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Emerging linguistic features of Sao Tome and Principe Sign Language

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In Sao Tome and Principe (STP), there are approximately five thousand deaf and hard-of-hearing individuals. Until recently, these people had no language to use between them other than basic home signs used only to communicate with their families. With this communication gap in mind, a project was set up to help them come together in a common space in order to create a dedicated environment for a common sign language to emerge.

In less than two years, the first cohort began to sign and to develop a newly emerging sign language – the Sao Tome and Principe Sign Language (LGSTP). Signs were elicited by means of drawings and pictures and recorded from the beginning of the project. The emergent structures of signs in this new language were compared with those reported for other emergent sign languages such as the Al-Sayyid Bedouin Sign Language (ABSL) and the Lengua de Señas de Nicarágua (NSL), and several similarities were found at the first stage.

In this preliminary study on the emergence of LGSTP, it was observed that, in its first stage, signs are mostly iconic and exhibit a greater involvement of the articulators and a larger signing space when compared with subsequent stages of LGSTP emergence and with other sign languages. Although holistic signs are the prevalent structure, compounding seems to be emerging. At this stage of emergence, OSV seems to be the predominant syntactic structure of LGSTP, and yet the data suggest that new signers exhibit difficulties in syntactic constructions with two arguments.

Keywords: sign language emergence, vocabulary development, iconicity, word order, language policy, home signs

1 Introduction

Sao Tome and Principe (STP) is a group of volcanic islands located in equatorial Africa, off the northwest coast of Gabon. The islands were discovered by Portuguese navigators in late 1470/early 1471. They were initially populated by Portuguese people, and for that reason Portuguese is their official language. The socio-economic development is rather low, and STP

is currently considered to be an “underdeveloped” or non-industrialized country.

A census in 2012 recorded a total population of approximately 187,000 inhabitants. Around 5,000 people, or roughly 3% of the population, have been identified as deaf or hard-of-hearing; the causes of hearing loss are presently being studied by Caroça (in preparation). The prevalence of hearing loss may be a result of genetic factors related to a high level of consanguinity, environmental factors such as various diseases (e.g. malaria, a disease that is very common in STP), and even side effects of malaria prophylaxis medication.

In STP, deaf children have traditionally been excluded from schools, which has increased inequalities in the access to communication in comparison to their hearing peers. The project *Sem Barreiras* (*Without Barriers*), which involved local governmental structures such as the Education and Cultural Minister of Sao Tome e Principe, intended to promote the emergence of a sign language among the deaf, which could facilitate increased communication among deaf individuals and provide a language of access to education for the deaf community. In this paper, we will focus exclusively on the first steps of STP sign language emergence, with special emphasis on vocabulary development.

2 Emergence of new sign languages

The emerging sign languages that linguists have studied unfold in two categories (Sandler 2005), “village sign languages” and “deaf community sign languages”.

The first type – village sign languages – emerges within communities that are relatively isolated geographically and in which an unusually high percentage of children is born deaf. One of the best-known “village sign languages” emerged in the Al-Sayyid village in the Israeli Negev desert. The Al-Sayyid family founded this village approximately 200 years ago, and after five generations, about 85 years ago, four siblings were born deaf. In the next two generations, more people were born deaf, and today, the deaf population of the village comprises about 130 deaf adults, adolescents, and children (Kisch 2012). As a result of the need for communication between parents and their children, Al-Sayyid Bedouin Sign Language (ABSL) emerged. Parents wanted to convey information regarding daily activities to their children and to share community values and traditions. Since these children were deaf, they used visual-manual ways to communicate and consequently, a sign language developed (Meir, Sandler, Padden & Aronoff 2010). ABSL displays SOV word order (Sandler, Meir, Padden & Aronoff 2005) and has a vocabulary that is clearly different from that of other sign languages of the region (Israel, Palestine, Jordan) (Al-Fityani 2007).

The second type of emerging sign language – deaf community sign languages – emerges when deaf people from different geographic parts of the same country are gathered, usually for educational purposes, in one place, such as schools and student residences. As Woll, Sutton-Spence & Elton (2001) state, the history of European sign languages is closely linked to schools for the deaf, student residences shared by deaf people, and associations that emerged from these communities.

Lengua de Señas de Nicarágua (NSL) is a modern example of this type of deaf

community sign language; it emerged when deaf children who previously lived with their hearing families in remote parts of Nicaragua were brought together in a common school in the capital Managua (Senghas 1995; Kegl, Senghas & Coppola 1999). Within two decades, a sign language emerged as a result of a combination of several manual communication systems: home signs of individual children, some cases of shared signs between siblings, and even linguistic contact with other European and American sign languages (Meir et al. 2010).

It is important to distinguish between home signs and sign languages. Home sign is a basic communication system set up within a family in order to address the communicative needs of a deaf individual within her/his hearing family. Home sign is based on a signer and not on a group or a community of signers (Goldin-Meadow 2003). This fact explains the structural differences between a conventionalized linguistic system, such as a sign language, and home signs. However, it is important to mention that this difference is gradual and not categorical – as also pointed out by Meir et al. (2010). Signs that may eventually become conventionalized arise from the home sign systems of several deaf candidates. This gradual process of linguistic creation has also been observed in Sao Tome and Principe, as we shall discuss in this paper.

3 Method

The project *Sem Barreiras* arose from the need to develop a language among the deaf people in Sao Tome and Principe. Due to social deprivation and lack of communication opportunities, the deaf and hard-of-hearing people, with few exceptions, did not know each other, and therefore, there was no opportunity for signed communication. At home and in their daily lives, they communicated mainly through home signs. It should be noted that, even though the islands of STP are relatively small, public transport is almost non-existent, which made it nearly impossible for deaf people to meet and interact with each other. Thus, many of them were socially and linguistically isolated, with family members who relied on a manual system of communication as their only communication partners.

