LÍNGUA GESTUAL PORTUGUESA E OUTRAS LÍNGUAS DE SINAIS

ESTUDOS LINGUÍSTICOS

ORG.
CELDA MORGADO
ANA MARIA BRITO

PORTO / 2022

LÍNGUA GESTUAL PORTUGUESA E OUTRAS LÍNGUAS DE SINAIS

ESTUDOS LINGUÍSTICOS

FICHA TÉCNICA

Organização e financiamento

Apoios

FCT Fundação para a Ciência e a Tecnologia

Centro de Linguística da Universidade do Porto

U.PORTO FLUP FACULDADE DE LETRAS UNIVERSIDADE DO PORTO

ESCOLA SUPERIOR DE EDUCAÇÃO POLITÉCNICO DO PORTO

P.PORTO

Centro de Investigação & Inovação em Educação
Centre for Research & Innovation in Education
inED

Mouth movements in the depiction of size and shape: Comparing two village sign languages in West Africa with different time depths

Marta Morgado

m.morgado@hum.leidenuniv.nl
Leiden University (Netherlands)

Victoria Nyst

v.a.s.nyst@hum.leidenuniv.nl
Leiden University (Netherlands)

Abstract

This study is about mouth movements in the expression of size and shape in two village sign languages. They are both located in West Africa, one in Adamorobe, Ghana, and the other in Bouakako, Côte d'Ivoire. These sign languages have no influence from a school context nor from another sign language. The first exists for several generations and has thirty signers. The second is still emerging and is used by seven deaf people. Participants were asked to produce stories about animal attacks, namely snakes, to motivate the use of size and shape in their own sign languages. We will seek to understand the type of mouth movements in the depiction of size and shape, by comparing both unrelated village sign languages.

Keywords: size and shape depiction, mouth actions, village sign language, sign language phonology.

1. Introduction

This text will focus on the role of mouth movements when in combination with the expression of size and shape of certain entities. The depiction of size and shape (S&S) of particular entities aims to describe its form. To do so, it relies on handshapes and/or body parts to specify its S&S features.This iconic description is often com-

bined with non-manual elements, especially mouth movements, to enhance visual characteristics of the entities. We will analyse the use of mouth movements with the depiction of S&S in two village sign languages. An older and more established one in the village of Adamorobe (AdaSL), Ghana, and a very young emerging sign language in the village of Bouakako (LaSiBo), Côte d'Ivoire, with very few signers.

We have observed that both languages in this study use facial expression with S&S depiction. However, there is little research on non-manuals in combination with such iconic depictions, and none regarding village sign languages. There is, though, an increasing number of studies on village sign languages, on facial expressions and on size and shape specifiers, separately. Because there are so many non-manual elements on the face, we decided to begin by looking at mouth movements.

This particular analysis is based on the task eliciting spontaneous narratives about animal attacks (see the methodology for further details). When describing the attacks, mainly from snakes, signers use the depiction of S&S recurrently in combination with facial expressions, mostly on the mouth.

To analyse such correlation,we are bound to ask 'How are mouth movements like in size and shape depiction?' and 'Are there differences in mouth movements in the two village sign languages?'. To answer these questions, we will analyse the form, meaning, and use of mouth movements. Before doing so, we will introduce the two sign languages, and discuss the relevant literature.

1.1 Background of AdaSL and LaSiBo

Geographically, the distance between the two villages, Adamorobe and Bouakako, is about 700 kilometres. The two villages are comparable in what regards the high incidence of hereditary deafness. Also, on both villages, the main activity of the deaf is farming. However, they are crucially different in terms of time-depth of the sign language and size of the deaf community. AdaSL is estimated to exist for 200 years and is currently used by about 30 deaf people (Nyst, 2007b), while LaSiBo is about 50 years old and is, at the time of this study, used by seven deaf people (Tano, 2016).

The village of Adamorobe is located in Ghana, about forty kilometres from the city capital, Accra (Figure 1a).The village of Bouakako is located in the southwest of Côte d'Ivoire (Figure 1b). It is one of the five villages in the municipality of Hiré, located about 250 kilometres from Abdijan, the economical capital.
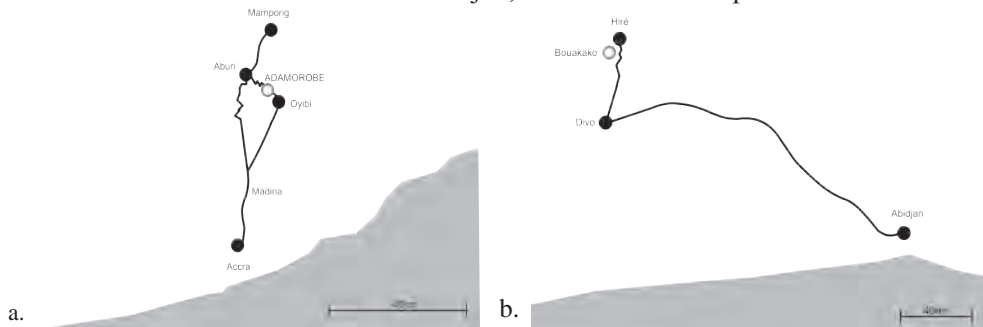

Figure 1. Locations of Adamorobe, in Ghana (a) and of Hiré, in Côte d'Ivoire (b).

The official language of Ghana is English. Akan is the language spoken by more than half of the population, especially in the southern part of the country. Akan has a group of dialects, known as Twi. In Adamorobe the most commonly spoken language is one of those dialects, the Akuapem Twi. In this article we will also talk about Ga, a south-eastern dialect, used in and around the capital Accra.

Deaf people in Ghana use Ghanaian SL (GSL). It is based on American Sign Language (ASL), introduced in 1957 by Andrew Foster, a deaf African-American missionary, who founded the first school for the deaf in the country.

The village of Adamorobe had thirty-three deaf inhabitants at the time of the fieldwork. Twenty-four deaf adults (sixteen women and seven men), aged from 20 to 72 years old, were filmed for this study. The older deaf people are mostly monolingual, using AdaSL, though they attend the weekly mass in GSL. The younger signers, who are schooled, are bilingual in both AdaSL and GSL.

There are several studies on AdaSL, especially by Nyst (e.g. 2007b, 2016a, 2016b, 2018) and Kusters (e.g. 2012, 2015, 2020). AdaSL has its corpus available online at The Language Archive (Nyst, 2012). The village of Adamorobe is used to receiving researchers from all over the world.

