Haviland** in his chapter entitled *Signs, interaction, coordination, and gaze: interactive foundations of “Z”—an emerging (sign) language from Chiapas, Mexico* looks at turn exchanges in a first-generation sign language, the Zinacantec Family Homesign in Chiapas (Mexico), and how it greatly depends on manipulating mutual attention through gaze. The family is composed of three deaf signers and their direct kin, all fluent in sign language. Although they represent a microcommunity, deaf and hearing signers have developed a sophisticated form of visual communication.

Haviland nicely shows how gaze plays a central role in how signers orchestrate interpersonal attention and manage synchrony and timing in their signing. While gaze is used also among speakers for turn taking, Haviland demonstrates how it is recruited by deaf signers to fulfill several functions: first, to index things and parts of the discourse (similar to spoken languages); second, how it is used

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<sup>6</sup> WEIRD = Western, Educated, and from Industrialized, Rich, and Democratic countries (Henrich, Heine and Norenzayan, 2010)

as a metalinguistic tool to put emphasis or question a sign as a linguistic sign; third, how it serves as a metapragmatic device used to address someone (or, on the contrary, by not looking to avoid interaction); and fourth, (although it could be taken as a subcategory of the third function), how gazing to nowhere allows syntactic breaks exhibiting hesitation or imagining a situation outside the here-now.

Haviland analyses in great depth several examples of natural interactions, looking at how gaze structures interactions (in the form of turn taking) but can, at the same time, convey meaning and display pragmatic features and intentionality in being a speech act on its own.

Although Haviland does not describe eye gaze in the surrounding Tsotsil culture, it is obvious that it is not as elaborate as in Z. His chapter clearly shows that, in some cases, a whole conversation can be performed and efficient without (almost any) manual signing. Haviland's analysis also shows that eye gaze is useful and, can allow various types of communicative interactions such as secret conversations, prompting, expressing displeasure, shaming and even expressing avoidance of interaction.

**Horton's** chapter *Representational strategies in shared homesign systems from Nebaj, Guatemala*, proposes an original approach to emerging sign languages as she examines several homesign systems in the same village and the individual evolution of signers over time. Her approach allows for an analysis of the correspondence between the communicative ecology in which child homesigners are embedded and the consistencies in patterns of referential strategies (in particular indexical and iconic) in their lexicon.

Horton's study examines various referential strategies that child homesigners mobilize in their emergent lexicons. Horton discusses the issue of categorization of emerging sign languages taking into account the specificities of her community of study and proposes an innovative framework to understand the homesign communicative ecologies. She differentiates three types of ecology, namely (1) individual homesigners in a hearing family, (2) homesigners in family ecologies, in which interactions happen with other deaf homesigners, and members of their families, and (3) the peer communicative ecology, where a homesigner may have few homesign interactions in the family environment, but also exchanges with other deaf homesigners in a community setting such as school or work.

Previous research on child homesign systems showed significant individual variation across the child homesign lexicons, but also significant internal consistency for each system, in terms of referential strategy – the relative prevalence of indexical (deictic) and iconic forms. In order to determine whether communicative ecology affects the form of lexicon, Horton ran a study with participants being given a book with photos of familiar animals, foods, vehicles,



clothing, tools, people and places they had to describe. While they distinguish animal referents, using hand-as-body-part iconicity they tend to use enactment signs for all three remaining referent types. On the other hand, family and homesigners in peer communicative ecology show evidence for iconicity for all referent types. Although, to some extent, communicative ecology may be associated with the use of particular referential strategies, it rather appears that the age of the homesigner is crucial, specifically pointing is preferred among younger homesigners. Horton also finds that many homesigners incorporate signs into their lexicon that resemble conventional gestures used by hearing speakers, and that the distribution of these signs varied across and within groups and by referent type. One conclusion of Horton's study is that increased interaction with another homesigner may support the emergence of patterned iconicity common to many sign languages.

**Safar and Petatillo Chan** in their chapter entitled *Strategies of noun-verb distinction in Yucatec Maya Sign Languages* explore the validity of a postulate widely used in linguistics and psychology that states there is a “universal distinction” between verbs and nouns. To test this hypothesis, they use YMSLs, emerging sign languages from Mexico. Their data were collected in four Yucatec Maya communities with a high incidence of deafness in the peninsula of Yucatán that have never been in contact. They also use, as a comparison group, hearing non-signing gesturers in a Yucatec Maya village without any deaf inhabitants.