When the project began in February 2013, we decided to gather deaf and hard-of-hearing people from all regions of the islands of STP in a common space. Their names were compiled in the context of the otolaryngology missions in STP led by João Paço and also by means of intensive television and radio advertising campaigns. The otorhinolaryngology humanitarian missions were integrated in a current project, funded by the European Commission (Project *Health for All*) and providing specialized care in diverse areas in STP.

Before designing the project *Sem Barreiras*, the team leaders were contacted by the Education and Cultural Minister of STP, as the Ministry were filling a gap in deaf education and did not have any know-how regarding sign language and deaf education. The team developed the entire project with their support, based on the present needs and with the local support of the Valle Flor NGO.

3.1 Sample

Initially, 20 deaf people met for sign sessions in this common space in Sao Tome, and over time, from February 2013 until December 2014, approximately 100 were enrolled in the project. The deaf participants were aged 4 to 25 years; 80% were female and 20% were male. This discrepancy of gender distribution in the project was due to the fact that there are more deaf women in Sao Tome and Principe (data from Project *Health for All*), and also due to the fact that some young male teenagers did not want to be enrolled in the program. All of the participants enrolled in the project were deaf or hard-of-hearing with a level of hearing loss from severe to profound.

The deaf children (from 6 to 18 years old) from our sample (34%) were excluded from schools due to their deafness. Also, these children were not well integrated in their families because of social shame and the sense of uselessness in the traditional African family structure they were living in; that is, they were born and grew up in an environment characterized by social deprivation and lack of communication. This information was obtained through interviews with the participants' families. All the parents of the deaf participants signed the consent form for their children to be enrolled in the project. Their transport to the common space previously arranged was provided by the project.

3.2 Procedure

The goal of avoiding linguistic imperialism, as well as respect for cultural differences, led the team leaders, among the deaf researcher of our team who is native signers of Portuguese Sign Language (LGP), not to use LGP signs. Rather, gestures, mime, and other visual representations were used to communicate with participants while potential signs were being identified and evaluated. We adopted the political choice of not "teaching LGP", but instead supporting a different language emerging from a non-European, African culture.

Although the islands' official spoken language is Portuguese, the vocabulary used in STP varies somewhat from what is used in European Portuguese. The spoken language therefore reflects local usage and cultural understandings. Similarly, we expected that signs, which were developed as the project proceeded, would reflect local cultural-specific activities, items, and conventions of social-interaction.

The sessions were all video-recorded, totaling about 400 videos of about 60 minutes each. The deaf researcher of our team elicited signs by means of cards with drawings or pictures of simple objects (animals, everyday items, as depicted in Figures 1 and 2). As she showed the cards, the boldest in the group would provide a sign and was then followed by other, more timid, classmates. Sometimes they simply imitated the sign previously given; at other times, they provided one or more different signs, which, however, could be phonologically similar to the first sign. As has often been observed in the literature (e.g. Taub 2000), iconicity turned out to be a fundamental process in the ex-nihilo creation of signs.

< INSERT FIGURE 1 around here >

< INSERT FIGURE 2 around here >

As time went by, the task became more complex, and, instead of simple objects, the researcher showed cards with drawings depicting more complex and abstract referents (concepts, emotions) and also short picture stories that the participants could sign to each other. This way, it was possible to elicit longer and more complex utterances and hence to encourage dialogues also outside the class. In order to facilitate communication between deaf participants in a less formal context, the deaf researcher organized weekend programs, tours, meals, and trips to the beach and the market. In this way, the participants got used to meeting each other, communicating with each other in the visual-gestural modality, and creating signs naturally. As a result of these sessions, the deaf people of STP discovered their own language.

3.3 Analysis

For the purpose of this paper, we analyzed 100 video recordings of 60 minutes each, which constitute 25% of the total corpus. This exploratory sample, the only one analyzed so far, is representative of the corpus which has been collected in three stages: videos from the early phase of the project (30%, collected February – July 2013), videos from the intermediate phase of the project (30%, collected September 2013 – February 2014), and videos from the final phase of the project (40%, collected March 2014 – July 2014). In the intermediate phase, the data come from more complex elicitation settings (sentences, stories, and conversation), and in the final phase, data recordings are based on vocabulary, sentence elicitation, and spontaneous signing. Across the three phases, we analyzed data from the same set of signers – 16 signers in the age range from 4–20 years – in order to study the preliminary development of the signs.

Moreover, the total corpus was analyzed, and we concluded that it contained 500 established signs. These signs were then analyzed in terms of lexical frequency. In order to make the analysis more rigorous, we divided the lexical frequency into 4 levels, listed below. The 282 signs that were recruited as the “fundamental vocabulary” in order to be included in the Official dictionary of Sao Tome and Principe Sign Language (LGSTP) (Carmo, Oliveira & Mineiro 2013) were all level 3 or 4.

- Level 1: signs that occur in our sample corpus 1 to 10 times;
- Level 2: signs that occur in our sample corpus 11 to 30 times;
- Level 3: signs that occur in our sample corpus 31 to 90 times;
- Level 4: signs that occur in our sample corpus 91 times or more.

4. Emerging linguistic features of Sao Tome and Principe Sign Language (LGSTP)

The signs that had been elicited in the first phase of the project are characterized by a greater involvement of the articulators (hands, head, and trunk) and a larger signing space, which results in a slightly increased duration for the production of a signed message when compared with other established sign languages like LGP. We believe that this is due to the necessity of mimetic communication whereby various parts of the body work together for the message to be transmitted. We observed considerable hesitation among participants, as they were apparently choosing between competing signs. On the other hand, since the signs were created by deaf signers native to the STP culture (rather than being taken over from another sign language), it appeared that they were easily comprehended and learned by the community. Perhaps for this reason, the vocabulary of the language developed so quickly that one could speak of a "linguistic boom". After one and a half years of the project, signers already used about 282 signs frequently and fluently, as we were able to determine by analyzing the lexical frequency of these signs in the total corpus and locating them at the frequency level 3 or 4.