In Côte d'Ivoire the official language is French and the most commonly spoken by the population is Dyula, one of the Mande languages, used along the northwest and center of the country. In Bouakako the vernacular language is a dialect called Dida Mamini from the Dida, which belongs to the group of the Kru languages, used in the southwest.

As in Ghana, the national SL is also based in ASL. Andrew Foster founded here, as well, a first school for the deaf, in 1974. This ASL variant in Côte d'Ivoire (ASL-CI) is used by schooled deaf people. Alternatively, deaf people with no formal education use several local sign languages, which are referred to as Ivorian sign languages (*Langues des Signes de Côte d'Ivoire* – LSCI), being LaSiBo one of them (Tano 2016).

The Bouakako village is quite small when compared to Adamorobe and there were only seven deaf inhabitants at the time of the fieldtrip. From these, one had recently moved to Bouakako. Deafness is also believed to be hereditary here and it seems it is still in its first generation of deaf people, which makes LaSiBoto be about 50 years old (Tano, 2016).

Deaf people in Bouakako rarely had contact with other deaf people from outside the village or with the sign language of Côte d'Ivoire (l'ASL-CI). In 2011, the first deaf 'outsiders' visited the village, as research assistants (Tano, 2016). In this first contact there were some small influences such as sign names and the manual alphabet. The manual alphabet didn't make much sense to them, because they were all unschooled.

Having put our languages of study into context, we will next look at the grammatical aspect of analysis, concerning the depiction of S&S.

1.2 Mouth movements in the depiction of size and shape in sign languages

The depiction of size and shape is often expressed by classifiers, or depicting handshapes. Supalla (1986) proposes that, in ASL, nominal classifiers be independently

categorised as (1) size-and-shape specifiers (SaSSs), when the handshape represents the size and shape of an object; (2) semantic classifier, when parts of the hand represent aspects of the object; (3) body classifier, involving a mimetic representation by the whole body; (4) bodypart classifier, when the hand, or other bodypart, itself represents the object; and as (5) instrument classifier, when the hand manipulates an object.

On the first group of classifiers, related to SaSSs, there are two subtypes: (1.1) static SaSSs, when the handshape indicates the size and shape of an object or entity; and (1.2) tracing SaSSs, when the hand movement outlines the size and shape of the object. For the latter, Taub (2001) suggests that a SaSS handshape combined with a SaSS movement is a dynamic SaSS, as opposed to the static one.

Furthermore, signs, including the ones for the depiction of S&S, often involve mouth movements. Its distinction was first based on whether mouth patterns were influenced by speech or not, establishing two types: (1) *mouthings*, from spoken components or entire words; and (2) *mouth gestures*, unrelated to speech (Sutton-Spence & Boyes Braem, 2001).

In what concerns non-speech-like mouth gestures, different types can be identified. The *adverbial* type, which may also function as *adjectival* by indicating, for instance, if an object is very small or very large (Woll, 2008). A good exemple of this is the adverbial mouth gesture known as 'mm', corresponding to relaxed pursed lips, where the bottom lip may protrude. It can mean, for instance, 'relaxed' in BSL (Sutton-Spence & Woll, 1999, cited by Lewin & Schembri, 2011). These may have an independent meaning associated with different signs, thus with some morphological freedom (Crasborn et al., 2008 and Sandler, 2009). The mouth seems to be used iconically with classifier constructions, including SaSS, handling and entity handshapes. In these cases, mouth gestures are defined according to their iconic use, adding meaning to the size and shape of objects (Sandler, 2009, and Lu & Goldin-Meadow, 2018). Such modifications of the mouth provide information about the shape of objects, acting as adjectival morphemes. They can be expressed by iconic mouth movements conveying particular meanings in the depiction of S&S of objects, like [sucked-cheeks] for 'thin' or [puffed-cheeks] for 'wide', 'big', 'large' or 'long' things in American Sign Language (Lu & Goldin-Meadow, 2018).

Besides looking at the origin of mouth movements, it is also possible to classify them according to the combinatorial restrictions established with manual signs (Bickford & Fraychineaud, 2006). As part of combinations with signs, mouth movements function as morphemes that are more or less dependent of specific signs. According to this perspective there are mouth morphemes that are either *inherently part of manual signs*, within fixed combinations, or associated with *independent meanings*, i.e. bound mouth morphemes that are able to recombine with different signs, but do not occur alone. Most mouthings and lexical mouth components fall in the first category, while the majority of mouth gestures correspond to the second. They are not, however, mutually exclusive. In fact, adjectival mouth gestures may be combined with specific lexical items and mouthings may carry independent meanings that may recombine with different signs, as observed by Mohr (2014). Thus, the major distinction resides on whether mouth movements have (or do not have) the ability to be combined with different signs while carrying a particular meaning.

In what mouth movements in the depiction of S&S is concerned, there have been a few studies involving both village SLs of Adamarobe and Bouakako, as described in the following section.

1.3 Mouth movements in the depiction of size and shape in AdaSL and LaSiBo

LaSiBo was first studied by Tano (2016), but not specifically on S&S depiction. It was later on, in the context of crosslinguistic studies, that this subject was first described in LaSiBo (Nyst, 2018, and Tano & Nyst, 2018). The depiction of S&S was, in turn, further explored in AdaSL (Nyst, 2007a, 2007b, 2012, 2016b, 2018, and Tano & Nyst, 2018).

Information about S&S can be conveyed in lexical signs, without necessarily depicting the actual S&S of an entity in the real world. It is rather used to refer to a concept in a more general manner. For instance, in AdaSL, the lexical sign for BOTTLE (S + lower arm handshape) represents the concept of a bottle, regardless of the actualsize and shape of a specific bottle.

Moreover, in face of her AdaSL data, showing a different system for S&S depiction (Nyst, 2007b, 2016a, 2018), she proposes new categories: (1) lexical signs of relative size; (2) simultaneous combinations of a size and shape sign and mouthing; (3) measure signs of absolute size with a growth line; (4) measure stick signs of absolute size; (5) tracing SaSS and depiction types; and (6) internal modification of existing signs. We describe them further below.