Their study looks at two strategies for expressing a noun-verb distinction that have been described in previous research, namely the use of Size-and-Shape specifiers (SASSes) as nominal markers (Tkachman and Sandler 2013) and consistent differences in iconic patterns for nouns and verbs (Padden et al. 2013; Padden et al. 2015). They ask three main questions: (a) do Yucatec Maya Sign Languages use SASSes and patterned iconicity to mark a noun-verb distinction? (b) if it is indeed the case, in what way do these strategies differ from their gestural precursors? and finally (c) which patterns of variation can be found between villages and among individual signers? In order to answer these questions, Safar and Petatillo Chan conducted three studies. The first analyses the use of SASSes in YMSL signs for objects. The second looks at the distribution of iconic strategies (instrument vs. handling handshapes) for the depiction of tools in YMSLs and in silent gestures produced by hearing Yucatec Maya. The last study examines differences in the use of these strategies for describing tools and actions associated with these tools.

Results from study 1 demonstrate that the use of SASSes to distinguish objects from actions is not obligatory in YMSLs, not all objects are marked with SASSes and there is variation in preference of use between signers. Even if the final position is preferred (as in other emerging sign languages), it is not compulsory



and other positions also occur with considerable frequency. In the various villages using YMSL, the use of SASSes is both semantically driven (as shown in Al-Sayyid Bedouin Sign Language), but also signer-driven. Interestingly, hearing Yucatec Mayas, when asked to describe the same set of photo stimuli in silent gestures, used almost identical handshapes for the same objects as YMSL signers. Results from study 2 demonstrate that the preference towards either an instrument or a handling strategy is not as pronounced as what Padden et al. (2013) show: the handling/instrument-split in Yucatec Maya gesture vs. YMSLs is much less striking than in the gesture/sign comparison among American and Bedouin participants. The last study indicates that in YMSL, no evidence for a distinction of objects and actions by means of an instrument/handling opposition could be found among Yucatec Maya participants. Unlike the US-American gesturers and signers in Padden et al.'s (2015) study, Yucatec Maya gesturers and YMSL signers do not alternate their iconic strategy in order to systematically distinguish objects from actions. Safar and Petatillo Chan conclude that there is not one solid grammatical strategy to mark the distinction between nouns and verbs in YMSL. This actually resonates with what Lois and Vapnarsky (2006) have shown for Yucatecan languages.

Another conclusion from Safar and Petatillo Chan's chapter, that goes in line with the qualitative analysis in Le Guen et al.'s chapter, are the striking analogies between signing communities that have never been in contact, providing more evidence that similarities in YMSLs from different villages go beyond the lexicon and that they also resemble each other in more profound formational principles.

**Le Guen et al.** in their chapter entitled *Yucatec Maya multimodal interaction as the basis for Yucatec Maya Sign Language* aim at demonstrating that the numerous non-verbal strategies used in everyday interactions among the Yucatec Mayas provide a rich background against which Yucatec Maya Sign Language develops. Their chapter, using qualitative examples, presents two main ideas. The first is that Yucatec Maya multimodal communication is not only rich in iconic and quotable gestures, but the visual modality often comes to complement speech as the main mean of communication of propositional content. As a result, the emerging sign languages created in different villages in Yucatan, end up looking similar at the lexical as well as syntactic levels because they take as a basis the systematic features of Yucatec Maya multimodal communication.

The theoretical postulate used by Le Guen et al. allow them to provide an explanation for the similarities between emerging sign languages that have never been in contact but emerged in a similar cultural and sociolinguistic context. If correct, their proposal allows to predict similarities and differences between the languages used in different villages and, indeed, they show that signers create signs based on their shared cultural knowledge and using similar gestural

strategies. Furthermore, they also provide an explanation for why the Yucatec Maya Sign Language can be considered a unified language and, at the same time, legitimize the unique label Yucatec Maya Sign Language (YMSL).

In their chapter, they use the notion of “composite utterances” (developed by Enfield 2009) to explain how the distribution of information is done between the two modalities (oral and visual) among Yucatec Maya speakers. Then, they go on showing how some gestures are transformed into signs (quotable, iconic gestures and SASSs), but also explain how gestural habits are recruited for the construction of the YMSL, in particular through the use of character perspective. They finally examine linguistic calques and transfer of cultural concepts and other communicative habits.

In the discussion, Le Guen et al. provide some reflections on the paths of grammaticalization and lexicalization from gesture to sign language considering various ways in which co-speech gestures can be used to form signs in YMSL. They also consider several features of the Yucatec Maya multimodal communication that can help but, in some cases, also limit, the creation of YMSL and some innovations of YMSL.