Before presenting some of the linguistic characteristics of LGSTP, it is important to keep in mind that the language is still emerging, and that the procedures described in the following do not yet have the validity of analysis that one might reach after a more extended period of time. Rather, we document the first steps of this language and some initial trends. Some of the trends identified for LGSTP reflect "universal" characteristics that result from the modality in which sign languages are produced and perceived, and they confirm the paths taken by other emerging sign languages in the primary stages of their evolution. One has to keep in mind that, unlike the other emerging sign languages described above, LGSTP is emerging from a planned project with clear linguistic policies as to how to naturally "hatch" a sign language: the first recorded signs from the LGSTP lexicon were elicited by the researcher through drawings of objects shown to the deaf adult/child participating in the programme *Sem Barreiras*. At this stage, the signs are mainly iconic.

4.1 Iconicity as a major factor in the emergence of signs

The role of iconicity in the lexicons of sign languages is a major issue in sign language linguistics as well as a controversial topic in the field (Fischer & van der Hulst 2011). The relation between words or signs and real world referents has always intrigued scholars, who have been debating the nature of this relation since antiquity.

Since Hockett (1960), no linguist would claim a "natural" connection between a word's form and its meaning for spoken languages. Rather, the arbitrariness of the signal is usually taken as a hallmark of natural language, and, at a lexical level, iconicity is generally assumed to be limited to onomatopoeic words. Although some authors suggest that iconicity remains a stable motivating factor in the creation of signs, even in established sign languages like LGP (Taub 2001), new signs are commonly created in ways other than by iconicity. In addition, LGP is an older language, and an iconic link between a sign and its referent may thus have

been weakened or even lost over time (Frishberg 1975). However, this is much less true for emerging and less stabilized sign languages in which the visual modality results in an abundance of iconic links between form and meaning (Perniss, Thompson & Vigliocco 2010). In fact, in the first stage of LGSTP, 92% of the 500 signs were found to be constructed based on an iconic process that visually represents the shape or function of its referent.

Iconicity in the formation of early signs was apparent in signs such as DOG, CAT, EAT, PENCIL SHARPENER, GOAT). Signs emerged through the representation of the shape of the object/action (e.g. PENCIL SHARPENER), through the depiction of prototypically salient visual characteristics of the referent (e.g. DOG, CAT, GOAT), or through imitating the form of an action (e.g. EAT). For example, in the case of GOAT, the sign represents the horns, for CAT its claws, and for EAT it mimics the action of "bringing something to the mouth".

Despite their iconic origin, some signs have already been transformed into more complex representations. For example, the sign for FISH was originally signed on the forearm, representing a fish being scaled at the market. This sign evolved into a verb TO-SCALE-A-FISH, and another sign, which represents the fish swimming, is now used for the nominal meaning FISH.

As for non-iconic signs (which make up only 8% of the sample), we found the adjectival sign forms ANGRY and MARRIED (see Figures 3 and 4) among other non-iconic signs. We did not find any common pattern characterizing the non-iconic signs.

< INSERT FIGURE 3 around here >

< INSERT FIGURE 4 around here >

4.2 Phonological characteristics of emerging signs

Phonologically, the signs showed characteristics familiar from other sign languages, as they were made up of the manual parameters handshape (finger selection and position), orientation, movement, and location, and they could be one-handed or two-handed. No handshape or location was observed to be particularly prevalent, and many signs are articulated with both hands. In the first stage, the location parameter appeared rather unconstrained, as signs could be performed anywhere in the signing space around the signer's body; also, some of the signs were anchored to certain body parts, such as legs, stomach, and the top of the head.

The signing space in LGSTP is rather large – much larger than the traditional rectangle in front of the signer in other more established languages. This can be observed, for instance, in the sign BEAT (Figure 5), which is characterized by a greater involvement of the trunk and a loose, broad and expressive use of the signing space. Further development and consolidation of the language may modify this process, which seems to be uneconomic as it slows down communication, even though it may be necessary at this stage of the language for the transmission of semantic and expressive contents, probably due to cultural variations.

Interestingly, in the little time LGSTP has had to develop, the sign for AIRPLANE (Figure 6) has already undergone changes: it was initially made with open arms but is now signed with one hand in front of the signer's upper body. Such articulator and signing space reductions are characteristic for language systematization and change over time, as was shown for ASL by Frishberg (1975).

< INSERT FIGURE 5 around here >

< INSERT FIGURE 6 around here >

The use non-manual elements, in particular numerous facial expressions, is also visible in many of the registered signs, and it might become a distinguishing parameter. This may be because in the early stages of emergence, some concepts for which no sign was available were expressed by pantomime; for example, the concept ASK was articulated through a wondering facial expression, similarly to what has been reported for Israeli Sign Language (ISL, Meir & Sandler 2008).

Early phonological productions also demonstrated a substantial involvement of elements of the body other than the hands, such as arms, shoulders, back, legs, stomach, and face. A similar pattern was found in the first stages of ISL emergence (Meir & Sandler 2008). For example, the sign FOOTBALL was articulated by the legs executing a kicking movement.

4.3 Trends in emergent morphology

As for the morphological level, we do not have sufficient information yet, but there appears to be a tendency for certain types of compounding (i.e. signs created by combining two (or more) signs), as in the case of BANANA TREE = TREE + BANANA or GIRL = WOMAN + CHILD (see Figures 7, 8, and 9). For other emerging sign languages, such as ABSL, the process of compounding has also been reported as prevailing (Aronoff, Meir, Padden & Sandler 2008), and this also seems to be the case in LGSTP.