Lexical signs of relative size (category 1) can be expressed by lexical signs like BIG (Figure 2a), SMALL (Figure 3b), TALL (Figure 2c) and SHORT (Figure 2d).These lexical signs are combined with specific mouth movements. For instance, BIG (Figure 2a) is combined with the mouthing 'agbo' (meaning 'big' in Gã) and SMALL (Figure 2b) is articulated together with the mouthing 'keketeke' (meaning 'small' in Akan).
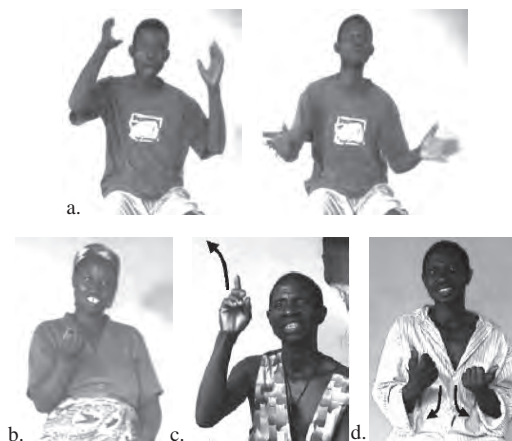

Figure 2: Lexical signs for BIG (a), SMALL (b), TALL (c) and SHORT (d), in AdaSL (from Nyst, 2007a, [a and b] and Nyst, 2007b, p. 135 [c and d]).

Such mouth movements deriving from speech, or mouthings, are commonly combined with a lexical base sign. In addition, Nyst (2007b) describes that they are morphemic, i.e. they may recombine with other signs, namely with productive S&S manual depictions. For example, in AdaSL, a manual sign showing the size of a big banana may consist of a body-based S&S sign delimiting the hand at the wrist, combined with the mouthing 'agbo'. Another example is a sign referring to the size of a small bottle using the same delimited hand with the mouthing [spread lips, closed teeth+ttt], meaning 'small'. This pair of examples suggests that the mouthings canonically associated with lexical items of size carry an independent meaning that can be simultaneously combined with other manual signs, in order to add information about their size. This size information conveyed by the mouthings is of a different type than that conveyed by the manual sign. Whereas the manual sign represents an actual, objective size (that can be measured), the mouthings convey a subjective or relative size, i.e. a subjective assessment of whether the size depicted by the manual sign is relatively small or big for the referent. A good illustration of this is the sign for 'sugar cube'. Here the lexical sign SWEET (Figure 3a) is followed by a S&S depiction with a delimited thumb tip, combined with the mouthing 'agbo' (Figure 3b), meaning 'big', probably because sugar usually consists of much smaller particles. The same delimited thumb tip sign can also be combined with the mouthing for 'small', for example when referring to a bell pepper of the size of a thumb, which is relatively small. Nyst (2007a; b) describes that mouthings associated with colour signs are able to combine with other manual signs in a similar way.

a.   b.

Figure 3: Lexical sign for SWEET (a) followed by the S&S depiction of a 'sugar cube' on the tip of the finger combined with the mouthing [abo] meaning 'big' (b), in AdaSL (from Nyst, 2007b, p. 151).

Besides the mouthings for 'big' and 'small', others appear to derive from local spoken languages, like 'tenten' (meaning 'tall' in Akan) and 'tia' (meaning 'short' in Akan). It is likely that they were borrowed from hearing gestures using those mouthings, during the emergence of AdaSL. Table 1, as defined in Nyst (2007a and 2007b) describes these fixed mouthings.

Table 1: Mouthings associated with AdaSL signs of relative size

Sign	Mouthing	Source word	
BIG	[puffed cheeks+release] ≈ [abo]	*agbo*	'big' in Gã
SMALL	[spread lips, closed teeth+ttt]	*ketekete*	'small' / 'little' in Akan
TALL	[spread lips, closed teeth]	*tenten*	'tall' / 'long' in Akan
SHORT	[spread lips, closed teeth]	*tia*	'short' / 'minor' in Akan

Absolute size can be measured by the use of a growth line (category 3). This line is vertical for height and is used in many SLs, like in the sign for CHILD with a B handshape in a lower position, or the signs for SHORT and TALL, indicating where the height usually stands. In AdaSL, this type of sign is used for animals, not for people. For such a growth line, the lower arm represents a body and the S handshape a head at a relevant position on the vertical line of growth. Absolute size can also be depicted by the use of measuring stick signs. In AdaSL, signers use their body frequently to depict S&S, either by having their arm represent a stick, where the extent of an entity is marked by the other hand from the level of the shoulder (Figure 4a), through the arm (Figure 4b), until the fingers (and sometimes also the width), or by having the thumb indicate small sizes within the length of the index finger.
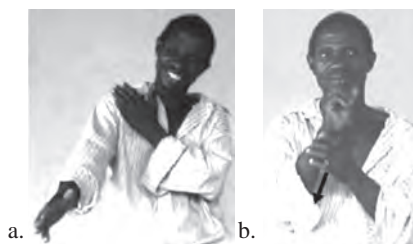

Figure 4: Signs measuring absolute size using the body as a stick on the shoulder (a) and on the arm (b), in AdaSL (from Nyst 2007b, p. 138).

In AdaSL, entity depictions are very frequent, while tracing is not. In what concerns entity depictions (category 5), the S handshape (fist), for example, is common to represent small round objects, like TOMATO (Figure 5), EGG and STONE.

Figure 5: Entity depiction of TOMATO, in AdaSL (from Nyst, 2007b, p. 145).

Because in AdaSL there were few tracing signs (also in category 5) at the time of this study (Nyst, 2007b), they were organized in the following subcategories: tracing the outline of a bound volume in neutral space, as in KIOSK (Figure 6a); tracing the outline of a bound volume in relation to the body, as in PREGNANT (Figure 6b); representing an entity while tracing its extent, as in STICK and ELEPHANT (Figure 6c); tracing a one-dimensional line on the body, as in the sign for POLICE, which indicates the stripes on the uniform trousers.

Figure 6: Tracing in space the outline of a KIOSK (a), tracing in relation to the body the outline of PREGNANT (b) and by representing the extent of a STICK(c), in AdaSL (from Nyst 2007b, p. 82 [a] and 129 [c] and Nyst 2007a [b]).

The internal modification of signs (category 6), can be exemplified by the sign for TURKEY, where the hand 'pulls' the nose to the front, as describing a long beak, or for a sort of wild cat, where both hands 'pull' the ears up. At the time of this research, Nyst had not found any signs of the sort in other SLs.