**Martinod et al.** in their chapter entitled *A typological perspective on the meaningful handshapes in the emerging sign languages on Marajó Island (Brazil)* consider a group of different homesigners in order to run a cross-linguistic comparison of the meaningful handshape component of sign language units, using several emerging sign languages (Marajó Island SL, homesigns from the center of Brazil (Fusellier-Souza 2004) and Kata Kolok from Bali) and but also institutionalized sign languages (LSF, TID, NGT, BSL and IU). Interestingly, as in Horton’s chapter, the social composition of the signing community is crucial for this study. In Marajó Island (located northeast of Brazil in the delta of the Amazon and the Rio Tocantins), while deaf people are slowly becoming a single community (though the creation of an association and the formation of a Deaf community), their signing originated from various homesign systems and other communication forms and languages that have come into contact with each other. In terms of emergence, it is also a situation somehow comparable to what Braithwaite (this volume) describes for Caribbean sign languages.

As Martinod et al. point out, handshape is one of the parametric components of sign language units and thus can be considered as a phonological or a morphemic element. As a morphemic element, it can either represent an entity by its shape or from the way the entity is handled (following Padden et al. 2013). Martinod et al. follow the so-called “Semiological Model” proposed by Cuxac (1999, 2000) that considers on the one hand that all sign languages of the world share a significant structural core (i.e., have at their core, the common human

experience) and, on the other hand, that all sign language units, whether lexical or non-conventional, are composed of morphemic meaningful elements.

They look at three possible hypotheses to examine whether cultural differences or the size of the signing community are correlated with the number of classifier types in the sign languages: (a) there is a high variance across sign languages, and limited usage of classifiers in sign languages of small communities, (b) handling classifiers exhibit low variance across sign languages and (c) size-and-shape specifiers exhibit the possibility of atypical use linked to the coverbal gestures of the surrounding culture. The data from Marajó Island SL consists of elicited productions based on stimuli as well as semi-structured and spontaneous conversations.

Their results show that both representational (i.e., “instrument” following the terminology used by Padden et al. (2013) and Safar and Petatillo Chan, this volume) and handling representations were attested in all of the examined sign languages. Overall, their data confirms the preference of some sign languages for handling handshapes or entity handshapes in specific contexts, as in Padden et al. (2013), see also Safar and Petatillo Chan’s and Horton’s chapters.

Their theoretical model supports the hypothesis of intrinsic similarities between emerging sign languages such as the Marajó sign languages and national established sign languages, validating at the same time their cross-linguistic study.

**Braithwaite**, in his chapter entitled *Emerging Sign Languages in the Caribbean*, discusses the various (possible) reasons that led to high incidences of deafness in the Caribbean region over specific periods. The Caribbean is defined as encompassing the islands of the Greater and Lesser Antilles, ‘the Guianas’ (Guyana, Suriname and French Guiana), and the coastlands surrounding the Caribbean Sea, including various island groups with political connections to the mainland, but historical, cultural and linguistic connections to the Antilles, such as San Andres and Providence of Colombia, the Bay Islands of Honduras, and the Corn Islands of Nicaragua.

Examining origins of deafness, it is noteworthy that one main factor of vulnerability has been the isolation of populations in this area, that exposed inhabitants to deafness due to either genetic endogamy (in some cases rooted in social factors), illnesses or various types of poisonings. Increase of population due to immigration and travels of the inhabitants to other countries have helped to significantly reduce causes of deafness.

Braithwaite’s chapter displays different paths of evolution of the various sign languages of the area. First, we note various attitudes towards sign language and deafness, some ambiguous or even negative (as in Providence) while in other places deaf people are more included into the wider society (Jamaican Country

Sign, South Rupununi Sign Language), and even deafblind people (Bay Islands Sign Language). Many local emerging sign languages had to face contact with institutionalized (national) sign languages, and, in some cases, ended up being replaced by them, especially among younger generations, like in the case of Old Caymanian Sign Language or Jamaican Country Sign (KonchriSain), which were both replaced by either ASL or a variety of Jamaican Sign Language. In contrast, for South Rupununi Sign Language, classified as a shared sign language, deaf people are integrated in the community (resembling other cases described in this volume such as Nebaj shared homesigns and Yucatec Maya Sign Language). Bay Islands Sign Language provides an original instance of deafness combined with blindness, giving rise to a tactile sign language. This language is used by deaf and deaf-blind people, their family members and friends. Braithwaite's chapter provides the first documentation of an emerging tactile sign language.

Braithwaite debates over the relation between these various Caribbean sign languages. While they exhibit many similarities (especially at the lexical level), it remains unclear if these resemblances are due to contact, parallel creations, shared cultural background (i.e., gestural behaviors among hearing people) or iconicity – or a combination of these factors.