< INSERT FIGURE 7 around here >

< INSERT FIGURE 8 around here >

< INSERT FIGURE 9 around here >

In the analyzed sample, we did not encounter compound signs in the 30 first videos corresponding to the early stage of data collection. However, in the second stage, that is, 6 to 12 month later, we observed 21 compound signs used in different contexts, for example: fruits (CAJAMANGA = CAJAMANGA + EAT); humans (BOY = MAN + CHILD); nature (SUNRISE = SUN + BORN). These compounds were consistently used in our corpus with lexical frequencies at

level 3, as described in Section 3.3. In the final stage of data collection, additional compounds were found referring to house divisions such as BEDROOM = ROOM + SLEEP, LIVING ROOM = ROOM + SEAT, KITCHEN = ROOM + PAN, and BATHROOM = ROOM + WASH. The total of compounds at this final stage was up to 37. Their frequency in the corpus was at level 3 or 4 of lexical frequency.

Based on our data set, we have to conclude that inflectional morphology in LGSTP is still non-existent, which is not surprising given that it is still a very basic emerging language. This finding is in accordance with reports of other emergent sign languages (Meir et al. 2010).

Nevertheless, we we found that the systematic use of personal pronouns referring to subjects and objects emerged early in LGSTP. Just as in other sign languages, pronouns in LGSTP are pointing signs that target loci in the signing space (Cormier 2012). Just as in other sign languages, be they established or emergent, in the analyzed videos, the LGSTP signers do not make any distinction between pronouns referring to subjects or objects. For example, in sentences like WE LIKE BEACH and TEACHER LIKE US, the first person plural pronoun is signed in the same way.

4.4 Emerging syntax

To investigate the emergence of word order in LGSTP, we have analyzed the constituent order of declarative sentences with a transitive verb and its two arguments (subject and direct object). In recordings of dialogues between fluent signers, we observed variable word orders, yet with predominance for object-subject-verb (OSV); that is, the sentence "I wash the dishes" would be signed as DISHES I WASH in LGSTP. OSV constructions occur in our analyzed corpus in 66% of the cases, over 17% cases of SVO, as, for instance, I BRUSH TEETH.

Some emerging sign languages seem to develop a predominant word order early on. For instance, ABSL opted for SOV order in the second cohort, which differs from the surrounding spoken Arabic SVO order (Sandler et al 2005; Meir et al. 2010). In the case of NSL, the first cohort signers used a rigid order N1V1V2N2, i.e. a construction with two verbs, each accompanied by a single argument, whereas second cohort signers preferred a different order where there is no interleaving of nouns and verbs. Two verbs are still required to express a single event involving two animate arguments (Senghas, Coppola, Newport & Supalla 1997). LGSTP, as used by the first cohort of signers, appears to still be a rather flexible language with only few rules, and only time will tell us which syntactic path it will traverse. The syntactic order may or may not be influenced by the surrounding oral language, Portuguese, which is SVO – the word order which we found to be the second most frequent in LGSTP.

Given that a preference for OSV order has not been described for other emerging sign languages, we could hypothesize that these OSV structures are topicalizations. However, topics are normally accompanied by non-manual markers, such as raised eyebrows or head tilt (e.g. Dachkovsky 2013). Yet, we have not yet witnessed non-manual elements accompanying or pauses following the first constituent. More data and a more thorough investigation are

required to determine the basic word order of LGSTP for simple sentences and to describe the behavior of complex sentences with non-manual markers.

Emergent sign languages tend to have simple syntax (Meir et al. 2010), and in the early stages, we can identify simple utterances consisting of just a single nominal. Based on the analyzed recordings, we find that LGSTP signers tend to break a sentence including a (di)transitive verb (e.g. GIVE, MARRY) into two separate clauses. For example, a giving event was signed as in (1a) – a pattern that is reminiscent to what has been described for NSL by Senghas et al. (1997). Note that the argument BOX was not signed independently, but was marked on both verbs by means of handshape. A transitive event involving the verb MARRY was signed as in (1b), where the verb is repeated.

(1) a. MOTHER GIVE-CL$_{Box}$. CHILD RECEIVE-CL$_{Box}$.
'The mother gives a box to the child.'

b. DAD MARRY. MOM MARRY.
'Father and mother are getting married.'

Thus, linguistic complexity in new languages takes time to evolve, as languages do not materialize instantly, with a complete syntax and a complete morphological system. As the grammar develops, the grammatical structures are expected to vary and become increasingly complex.

So far, facial expressions appear to be used in two ways: as non-manual adverbs and as prosodic/syntactic markers. In sequences such as FAR AWAY RIVER and LONG TIME AGO, a facial expression performs an adverbial function of a distance marker (space or time). The facial expression involves a lowering of the eyebrows and is coarticulated with the signs RIVER and TIME, respectively. In interrogative and exclamatory sentences, facial expression plays a prosodic/syntactic role (Zeshan 2006; Padden et al. 2010). We found that in LGSTP interrogatives the head is tilted forward and the signer furrows his/her brow. This was observed in polar questions like FISHING WANT ('Do you want to go fishing?') as well as in content questions like ANGRY WHY ('Why are you angry?'). Linguistic facial expressions like the ones we identified for LGSTP at the earliest stages of this language were not observed in early generations of ABSL signers (Sandler et al 2011), but only in subsequent generations.

There is some controversy about whether facial expressions are syntactic or prosodic markers, and in this paper, we will adopt Sandler's position (2010) according to which facial expressions in interrogative sentences in ASL and ISL constitute a bridge between between prosody and syntax. In early research on ASL, scholars pointed out that certain syntactic constructions (i.e. interrogatives, relative clauses, and conditionals) are systematically accompanied by certain non-manual markers (e.g. Liddell 1980). This finding led to treatments of these markers as syntactic entities. Other scholars, however, claimed that the forms in question mark prosodic constituents and intonational meanings. Sandler's position is attractive as it recognizes the relationship between syntax and prosody without losing sight of their difference.