Although LaSiBo has not been much described in what concerns size and shape, it is known to make little use of space-based distance for size depictions in lexical signs (c.f. Figure 6 for AdaSL). In a comparative study of the use of space-based size depiction in lexical signs in six SLs, Nyst (2018) finds that this is similar to AdaSL and unlike other European SLs (Nyst, 2018). In fact, LaSiBo seems to prefer body-part constructions for size and shape (Tano & Nyst, 2018) in the same way AdaSL does. These body-part constructions involve, for instance, one hand delimiting size on the other arm (e.g. Figure 4 for AdaSL), the use of the delimited tip of the index finger to mean 'narrowly, only just' (also used by hearing Dida speakers as a gesture), or the delimited wrist joint with fist handshape (e.g. TOMATO). In LaSiBo, signers delimit part of the arm at the level of the elbow or the shoulder in the same way as AdaSL. On the forearm, signers can also refer to a bigger kind of BANANA or STONE, or to a BOTTLE (just like in AdaSL). With the whole arm there is the example of the size and shape of a snake, from the shoulder until the fist. In addition, it was observed size and shape using the leg to depict the width of particular entities, which was not seen in AdaSL (Tano & Nyst, 2018).

The current study will focus on the manual depictions of size and shape that are produced together with mouth movements. This points towards the already described mouthings for AdaSL (in Table 1) and possibly to adjectival mouth gestures that may (or may not) have independent meanings when combined with the depicting sign.

After this overview of the studies about mouth movements in general and in combination with the depiction of S&S, in particular, we will go back to our research questions: how do an emerging and an established village sign language compare when it comes to mouth movements? More particularly, in AdaSL and LaSiBo, what are mouth movements like in combination with S&S depictions? Are they systematically associated with particular signs? Or have they developed independent meanings? Having observed the existence of these major types of mouth movements produced together with the depiction of S&S, we will then be able to compare both SLs and see if and how any differences can be attributed to the difference in language age.

2. Methodology

2.1 Data collection

Before the fieldwork, the stimuli set was entirely prepared at Leiden University, in the Netherlands. For the purpose of our research, we decided to do five different tasks and one survey, but for this particular analysis only one of the five tasks was taken into account.This task aimed to elicit a spontaneous narrative about an animal attack, which could have been experienced by the deaf person him/herself, or he/she have seen happening to someone else or he/she were told about.

We decided not to use any stimulus material, to ensure compatibility with different backgrounds and to give the participants more freedom in their discourses, as if it were in the context of a normal conversation. It was explained to the subjects that we wanted them to tell us about an animal attack that they had seen or experienced. We suggested animal attacks involving snakes, as an example, because we were aware of their frequency and for easily inducing the depiction of S&S.

For this study, 24 deaf people from Adamorobe and six deaf people from Bouakako were asked to tell a personal experience concerning animal attacks. Each one of them ended up telling a story. In total there were 34 videos (28 in AdaSL and 6 in LaSiBo). In Adamorobe, four of the deaf participants made two videos each, because they asked to add an extra story on snake attacks and one of them wanted to tell also a story about a lion attack. In both languages, narratives have an average duration of two minutes.

The stories in AdaSL were mostly about snakes, but, other than the one about the lion attack, there was another one about a bee sting. In Bouakako, everyone narrated about snakes. Most participants explained that small snakes are killed with the cutlass that they use for working on the farm. However, when they see big snakes, they usually run away. Coming across snakes often happens when they are working on the farm.

2.2 Annotation

The protocol for glossing is based on Johnston's annotation guidelines for Auslan corpus (2014) and on Crasborn et al.'s manual for the Global Sign bank (2018). The protocol for S&S annotation developed specifically for our research was based on Nyst (2016b).

A central, three-way distinction in the annotation protocol for S&S consists of (1) the role of the hand in the depiction of 'shape'; (2) the two points delimiting 'size' between the hand(s) and/or the space; and (3) the relevance of iconic 'movement'.

Our template for Elan annotations includes different tier groups, from which we will highlight here only the ones concerning the depiction of *size and shape* and *mouth* movements. Besides the animal attack stories, videos from other tasks were annotated as well, so new codes were required and regularly reviewed with the team throughout the project.

2.2.1 Coding size and shape depiction

We develop a fine-grained, multi-layered coding system for size and shape depiction, that builds on the model for S&S depiction proposed in Nyst (2016). Our goal was that each element found to be capable of depicting size and/or shape in sign languages can be coded separately. The coding system is componential in that one sign often has multiple S&S depicting elements. It is hence not a system for categorizing whole signs, but rather for categorizing components. We considered the features to depict S&S, as shown in Tables 2 and 3, respectively. Each code is illustrated with corresponding signs. Also, the categories shaded in grey were not found in the data, thus, will not be mentioned in the results.

In shape depictions, in Table 2, a distinction is made for four different roles of the hand. The hand can represent the object, i.e. the entity, as a whole (a), or it can act as it is holding, or handling, the object (b). The hand movement can also draw in space the shape of an entity, by tracing its outline (c). When it is not none of the previous, as in non-handling, then it can mimic the action itself (d), like running or swimming (this last one was not observed in our data).

Table 2. Annotation guidelines for shape depiction

	a. entity	b. handling	c. tracing	d. non-handling
Shape: Role of the hand				
	e.g.TOOTHBRUSH	e.g.BRUSH-TEETH	e.g.SQUARE	e.g.RUN

The depiction types for size delimit the size of the entity, according to the distance between two endpoints. A two-way distinction is made between space-based and body-based size depiction. A space-based depiction concerns a distance indicated in space, which can be realized in four ways; by two inherent points within the hand (a. hand internal in space); by the hand(s) in relation to the body (b. hand and body or the finger); between both hands in the signing space (c. two hands); or between the hand and the ground (d. hand and ground), as shownin Table 3 (the last one, in grey shade, was not observed in our data).