Besides emerging sign languages, the Caribbean also encompasses a number of institutionalized sign languages, that developed mainly through schooling and formal education, under the influence of French Sign Language, ASL and Signing Exact English, Sign Language of the Netherlands and British Sign Language, depending on the colonial country the islands belonged to. Interestingly for this volume, all these institutionalized sign languages were also, at some point, “emerging institutionalized sign languages” like Haitian Sign Language (LSH), Jamaican Sign Language and Trinidad and Tobago Sign Language (TTSL).

**Coppola's** chapter entitled *Gestures, homesign, sign language: Cultural and social factors driving lexical conventionalization* uses emerging sign languages as a window into the origins of lexical items and their conventionalization. She describes two studies examining an emerging community sign language, Nicaraguan Sign Language (NSL), and gestures and homesign systems also used in Nicaragua. The first study examines the processes of adoption and adaptation of conventional gestures used by hearing Nicaraguan Spanish speakers into NSL. She finds that, despite their lack of contact with Deaf signers who use NSL, hearing gesturers in Nicaragua very often produced the same forms observed in NSL signs. In many cases, the gestures and signs share very similar forms and meanings. However, when they entered the lexicon of the sign language, Coppola notices that certain signs changed either in their shape or meaning. It seems that the path from gesture to language is mediated by homesigners and there is a clear

tendency toward arbitrariness and processes of grammaticalization that operate on non-linguistic elements (i.e., iconic gestures).

Her second study looks at the role of social interaction in conventionalization of the lexicon. Specifically, she compares the process of conventionalizing lexical forms in two types of language emergence situations in which groups of people communicate on a regular basis and over an extended period of time: early members of the Nicaraguan Deaf community and deaf homesigners and their hearing communication partners. She finds that the rate of conventionalization is correlated with the social network and communicative settings. Both groups differ in a striking way. While NSL signers evolve in a “richly-connected” network where all members use NSL to communicate with each other, the homesigners only have a one-to-one communication with multiple partners, which situate them in a “sparsely-connected” network, where they are the only person who uses the homesign system as their primary language. She concludes that the configuration of the network influences the process of conventionalization of lexical signs.

It should be mentioned also that an additional benefit for NSL signers lies in the fact that they are in a context of formal education, whereas the homesigners are not. As other studies have shown, formal education has been associated with greater standardization of language forms.

Her findings are validated through a computational study that provides additional insight into the factors driving the robustness and rate of lexical conventionalization.

## Main issues raised in this volume

Several issues are raised in this volume across the various chapters. While looking at the processes of emergence of different sign languages of the Americas, many parallels can be found between the individual chapters.

The first issue raised in this volume, and maybe the most original in current research on emerging sign languages, relates to the influence of the surrounding sociolinguistic context in the process of emergence of these new created languages. How much do the surrounding culture, language and local ideologies regarding language and deafness play a role in the emergence of a new sign language?

One central topic relates to the communicative network in which deaf signers are embedded that appears to have crucial outcomes on the development of the language (in particular on the process of sign conventionalization) as shown in the chapters by Horton, Braithwaite, Martinod et al. and Coppola. Horton’s study

clearly indicates how increased interaction with other homesigners supports the emergence of patterned iconicity.

A second related issue has to do with the degree of linguistic input already present in the surrounding culture that helps the emergence of a new sign language. Safar and Petatillo Chan as well as Le Guen et al. point out the importance of the influence of the communicative multimodal environment in the case of YMSL. Coppola, looking at the lexicon in NSL and homesign systems, also shows the influence of lexical quotable gestures used among the surrounding Spanish-speaking population. On this point, Braithwaite reminds us that sign languages did not emerge *ex nihilo* and that the language used by the hearing people (spoken, gestured, and written) may also play a prominent role in the schools where new signed languages have emerged.

Several chapters also mention the complexity of emerging sign languages almost from their very origin. Haviland's chapter is especially revealing on this issue, demonstrating the complex use of eye gaze in many types of communicative events. However, as mentioned above, as the communicative network increases, more complexity is allowed, mainly through conventionalization of linguistic structures.

While this is not a central theme in the chapters of this volume, but discussed in the sociolinguistic sketches, it is interesting to note that deafness is not always regarded the same way in every community. While some indigenous communities accept deafness and find ways around it to successfully communicate (Safar and Le Guen, Horton, Braithwaite), others do not value it as much (like the Tsotsil, see Haviland's sketch). The same goes for more institutionalized settings, as Braithwaite shows on the various communities of the Caribbean.

As already pointed out many years ago (Johnson 1991), in many of the cultural settings explored in this volume, deafness does not represent a marker of identity. Social networks (e.g., kinship affiliation) are often more prominent than hearing status in this respect, especially in indigenous communities.