4.5 Sign development

The signs of every sign language, just like the words of every oral language (Labov 1994, 2001), develop and change over time due to internal or external factors. When a language is still new, changes in its lexicon are particularly relevant as they serve basic communicative needs. Over the period in which the project *Sem Barreiras* was ongoing, from 2013 to 2015, some of the signs evolved since their first attestation. This observation is manifested in the preference for one sign over another, and it is measurable by the lexical frequency. Signs like AIRPLANE that have undergone alteration (as described 4.2.) had a higher frequency level in our corpus than the "original" sign.

We also observed an interesting change with respect to handedness: signs which were originally signed with both hands evolved into one-hand signs (signed by the dominant hand). That was the case, among others, for GOAT. In the first recordings, GOAT was signed with much involvement of the trunk and with both hands. At later stages, the lexicalized GOAT became a much more economic sign, as it was signed with only one hand and without involvement of the trunk. A similar change affected the sign AIRPLANE, as explained before. Another example of increased economy is the sign BICYCLE, which was articulated with the two legs moving (as if riding a bicycle) in the first attestations of our corpus, but is currently performed with both hands. Together with AIRPLANE, GOAT and some other signs, this evolution illustrates the powerful mechanism of of simplification and economy (ease of production) that characterizes phonological change in sign languages. 7% of the 500 analyzed signs underwent alterations within the period of the project. In principle, one could hypothesize that we are dealing with synchronic variation,, but this cannot explain why the use of the more economic sign became more frequent over time.

Another interesting characteristic of the most frequent signs chosen to be part of the dictionary of LGSTP is the influence of the socio-economic status in the genesis of the signs. Previous studies have shown that in other emergent sign languages, children are responsible for lexical innovations (Senghas, Kita & Özyürek 2004). Therefore, we would expect the particular environment to which most of the children were exposed to influence their sign creations.

For TAKE-A-BATH, there were two concurrent signs: one holding a hand on top of the head representing a shower, and another one representing a person taking water from a bucket and washing the body. The sign that won the consensus for representing the action "take a bath" was the second one, most likely due to the fact that the majority of signers do not have a bathroom at home. In the same way, there were two variants of the sign EAT: one which depicts eating with hands and one which depicts eating with cutlery. Again, the winning sign was the one belonging to a poorer background, i.e. the first one. Thus, the social background seems to strongly influence the genesis of the signs.

As for the lexicon, and since the deaf researcher who followed and implemented the programme *Sem Barreiras* is native and fluent in LGP, one might think that by contact, some signs could have been adopted from LGP. Of the approximately 500 signs recorded, only 12%

were similar or identical to corresponding LGP signs. For example, the sign SMILE in LGSTP was originally performed with both hands in a mirror position but was replaced by a one-handed variant, similar to the LGP sign. However, this change might also be explained by phonological simplification rather than lexical borrowing from LGP. As noted above, we have adopted the linguistic policy of letting the signs flow within the native culture and not imposing signs of the older, established sign language.

Finally, in terms of lexicalization of signs, for some signs (e.g. signs for colors), there is still considerable variation. That is, there are still several "candidates" for becoming the established signs, but as all variants are commonly shared and widely used by the local community, until now no decision has been made on which sign to adopt for specific referents.

5 Conclusions

In this paper, we reported the first stages in the emergence of LGSTP. Active participation in and stimulation of the process of emergence of a new sign language allowed us to observe the unfolding of a linguistic system. Capturing aspects of this process reveals properties of our language capacity that are usually inaccessible. Here we summarize our first findings.

As mentioned earlier, the deaf and the hard of hearing children of STP do not attend school because there is no deaf education system in Sao Tome, and the society does not accept their inclusion in daily life. They are, therefore, excluded from formal education and formal language. The project *Sem Barreiras* brought together approximately 100 deaf participants (children and youth) and initiated the birth of a natural sign language for the deaf. Adopting a non-imperialistic language policy and a non-invasive methodology, which respect the local culture, signs and later signed utterances were recorded, documented, and analyzed, as they occurred during the first stages of the language. We relied on frequency of use at each stage in our analysis, but at this point, we are not yet in a position to say with certainty whether the signs that seem to have replaced older ones will turn out to be synchronic variants, or whether the older and increasingly less frequent signs will disappear. Only time will tell which of the two scenarios is the realistic one.

Currently, after two years of this project, 282 signs of the Sign Language of Sao Tome and Principe have been chosen from the 500 conventionalized signs and have been recorded in a dictionary. Deaf people now meet outside the classroom, and one can often observe children, adolescents, and adults on the street communicating with each other with their hands. The fluidity of the communicative exchanges using LGSTP between them is remarkable. Deaf people in Sao Tome and Principe have become a community with a common characteristic: a language that unites them and through which they can communicate.

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References

Al-Fityani, Kinda. 2007. Arab sign languages: A lexical comparison. *Technical Report. Center for Research in Language Newsletter* 19(1).

Aronoff, Mark, Irit Meir, Carol A. Padden & Wendy Sandler. 2008. The roots of linguistic organization in a new language. *Interaction Studies: Special Issue on Holophrasis vs. Compositionality in the Emergence of Protolanguage* 9(1). 131-150.

Carmo, Patrícia, Ricardo Oliveira & Ana Mineiro. 2013. *Dicionário da Língua Gestual de São Tomé e Príncipe – Dicionário oficial da República Democrática de São Tomé e Príncipe*. Lisboa: UCEditora.

Caroça, Cristina. In preparation. *Contribution to the study of epidemiological factors associated with sensorineural hearing loss in the population of Sao Tome and Principe*. Lisbon: Catholic University of Portugal. PhD dissertation.