Table 3. Annotation guidelines for space-based size depiction

	Space-based size depiction			
	a. hand internal	b. hand and body	c. two hands	d. hand and ground
Size: Delimited by two points				
	e.g.PIPE-WIDTH	e.g.SWELLING	e.g.BOX-WIDTH	e.g.ANIMAL-HEIGHT

The distance can also be body-based. Body-based size depiction comes in four different types (Table 4), i.e. one finger delimiting size on another finger from the same hand (a. hand internal); one hand marking size on the other arm, hand or finger (b. hand in arm/hand/finger); both hands depicting size in relation to the body (c. two hands in the body); or by referring to the inherent points in the body itself, such as the extreme end of a finger, or a joint (d. inherent points). The last two types were not observed in our data.

Table 4. Annotation guidelines for body-based size depiction

	Body-based size depiction			
Size: Delimited by two points	a. hand internal	b. hand on arm/hand/finger	c. two hands	d. inherent points
	e.g.NUT	e.g.TOMATO	e.g.CROWN	e.g.BEAK

As for the contribution of movement to the depiction of S&S, we distinguish between different types of movements, as illustrated in Table 5. Movement to stress the shape delimitation (a); extending movement to trace the shape in space (b); shaking movement to focus on a particular shape (c); movement showing a change in size (d) and real life movements (e). The last two were not observed in our data,

Table 5. Annotation guidelines for movement in size and shape depiction

	a. movement for shape	b.extent in shape	c. movement for focus	d. change in size	e. real life movement
Iconic **movement**	e.g.TRUNK-WIDTH	e.g.STICK	e.g.MANGO-SIZE	e.g.REDUCE	e.g.DRINK

In this way, shape depiction was considered according to its representation by the hand. Size was analysed on the basis of being delimited by the hand(s) in relation to the body and/or the space. Last, movement served mainly to illustrate more clearly S&S depiction.

2.2.2 Coding mouth movements

Mouthings identified for AdaSL in Table 1 (Nyst, 2007a and 2007b), for the sake of economy, will be annotated as:

[abo], also glossed as [puffed cheeks+release] by Nyst, usually combined with the lexical sign BIG; and

[spread lips], also glossed as [spread lips, closed teeth+ttt] by Nyst, usually combined with the lexical signs SMALL, TALL and SHORT.

For mouths gestures, we added the following annotations:

[pursed lips] (e.g. Baker-Schenk & Cokely, 1980, cited in Bickford & Fraychineaud, 2006),

[puffed cheeks] (e.g. Lu & Goldin-Meadow, 2018),

[oo] (e.g. Bickford & Fraychineaud, 2006), and

[mm] (e.g. Sutton-Spence & Woll, 1999, cited by Lewin & Schembri, 2011).

To understand the type of combination established with manual signs, mouth movements will be classified as (1) inherent part of sign or as (2) independent of sign (Bickford & Fraychineaud, 2006).

Besides the lexical sign for 'small' identified by Nyst, we have found, in our AdaSL data, what seems to be a new lexical sign also to mean 'small'. Thus, we will gloss them differently: the body-based hand internal one (as documented by Nyst, 2007) will be glossed as SMALL-1 and the new body-based with two hands sign will be glossed as SMALL-2.

With S&S depiction coded in this way, we looked, in the data, to describe it in the two village sign languages, focusing on the interconnections between S&S and mouth activity.

3. Results

All AdaSL signers, except one, included S&S depiction spontaneously in their stories. To the one signer that had not used it in his narrative, it was asked, in the end, what was the size and shape of the snake and he ended up depicting it afterwards.

In AdaSL, a total of 1143 signs were calculated in all narratives and 61 signs for the depiction of S&S were identified. Nevertheless, six of the 24 deaf participants did not produce any depiction in size or shape. Of the 61 AdaSL S&S signs, 47 are related to the snakes' depiction, whether large or small. Furthermore, two S&S signs are found involving a bee attack, three S&S describing a hole and four depicting snakebite swellings. And of the 61 signs, seven produced no mouth movement.

For LaSiBo, all signers had to be asked about the size and shape of the snake because none used a depiction of S&S in their stories. In the end, we were able to collect enough information about the size and shape of the animals, in both languages, as intended. All six deaf LaSiBo signers produced S&S signs. In a total of 462 signs produced in the stories, 32 were categorized as S&S depiction. Of the 32 signs, 25 had no mouth movements.

It is also important to note that AdaSL has one lexical sign for SNAKE (with the index finger forward), regardless of its size. In LaSiBo two signs of the sort were found, one for 'small snake' and one for 'python'. The generic sign for SNAKE consists of the palm of the hand and the arm making the movement of the snake slithering (Figure 7a). In the sign for PYTHON, the arm represents the snake, while the dominant hand indicates spots on what is supposed to be the snakes' skin (Figure 7b).

a.   b.   c.

Figure 7: Lexical signs for SNAKE (a),in AdaSL, and for PYTHON (b), in LaSiBo.

For this study, we considered only S&S depictions original to AdaSL and LaSiBo. Apart from these, we found a few lexical S&S signs borrowed from GSL in the AdaSL data. These were the GSL signs for LARGE (two occurrences), based on the manual letter 'L', and for SHORT (one occurrence).

3.1. Mouth movements in the depiction of size and shape in AdaSL

In the AdaSL data, 61 instances of mouth movements with S&S signs were found. These were categorized into five different mouth patterns: [abo] (combined with BIG), [spread lips] (associated with both SMALL-1 and LONG), [pursed lips] (combined with SMALL-2), [oo] (produced together with the depiction of 'circular shape') and [puffed cheeks] (co-occurring with the depiction of 'swelling').

The most frequent type of mouth movement was the [puffed cheeks+release] or [abo], associated with the sign BIG (Figure 8), found in 21 cases. This mouth pattern was not observed in combination with any other manual sign within this data.

Figure 8: Example of [abo] produced with the lexical sign BIG, in AdaSL.

Twelve instances of a mouth component consisting of [spread lips] were encountered.This mouth component was combined both with the sign for SMALL-1 in six cases, and with the sign for LONG in another six cases.

The mouth movement of [spread lips] was also found in the context of a small size. It is found only twice, once with the lexical sign SMALL-1 (Figure 9a) and once with a body-based size sign delimiting the tip of the index finger (Figure 9b). This confirms the morphological status of the mouth movement to indicate 'small size'. The mouth pattern that is produced together with the sign for SMALL-1 (Figure 9a) seems to have some morphological freedom to combine with other signs with related meaning. This is the case of the mouth movement combined with the body-based depiction of a 'very small size', delimiting the tip of the index finger, in two out of the six of such occurrences (Figure 9b), the remaining four do not produce any mouth movements. The difference between both manual signs is that the lexical sign for SMALL-1 delimits an invisibly small part of the finger nails, whereas the depiction of 'very small size', in this case, marks the size on the index finger.