Finally, at the typological level, the various emerging sign languages examined in this volume come to challenge existing typologies of sign languages (even the one we proposed above). Signers' networks and communities do not always nicely fit all the criteria used to define a homesign system vs. a village sign language or an institutionalized sign language. Horton shows how various homesigners can also gather in other places besides school and form a larger network. Safar and Petatillo and Le Guen et al. show that, although YMSL(s) can be categorized as village sign language(s), the sign languages of some communities are indeed closer to homesigns in terms of their sociologic composition, but display similar characteristics at the linguistic level. Braithwaite's chapter exhibits how even institutionalized sign languages can be emergent, built on a sedimentation of

homesign systems and older established sign languages, similar to Martha's Vineyard sign language (which was a mix of the local sign language, French sign language and ASL).

As far as how the field of emerging sign languages can move forward, we encourage authors to follow this kind of compilation in building comparative research and analysis that can help further describe the sociolinguistic factors that help to give rise to new visual forms of communication. What is now needed are more hypotheses regarding the factors that relate to the emergence of linguistic complexity, on the emergence of a language itself, but also its changes over time and generations. It is crucial in further studies to take into account sociological factors, the environment of the signers, deaf and bilingual, the local ideology and the larger global context (schooling, the access to the internet, new technologies, etc.).

We hope that this volume will provide new insights to the discipline of sign language research and specifically on emerging sign languages of the Americas and other parts of the world and that it will also encourage more comprehensive research towards a better understanding of the phenomena that contribute to the emergence of these new systems of communication.

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Marie Coppola

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

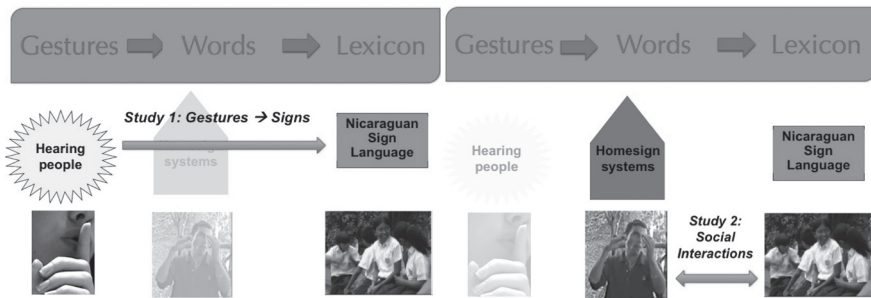
At any given period, however far back in time we go, a language is always an inheritance from the past. The initial assignment of names to things, establishing a contract between concepts and sound patterns, is an act we can conceive in the imagination, but no one has ever observed it taking place... 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



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<sup>1</sup> (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

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<sup>1</sup> 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.<sup>2</sup> 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.

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<sup>2</sup> 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.<sup>3</sup> 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

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<sup>3</sup> 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.<sup>4</sup> 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<sup>5</sup> (though see Nyst, 2016 for examples of detailed coding of iconic gestures produced by hearing speakers cross-linguistically).

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<sup>4</sup> 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.

<sup>5</sup> 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
<b>Handshape</b>	
Handshape (modified Stokoe notation)	0.94
Change of handshape (yes or no)	1.00
Number (1-handed or 2-handed)	0.90
<b>Movement</b>	
Direction (e.g., away from body, up and down, contact)	0.80
Type (e.g., circular, repeated, restrained)	0.80
<b>Orientation</b> (of palm) (e.g., toward body, toward out)	
	0.82
<b>Location</b>	
	0.98
<b>Mean across categories</b>	
	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.