Cormier, Kearsy. 2012. Pronouns. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Sign language. An international handbook* (*HSK – Handbooks of Linguistics and Communication Science*), 227-244. Berlin: De Gruyter Mouton.

Dachkovsky, Svetlana, Christina Healy & Wendy Sandler. 2013. Visual intonation in two sign languages. *Phonology* 30(2). 211-252.

Fischer, Susan & Harry van der Hulst. 2011. Sign language structures. In Mark Marschark & Patricia E. Spencer (eds.), *The Oxford handbook of deaf studies, language, and education, Volume 1 (2nd edition)*, 336-349. Oxford: Oxford University Press.

Frishberg, Nancy. 1975. Arbitrariness and iconicity: historical change in American Sign Language. *Language* 51. 696-719.

Goldin-Meadow, Susan. 2003. *The resilience of language: What gesture creation in deaf children can tell us about how all children learn language.* New York: Psychology Press.

Kegl, Judy, Ann Senghas & Marie Coppola. 1999. Creation through contact: Sign language emergence and sign language change in Nicaragua. In Michael DeGraff (ed.), *Language creation and language change: creolization, diachrony, and development*, 197-237. Cambridge, MA: MIT Press.

Kisch, Shifra. 2012. Demarcating generations of signers in the dynamic sociolinguistic landscape of a shared sign-language: the case of the Al-Sayyid Bedouin. In Ulrike Zeshan & Connie de Vos (eds.), *Sign languages in village communities: anthropological and linguistic insights*, 87-125. Berlin: De Gruyter Mouton.

Hockett, Charles F. 1960. The origin of speech. *Scientific American* 203. 88-111.

Labov, William. 1994. *Principles of linguistic change*. *Volume I: Internal factors.* Oxford: Blackwell.

Labov, William. 1994. *Principles of linguistic change*. *Volume II: External factors.* Oxford: Blackwell.

Liddell, Scott K. 1980. *American Sign Language syntax.* The Hague: Mouton.

Meir, Irit & Wendy Sandler. 2008. *A language in space. The story of Israeli Sign Language*. New York: Lawrence Erlbaum.

Meir, Irit, Wendy Sandler, Carol Padden & Mark Aronoff. 2010. Emerging sign languages. In Mark Marschark & Patricia E. Spencer (eds.), *The Oxford handbook of deaf studies, language, and education, Volume 2*, 267-280. Oxford: Oxford University Press.

Padden, Carol, Irit Meir, Wendy Sandler & Mark Aronoff. 2010. Against all expectations: Encoding subjects and objects in a new language. In Donna Gerdts, John Moore & Maria Polinsky (eds). *Hypothesis A / hypothesis B: Linguistics explorations in honor of David M. Perlmutter*, 383-400. Cambridge, MA: MIT

Press.
Perniss, Pamela, Robin L. Thompson & Gabriella Vigliocco. 2010. Iconicity as a general property of language: Evidence from spoken and signed languages. *Frontiers in Psychology* 1. 1-15.
Sandler, Wendy. 2005. An overview of sign language linguistics. In Keith Brown (ed.), *Encyclopedia of language and linguistics*, 2nd ed., 328-338. Oxford: Elsevier.
Sandler, Wendy, Irit Meir, Carol Padden & Mark Aronoff. 2005. The emergence of grammar: Systematic structure in a new language. *Proceedings of the National Academy of Sciences of the United States of America (PNAS)* 102(7). 2661-2665.
Sandler, Wendy. 2010. Prosody and syntax in sign languages. *Transactions of the Philological Society* 108. 298-328.
Sandler, Wendy, Irit Meir, Svetlana Dachkovsky, Carol Padden & Mark Aronoff. 2011. The emergence of complexity in prosody and syntax. *Lingua* 121(13). 2014-2033.
Senghas, Ann. 1995. *Children's contribution to the birth of Nicaraguan Sign Language*. Cambridge, MA: MIT PhD dissertation.
Senghas, Ann, Sotaro Kita & Aslı Özyürek. 2004. Children creating core properties of language: Evidence from an emerging sign language in Nicaragua. *Science* 305. 1779-1782.
Senghas, Ann, Marie Coppola, Elissa Newport Ted Supalla. 1997. Argument structure in Nicaraguan Sign Language: the emergence of grammatical devices. In Elizabeth Hughes, Mary Hughes & Annabel Greenhill (eds.), *Proceedings of the Boston University conference on language development (BUCLD)*, 550-561. Boston, MA: Cascadilla Press.
Taub, Sarah F. 2000. Iconicity in American Sign Language: Concrete and metaphorical applications. *Spatial Cognition and Computation* 2(1). 31-50.
Taub, Sarah. F. 2001. *Language from the body: Iconicity and metaphor in American Sign Language*. Cambridge: Cambridge University Press.
Woll, Bencie, Rachel Sutton-Spence & Frances Elton. 2001. Multilingualism: the global approach to sign language. In Ceil Lucas (ed.), *The sociolinguistics of sign languages*, 8-32. Cambridge: Cambridge University Press.
Zeshan, Ulrike (ed.). 2006. *Interrogative and negative constructions in sign languages*. Nijmegen: Ishara Press.