Figure 9: Examples of [spread lips] with squint eyes and furrowed eyebrows produced with the lexical sign SMALL-1 (a) and the body-based depiction of 'very small size' (b), in AdaSL.

The [spread lips] mouth movement was also found in the context of length in six signs depicting a long snake, as in Figure 10 below. The difference between the mouth movement [spread lips] combined with the signs for SMALL-1 and LONG is that the first one is produced with squint eyes and furrowed eyebrows (Figures 10a and 10b). The mouth movement [spread lips], combined with the sign for LONG, has, in contrast, the teeth more exposed and eyebrows mostly raised (see Figures 10a, 10b and 10c).

Figure 10: Examples of [spread lips] with raised eyebrows produced with the space-based depiction of LONG-SNAKE with two hands (a, b and c), in AdaSL.

Nyst (2007) describes the combination of this mouth movement with the lexical sign for TALL, as well. However, this lexical sign was not observed in our data.

The depiction of LONG-SNAKE always has the index fingers representing the snake. The movement extends the length of the snake by increasing the distance between both hands.

All AdaSL signs for 'long snake', thus, involve an entity handshape with tracing movement. This is done either by moving both fingers apart from each other simultaneously (Figure 10a and10b) or by moving just one of them away from the other (Figure 10c).

The depiction of LONG-SNAKE, in AdaSL, is combined also with TONGUE-OUT, with only one occurrence in the data. We considered this as an iconic mouth gesture because the signer seems to be mirroring with the tongue the great length of the snake, but also embodying the snake. Since this was a unique occurrence and spread along the sentence, we do not know how recurrent this form might be.

In addition to the mouth patterns deriving from mouthings, other mouth movements were found that have not been studied before in AdaSL. These were [pursed lips], [oo] and [puffed cheeks].

All the seven occurrences of the space-based depiction of 'small size', involving two hands with a smaller distance between them, henceforth glossed as SMALL-2, are produced together with [pursed lips] (Figures 11a and 11b). Also, one occurrence of the hand internal delimitation of the tip of the thumb is alternatively combined with the mouth movement [pursedlips] (Figure 11c). This variation of the body-based depiction delimiting the tip of the thumb of 'very small size' receives again a bound-mouth morpheme, but this time from a newly identified lexical sign, SMALL-2.

Figure 11: Examples of [pursed lips] produced with the space-based lexical sign SMALL-2 with different distances between the two hands (a and b) and with the body-based depiction of 'very small size' (c), in AdaSL.

When describing a circular shape, whatever the size, signers of Adamorobe produce the mouth gesture [oo] on six occurrences. Two are body-based depiction signs produced with the hands marking a circumference of a body part (Figures 12a and 12b).The remaining four signs involve tracing depictions of outlined circular shapes. They indicate with the index finger the shape of a snake wrapped up on the ground (Figure 12d) or the hole where the snake was in the ground or the cave (Figure 12c). These depiction signs make use of 'movement for shape' to mark the width of a circumference of a body part or by tracing the circular shape of a static entity in space.

Figure 12: Examples of [oo] produced with the body-based depiction (a and b) and the tracing depiction (c and d) of 'circular shape', in AdaSL.

Finally, five mouth gestures with [puffed cheeks] are produced together with the sign for SWELLING. The signs articulated with the hands in relation to the body refer to the depiction of the volume of a swelling. All signs were produced with both hands, always in roundish '5' or 'B' handshapes, in relation to the leg, except for one articulated on the face. The swelling depicted on the leg (Figure 13a) resulted from snake bites and the one on the face (Figure 13b) from a bee sting.

Figure 13: Examples of [puffed-cheeks] produced with the space-based depiction of SWELLING with the hands in relation to the leg (a) and to the face (b), in AdaSL.

3.2. S&S depiction in LaSiBo with and without mouth movements

In LaSiBo, only two mouth gestures were identified: [puffed cheeks] and [mm]. The five occurrences of [puffed cheeks], instead of associated to a 'swelling', as observed in AdaSL, were rather produced in combination with the depiction of 'big size' (Figure 14a). For both the depiction of 'big size' (Figure 14b) and of 'swelling' (Figure 14c) with two hands, the mouth gesture [mm] was used with one occurrence each.

Figure 14: Examples of [puffed-cheeks] (a) and [mm] produced with the space-based depiction of 'big size' with two hands (b) and with the sign for swelling on the leg (c), in LaSiBo.

In general, the distribution of S&S depiction in AdaSL and LaSiBo is very similar in what concerns space-based depiction of 'big size' with both hands and of the volume of a swelling in relation to the body. However, even if produced with a similar movement and delimited in space also with both hands, the length of a snake mobilizes different handshapes in AdaSL and LaSiBo. In AdaSL, all seven signs depicting a long snake use an entity handshape, while the Bouakako signer uses a handling handshape in all four signs he produces.

Depiction of 'small size' in LaSiBo seems to rely exclusively on the tip of the finger and none of them are combined with mouth actions. The four signs in this category are articulated with the tip of the finger. Two of these are hand internal, i.e. within the hand itself, using one finger to mark size on another finger. This delimitation is marked by the thumb on the index finger (Figure 15a) and by using one hand to delimit size on the finger of the other hand (Figure 15b).

Figure 15: Examples of the body-based depiction of 'very small size', as hand internal with the tip of the thumb (a)and with one hand on the other index (b), with neutral mouth, in LaSiBo.

All six signs depicting a 'circular shape' in LaSiBo are body-based (two with a digit, three on the arm and one on the leg). The width of very slim snakes is depicted using the tip of the pinky finger (Figure 16a). Larger snakes are depicted with the arm (Figure 16b) or the leg (Figure 16c). The S&S of these bigger snakes relies on the inherent delimitation given by a wider body part to represent its real size and shape. Again, there are no mouth gestures combined with the depiction of circular shape in LaSiBo.

Figure 16: Examples of body-based depiction of VERY-SLIM-SNAKE with one hand on the other pinky (a), and of LARGE-SNAKE with one hand on the other arm (b) and on the leg (c), in LaSiBo.