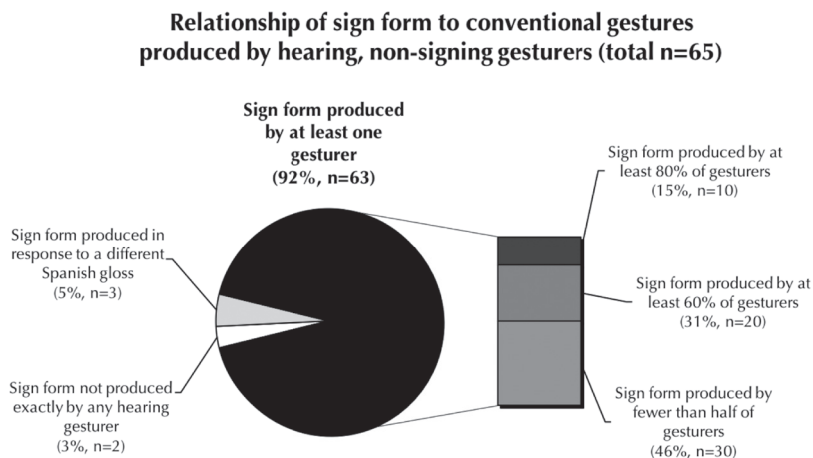
## 1.6 Results

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



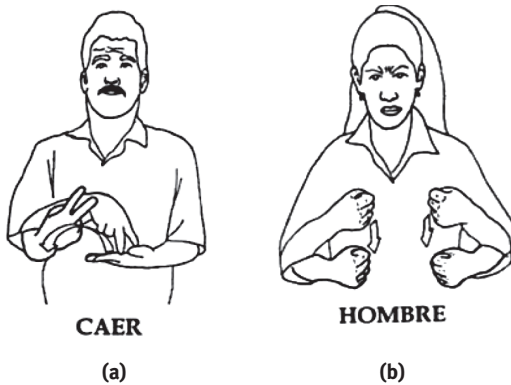
are frequently used, their forms are formationally quite simple, and also because these emblems are in use cross-culturally (they are at least shared between Central America and North America).



**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.



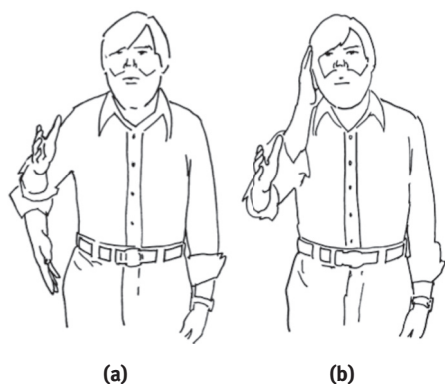
**Figure 3:** The NSL dictionary forms for FALL (CAER) (a) and MAN (HOMBRE) (b). Note the “V” handshape of the sign for “fall” (a).

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.

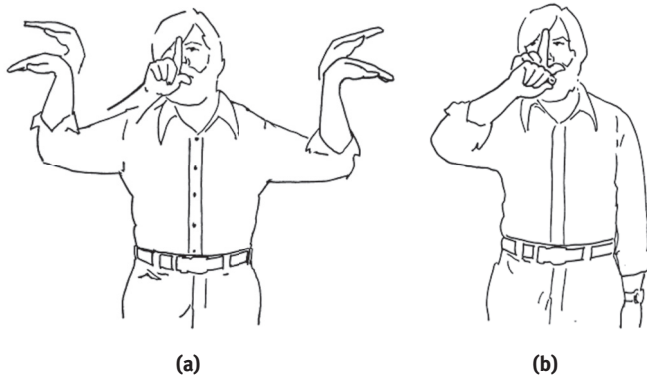
This brings us to the second part of the research question: As forms transition from gestures to signs, do their meanings and or semantic ranges and/or shift, and if so, how? While a large proportion of gestures and signs shared a referent or gloss, we did observe some interesting shifts in meaning/reference.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

## 1.7 Changes in form

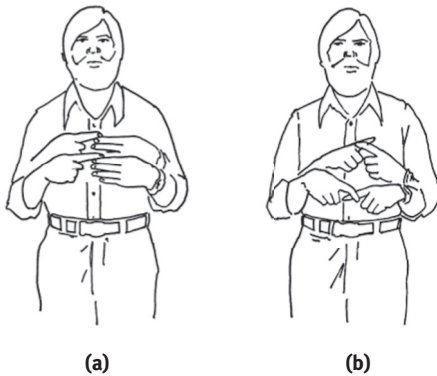
As alluded to earlier, we observed changes in both form and in meaning as gestures entered the NSL lexicon. The form changes we observed with lexicalization in NSL included many of the tendencies toward arbitrariness, and away from iconicity, described in Frishberg's (1975) study of historical changes 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.

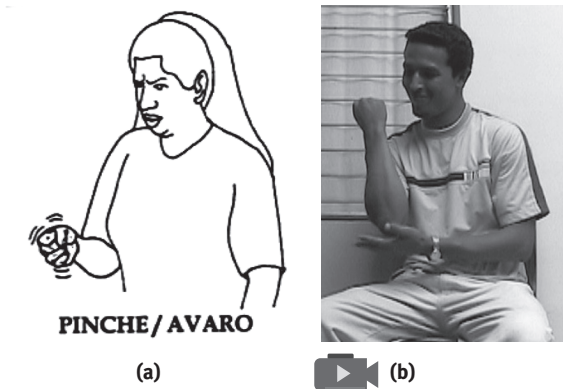
The first example is CHILD (Figure 7). All 11 gesturers produced the same movement and orientation found in the NSL sign, as well as similar handshapes. However, we observed variation in the Location parameter for a subset of gesturers. Some gesturers produced the form much higher, much lower, or even 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.