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FIGURES (with captions)

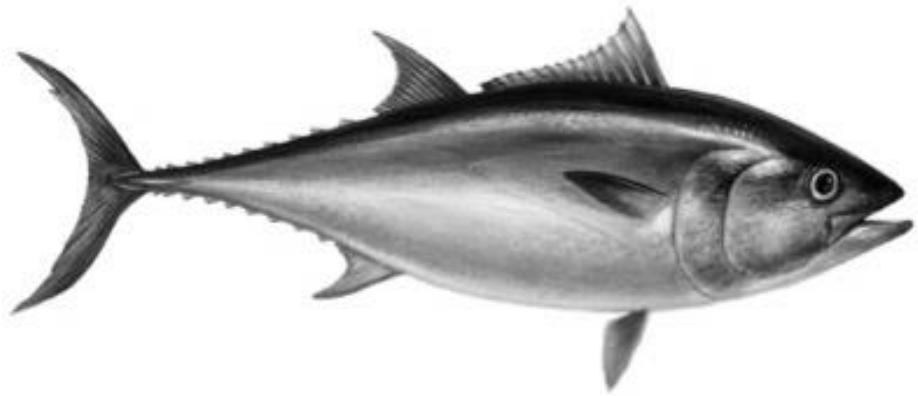

Figure 1. Picture of a fish used for sign elicitation

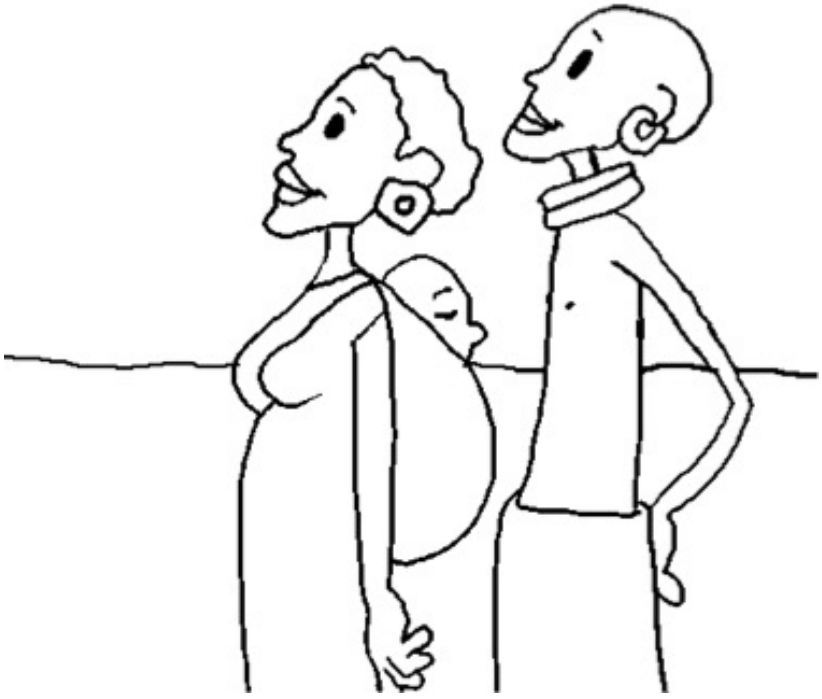

Figure 2. Drawing used for the elicitation of signs referring to family relations and everyday items.

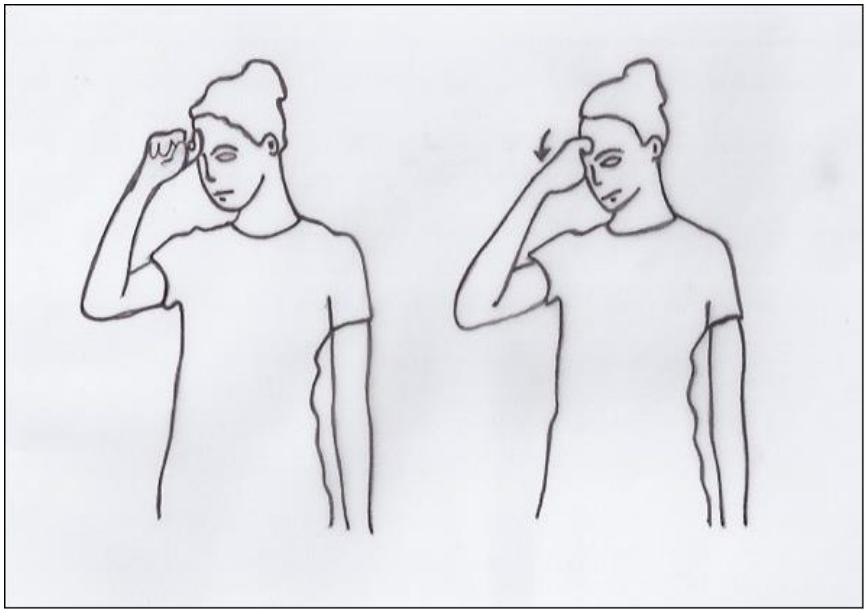

Figure 3. Sign ANGRY in LGSTP: X-hand makes rotating movement at forehead.

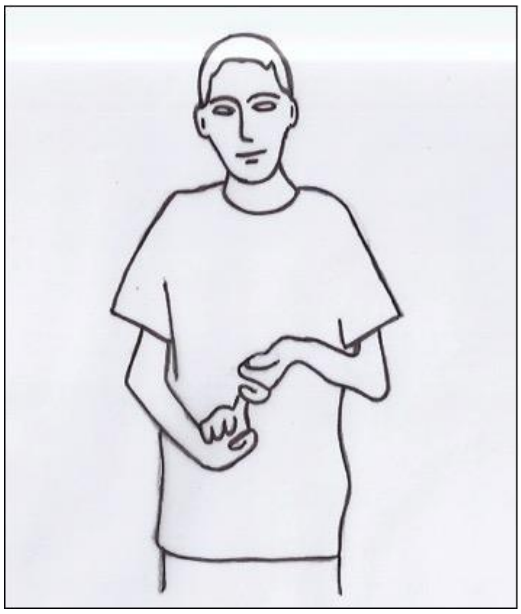

Figure 4. Sign MARRIED in LGSTP: both hand articulated with X-hand shape, extended index finger of dominant hand makes contact with the index finger of non dominant hand.