Summarizing the findings regarding mouth movements, we see that they occur with the depiction of 'big' and 'small size' and 'circular shape', in AdaSL, whereas, in LaSiBo, it is hardly used. In fact, we find them only in the depiction of 'big size'. A major distinction coming out of this analysis is that AdaSL has lexical signs for both BIG and SMALL-1, as well as the newly identified lexical sign for SMALL-2, combined with fixed mouth components. The two lexical signs SMALL-1 and SMALL-2 have their mouth components behaving as bound mouth morphemes when recombined with body-based depictions of 'very small size'. Also, AdaSL seems to have a mouth

movement inherently associated with the space-based depiction of LONG-SNAKE. Last, independent mouth gestures appear to consistently pattern as adjectival morphemes in AdaSL, as PUFFED-CHEEKS produced together with the depiction of SWELLING and [OO] combined with the depiction of 'circular shape'. In LaSiBo, mouth movements are quite scarce and five out of the six occurrences are produced by the same signer, which does not allow us to draw any reliable conclusions.

To summarise the overall results in relation to the manual depiction of S&S, both SLs use more space-based than body-based size depiction for 'big'. What is more, the depiction of the volume of swelling using the distance between the hand and the leg was produced in the same way. Both SLs use the tip of the finger to depict a 'very small size', i.e. body-based size depiction. Body parts are also mobilized by signers of the two SLs to depict a 'circular shape'. However, AdaSL gives preference to the tip of the fingers to depict small circumferences, whereas LaSiBo expresses wider circumferences on the arm and leg. An interesting difference is found between the languages in the use of space-based depiction for smaller entities and for circular shapes. Thus, for smaller entities, signers of LaSiBo exclusively use body-based size depiction, but signers of AdaSL use both space- and body-based size depiction. For larger, circular circumferences, AdaSL uses space-based depiction combined with either a tracing handshape (an index) or an entity handshape (a fist with a curved arm). Again, LaSiBo only uses body-based size depiction for circular shapes.

4. Discussion

The two languages differ in time depth and community size, being AdaSL much older than LaSiBo, and having also more signers than the latter. In spite of these major differences, the two communities are mainly constituted by farmers who have experienced themselves, or have heard about, attacks by snakes. Keeping in mind that there are more deaf people in Adamorobe than in Bouakako, the frequency of manual S&S depiction in these snake stories is very similar, with 6% in LaSiBo and 5% in AdaSL.

However, there are very different numbers of mouth components. AdaSL was found to have a much higher percentage of S&S depiction combined with mouth movements than LaSiBo. LaSiBo has a strikingly high percentage of S&S signs with a neutral mouth as compared to AdaSL.

In AdaSL, mouth movements are mostly produced together with lexical signs and body-based S&S signs. A third of them are associated with the lexical signs for BIG and SMALL-1. These lexically associated mouth movements may derive from mouthings from the local spoken languages, as suggested by Nyst (2007a and 2007b). Taking the example of the lexical S&S sign for BIG, it is very plausible that the words 'agbo', meaning 'big' in Gã, and 'ketekete', meaning 'small' in Akan, were borrowed at first as mouthings and were progressively incorporated into the sign language as lexical mouth actions (Sutton-Spence & Day, 2001). This can be argued by the loss of [ttt] with [spread lips and closed teeth] in the mouth movement associated with the lexical sign for SMALL-1. In addition, Nyst (2007a and 2007b) has demonstrated the morphological freedom of the lexical mouth components combined with BIG and SMALL-1 in AdaSL,

like in 'big banana' or 'small bottle'. In our study we have also observed lexical mouth components with independent meanings, i.e. able to recombine with productive S&S signs, namely with body-based depictions on the tip of the finger. Besides these two mouth components that have probably derived from former mouthings, we observed in the AdaSL data a new fixed mouth component, [pursed lips], inherently associated with the newly identified lexical sign SMALL-2.The mouth components associated with both lexical signs to mean 'small' are also seemingly able to recombine with the hand internal depicting sign with the tip of the finger of 'very small size', as shown in Table 6. In contrast, there are no lexical signs of S&S, in LaSibo.

In the data, no signs for TALL were found. Instead, the corresponding mouth movement, [spread lips], as described by Nyst, appears associated to a related meaning, the depiction of the length of a snake. It is then possible that we are actually observing a mouthing, or a derivation of such, associated to a semantically related sign, the sign for LONG.

Table 6: Mouth movements as inherent part of S&S signs, in AdaSL

	Mouth as inherent part of sign	S&S signs (AdaSL) (number of mouth movements combined with S&S signs)	
	[abo] Nyst (2007a and 2007b) [Puffed cheeks+release][abo] 'big' in Gã	BIG lexical (N=21) total=21	
a. b.	**[spread lips]** (mouth morpheme able to recombine) Nyst (2007a and 2007b) [spread lips, closed teeth+ttt] *ketekete* 'small' / 'little' in Akan	SMALL-1 lexical (N=3) 'very small size' body-based depiction(N=3) total=6	
	[spread lips] Nyst (2007a and 2007b) [spread lips, closed teeth] *tenten* 'tall' / 'long' in Akan	LONG space-based depiction (N=6) total=6	
a. b.	**[pursed-lips]** (new mouth morpheme able to recombine)	SMALL-2 (maybe) lexical (N=7) 'very small size' body-based depiction (N=1) total=8	

Besides the new mouth component in the closed set of lexical signs for the depiction of S&S, that is [pursed lips], two new mouth gestures were identified in AdaSL, independently combined with depiction signs of S&S. Signers of Adamarobe produce independent mouth morphemes, like [puffed-cheeks] for SWELLING and [oo] for 'circular shape', to add meaning to the manual S&S depictions, as described for other SLs (e.g. Crasborn et al., 2008, Lu & Goldin-Meadow, 2018).

Table 7: Adjectival mouth gestures combined with S&S depiction of 'big size' and 'circular shape', in AdaSL, and of 'big size', in LaSiBo

	Mouth independent of sign	S&S sign (AdaSL) (number of mouth movements combined with S&S signs)	
	[puffed-cheeks] *new fixed mouth component for AdaSL	SWELLING	body-based depiction (N=5) Total=5
a. b.	**[oo]**	'circular shape'	body-based depiction (N=2) space-based depiction (tracing) (N=4) Total=6

The summarising results presented here show that AdaSL has consistently developed mouth movements as inherent part of particular signs (Table 6). Independent mouth gestures (Table 7) are also more consistent in providing information about S&S in AdaSL rather than LaSiBo, which rarely produces them. In fact, only one mouth gesture, [puffed cheeks], was found repeatedly with the same manual depiction for 'big size', although produced by the same signer. These differences may reside on the fact that AdaSL is much older than LaSiBo.