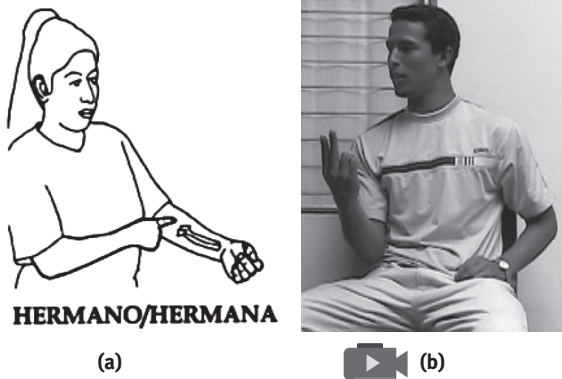


**Figure 8:** The NSL sign glossed STINGY (PINCHE/AVARO) (a). An example of a gesture response using two hands, that includes the closed fist of the NSL sign but also features the additional (perhaps original) component of the open palm contacting the elbow (b).

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.

	<b>Description of form and number of gesturers producing this form (total = 11)</b>	<b>Relationship to conventional gestures or NSL signs</b>	<b>Relevant grammaticalization principle and notes</b>
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.



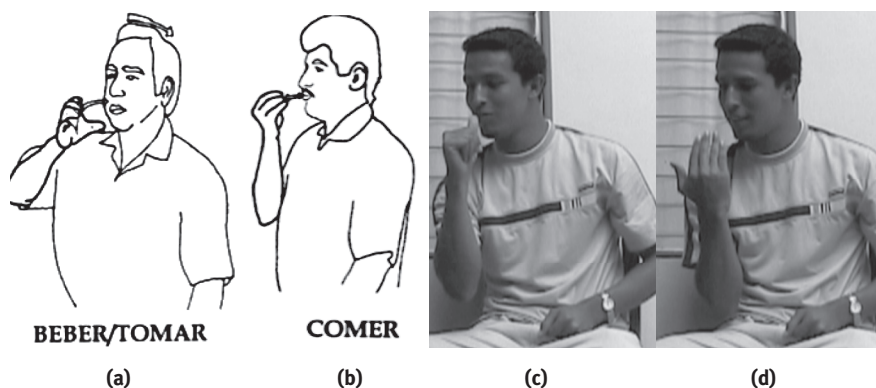
Table 3: (continued)

	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.<sup>6</sup>

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).<sup>7</sup> The analysis presented here, as well as a number of other works that carefully compare

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<sup>6</sup> 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).

<sup>7</sup> 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.<sup>8</sup> 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,  $M=27$ ).<sup>9</sup> 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

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<sup>8</sup> 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.

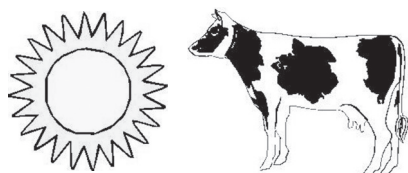
<sup>9</sup> We thank Ann Senghas for contributing these production data from her archive of early Nicaraguan Sign Language.



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.

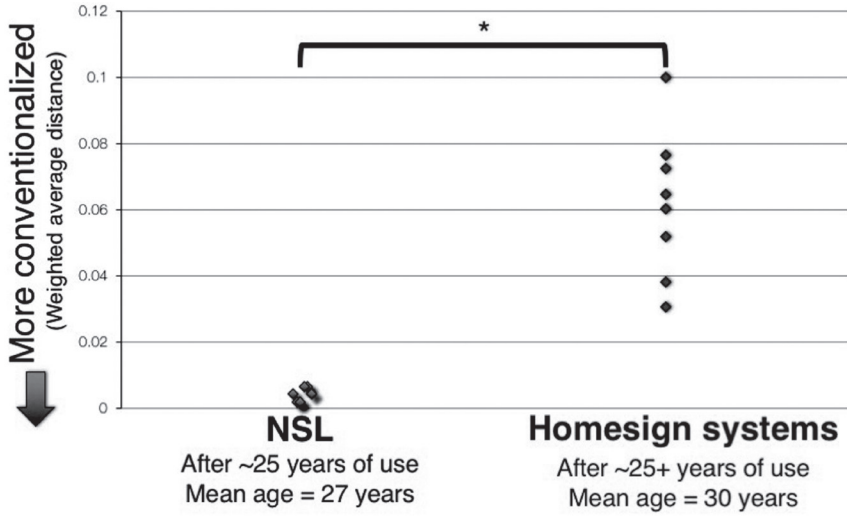
Each participant produced at least one gesture or sign in response to each line drawing. In line with Sandler et al.'s notion of an "iconic prototype" (2011), for the analyses presented here we used the iconic motivation for a form, rather than its phonetic realization, to categorize responses. This 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