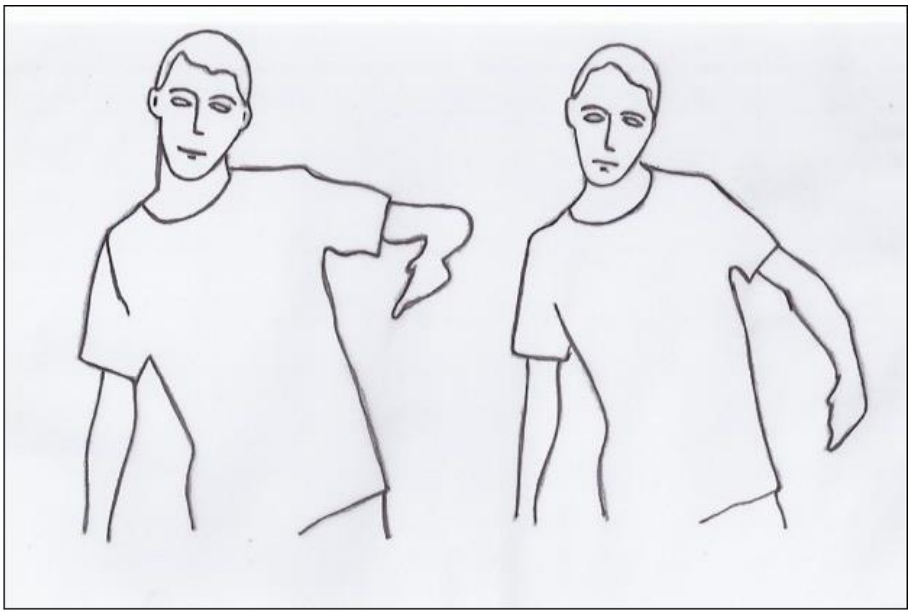

Figure 5. Sign BEAT in LGSTP: B-hand moves from top to bottom with palm orientation facing backwards.

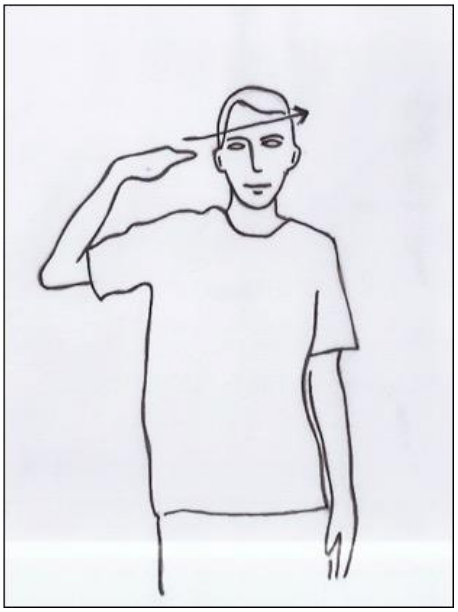

Figure 6. Sign AIRPLANE in LGSTP: Flat B-hand moves from ipsilateral to contralateral side in front of the forehead.

Figure 7. Sign CHILD in LGSTP: Flat B-hand, palm orientation downwards, executes short downward movement at the ipsilateral side of the signing space.

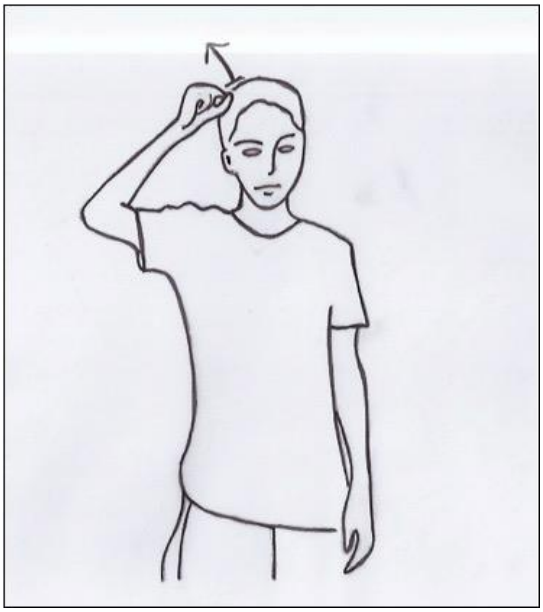

Figure 8. Sign WOMAN in LGSTP: Baby O-hand moves from head to up.

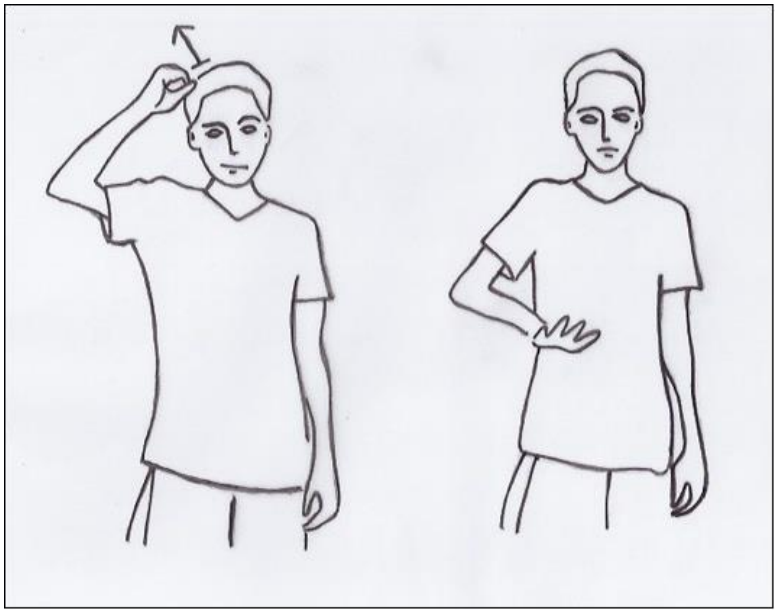

Figure 9. Sign GIRL in LGSTP: a compound of the signs WOMAN (Fig. 8) and CHILD (Fig. 7).