4. Conclusion

To conclude, we are now able to answer the question posed initially 'How are mouth movements like in S&S depiction?' Even though the proportion of manual S&S depiction is similar in both SLs, results show that mouth components, in AdaSL, are quite numerous and most seem to have independent meanings. This contrasts with the marginal occurrences in LaSiBo.

Overall, and to answer the second question about the differences between both SLs, we observe that AdaSL signers produce mouth patterns as fixed combinations

with signs for S&S depiction, namely for BIG, SMALL-1and also for LONG, deriving from mouthings. According to the data, a new fixed mouth component was identified combined with the space-based lexical sign SMALL-2. All of these mouth movements, in AdaSL, seem to be able to recombine with other depiction S&S signs with related meanings. In contrast, Ivorian signers from Bouakako do not produce any of the sort.

In what concerns manual depiction of S&S, LaSiBo shows an overwhelming tendency to produce body-based signs, doing exclusively in this manner, in the depiction for 'small size' and 'circular shape', signs that, for the most, do not have mouth movements.

To follow up on this work, it would be interesting to analyse the facial expressions, specifically concerning mouth, in our other tasks that were performed during fieldwork and that were not so emotional as the spontaneous narratives on animal attacks.

5. References

Bickford, J. A., & Fraychineaud, K. (2006). Mouth morphemes in ASL: A closer look. In Quadros, R. M. (Ed). *Sign Languages: Spinning and Unraveling the Past, Present and Future. Ninth Theoretical Issues in Sign Language Research Conference, TISLR9* (pp. 32-47). Petrópolis: Editora Arara Azul.

Crasborn, O. A., Van Der Kooij, E., Waters, D., Woll, B., & Mesch, J. (2008). Frequency distribution and spreading behavior of different types of mouth actions in three sign languages. *Sign Language & Linguistics*, *11*(1), 45-67.

Crasborn, O., Zwitserlood, I., van der Kooij, E., & Schüller, A. (2018). *Global SignBank manual*. Radboud University, Centre for Language Studies.

Johnston, T., Van Roekel, J., & Schembri, A. (2016). On the conventionalization of mouth actions in Australian Sign Language. *Language and speech*, *59*(1), 3-42.

Johnston, T., & De Beuzeville, L. (2014). *Auslan corpus annotation guidelines*. Centre for Language Sciences, Department of Linguistics, Macquarie University.

Kusters, A. (2012). "The Gong Gong Was Beaten"—Adamorobe: A "Deaf Village" in Ghana and Its Marriage Prohibition for Deaf Partners. *Sustainability*, *4*(10), 2765-2784.

Kusters, A. (2015). *Deaf space in Adamorobe: An ethnographic study of a village in Ghana*. Gallaudet: Gallaudet University Press.

Kusters, A. (2020). One Village, Two Sign Languages: Qualia, Intergenerational Relationships and the Language Ideological Assemblage in Adamorobe, Ghana. *Journal of Linguistic Anthropology*, *30*(1), 48-67.

Lewin, D., & Schembri, A. C. (2011). Mouth gestures in British Sign Language: A case study of tongue protrusion in BSL narratives. *Sign Language & Linguistics*, *14*(1), 94-114.

Lu, J. C., & Goldin-Meadow, S. (2018). Creating images with the stroke of a hand: Depiction of shape and size in sign language. *Frontiers in Psychology*, *9*, 1276, 1-15.

Mohr, S. (2014). *Mouth actions in sign languages: An empirical study of Irish Sign Language* (Vol. 3). Berlin: De Gruyter Mouton.

Nyst, V. A. S. (2007a). Simultaneous constructions in Adamorobe Sign Language (Ghana). In Vermeerbergen M., Leeson L., Crasborn O.A. (Eds.) *Simultaneity in Signed Languages.* Amsterdam, Philadelphia: Benjamins.

Nyst, V. A. S. (2007b). *A descriptive analysis of Adamorobe sign language (Ghana)*. Netherlands Graduate School of Linguistics.

Nyst, V. A. S. (2012). *A Reference Corpus of Adamorobe Sign Language. A digital, annotated video corpus of the sign language used in the village of Adamorobe,Ghana*[https://archive.mpi.nl/tla/islandora/object/tla%3A1839_00_0000_0000_0016_3693_A].

Nyst, V. A. S. (2016a). The depiction of size and shape in gestures accompanying object descriptions in Anyi (Côte d'Ivoire) and in Dutch (The Netherlands). *Gesture*, *15*(2), 156-191.

Nyst, V. A. S. (2016b). Size and shape depictions in the manual modality: A taxonomy of iconic devices in Adamorobe Sign Language. *Semiotica*, 210, 75-104.

Nyst, V. A. S. (2018). Cross-linguistic variation in space-based distance for size depiction in the lexicons of six sign languages. *Sign Language & Linguistics*, *21* (2), 350-379.

Tano, A. J. J. (2016). Etude d'une langue des signes émergente de Côte d'Ivoire: l'example de la langue des signes de Bouakako (LaSiBo). PhD Dissertation. Leiden University, Leiden.

Tano, A., & Nyst, V. A. S. (2018). Comparing Body-Part Size and Shape Constructions in Village Sign Languages with Cospeech Gesture. *Sign Language Studies*, *18*(4), 517-545.

Sandler, W. (2009). Symbiotic symbolization by hand and mouth in sign language. *Semiotica*, 174, 241-275.

Woll, B. (2008). Do mouths sign? Do hands speak?: Echo phonology as a window on language genesis. *LOT Occasional Series*, *10*, 203-224.

Supalla, T. (1986). The classifier system in American sign language. *Noun classes and categorization*, *7*, 181-214.

Sutton-Spence, R., & Boyes Braem, P. (2001). *The Hands Are the Head of the Mouth. The Mouth as Articulator in Sign Languages*. Hamburg: Signum Press.

Zwitserlood, I. (2012). Classifiers. In P. Roland, S. Markus & W. Bencie (eds.). *Sign language: An International Handbook*. Berlin: De Gruyter.