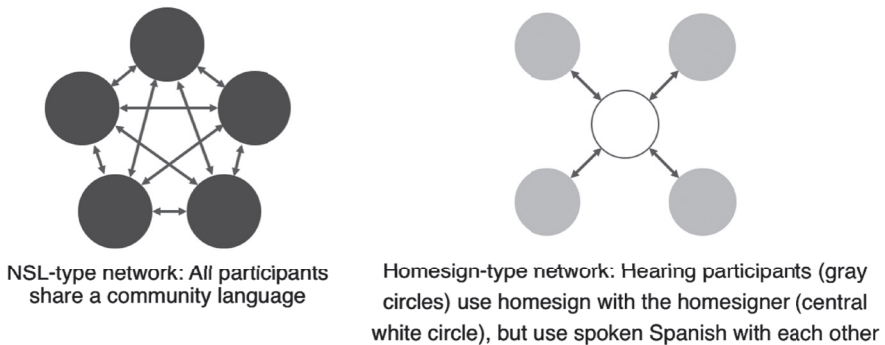
Each data point represents the distance between the responses produced by a pair of individuals (Figure 12), averaged across the 9 objects. For details of how this distance was calculated, see Richie et al. (2014b). The points on the right, for the homesign systems, indicate the average distance, across 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/lleño	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	espíalo	I am watching you	modulator	ex: unverifiable	





## Part II: **Sociolinguistic sketches**

Coppola, M. (in press). Sociolinguistic sketch: Nicaraguan Sign Language and adult homesign systems in Nicaragua. In *Emerging Sign Languages of the Americas*, O. LeGuen, M. Coppola, & J. Safar (Eds.). Berlin: DeGruyter.

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<sup>2</sup> (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

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

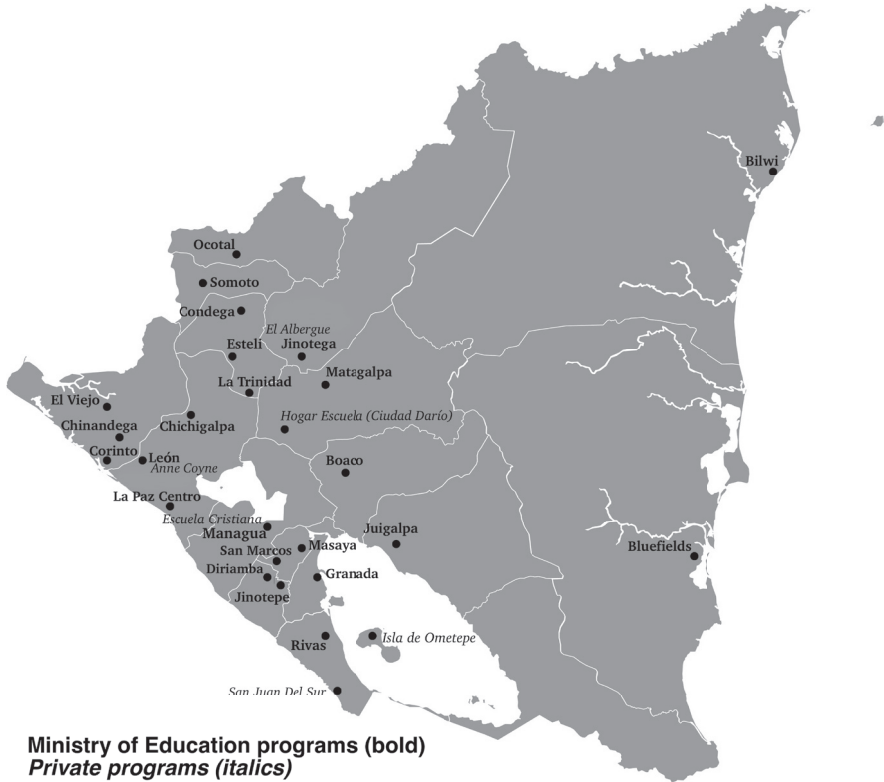
According to a census conducted in 2009 in which 179,138 households were visited, people with hearing loss constituted 10.1% of the disabled population in Nicaragua (12,783 people) (JICA, 2014). This figure likely includes many non-signing deaf people. The census also reports that 41% of people with 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<sup>1</sup> 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

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<sup>1</sup> 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](http://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](http://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, <i>Nicaraguan Sign Language</i>	2009	Nicaraguan Sign Language is the official language of Deaf people in Nicaragua.
Law 763, <i>Rights of disabled people</i>	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](http://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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