Adding pieces to the Portuguese Sign Language lexicon puzzle: three pilot studies

Juntando mais peças ao puzzle do léxico da LPG: três estudos pilotos

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Resumo

O principal objectivo deste artigo foi apresentar as várias peças que compõem o puzzle do léxico da Língua Gestual Portuguesa (LGP) – a polissemia, a especialização linguística das formas e a história dos gestos através do tempo – demonstrando como essas peças se emolduram no mecanismo linguístico da criatividade humana e da evolução dinâmica das línguas, enquanto factores privilegiados de expressão cultural.

Palavras Chave: Língua Gestual Portuguesa (LGP); Léxico; Polissemia; Terminologia; Variação Diacrónica ⏮

Abstract

The main goal of this article is to present several pieces of the "puzzle" concerning Portuguese Sign Language (LGP) lexicon – polissemy, linguistic specialization of forms and the sign's history throughout time –, thus demonstrating how these pieces fit into the linguistic mechanism of human creativity and the dynamic evolution of languages, two privileged factors in cultural expression.

Key-Words: *Portuguese Sign Language (LGP); Lexicon; Polissemy; Terminology; Diachronic Variation* ⏮

> *A language's lexicon is like a galaxy,*
> *it lives in permanent expansion*
> *for it incorporates the social and personal experiences of the community that speaks it*[1].
>
> (Nelly Carvalho: 1989)

1. Introductory Notes

Words are the building blocks of human language and culture. The ability to create and use words distinguishes *homo sapiens* from all other animals. In fact, nothing else is so unique and profoundly human as the creation and usage of language.

If the ability for language is inscribed in the modern Man's evolution, the truth is that there are two modalities which reveal and express both our language creation ability and language usage: the oral modality and the visual-gestural modality.

Both modalities in human languages are held by a complex system ruled by lexicon, phonology, morphology, syntax, semantics and pragmatics. Such basis is present in every language in the world and differs from one language to the other.

As far as this article goes, we will present some of the "pieces" that compose the "lexicon puzzle" in Portuguese Sign Language, brought about by the most recent research work conducted in the area of LGP. We will start by defining lexicon and the lexicon dimensions we will be focusing on.

The word Lexicon has its origins in the Greek term «lexicon» and, *latu sensu*, is a synonym of vocabulary[2]. The lexicon of a language encloses its complete inventory of words or signs as well as the virtual possibility for creating new items (whether signs or words). A language's lexicon codifies the

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[2] In this context we will operatively perceive lexicon and vocabulary as synonyms.

knowledge shared by the members of the community that uses it, and it integrates and absorbs the new personal and social experiences of such a community of signers or speakers.

A given language, through the vocabulary that connects it to the world, reflects society's valid culture. In the history of languages, the old forms perish as new ones arise. Besides, the way in which form and content relate to one another is constantly changing. In the basis of these modifications lies an endogenous trait of the linguistic system: creativity.

This issue is crucial because languages, the same as signers and speakers, born and evolve, so do their signs and words. Therefore, in their "useful life", lexical units that used to have a certain meaning can come to acquire another or various others due to the effect of *polissemy*, *specialization of meaning (terminology)*, or as a result of time and usage, effects of the *history of the language*.

In this work we will account for the lexicon's dynamic and creative function in languages, which renovates, increase and extinguishes words and signs. We will do so by summing up three studies which present these dimensions of language lexicon concerning LGP. We will emphasize that these are the first three research works on this domain, and are therefore must be considered as exploratory studies. LGP is a language without a written form and its lexicon hasn't yet been systematically explored, gathered up and organized, so to provide researchers with the qualitative and quantitative data required for a thorough analysis of the language's lexical aspects. Hence, we can only raise hypotheses for terminological, polissemic, and diachronically evolutive signs.

2. Polissemy

The concept of polissemy, which is "the association of two or more related senses with a single linguistic form" (Taylor 99), is a common phenomenon in natural languages and for that it has been attended to by researchers from diverse linguistic currents, different branches of Linguistics. Nevertheless, not every linguistic current has paid the same amount of attention to polissemy. After an initial period, centered in diachronic study, Bréal (1887) was the first to provide a synchronic vision of polissemy and to characterize it as a systemic phenomenon connected to semantic change and language evolution. However, polissemy has played a rather secondary role in linguistic studies carried out either by structuralism or generativism.

According to structuralists, meaning analysis was based on decomposition into semantic traits. This process allowed them to identify each signifier-signified pair, describing it and relating it to the contiguous meanings (through categorizing in Necessary and Sufficient Conditions, normally represented in the form of matrixes of semantic traits). This methodological perspective with a compositional basis was centered on the equivalence between a phonological form and one single meaning. It minimized perception of a phenomenon which, due to its own nature, demanded a more global, less formal and less compartmented approach. In a way, this confusion between polissemy and homonymy was recovered by generativism. Some authors referred to this dominant paradigm during the most part of the 20th century as the "single meaning approach" (Cuyckens e Zawada, 2001). Hence, generativist linguists, much more interested in the concept of "competence" than "performance", undertook a semantic analysis where a lexical unit's different meanings were inserted in a wider, more global meaning, described in the language's "system". For this reason, describing real meanings, resulting from usage, did not interest them.

Basically, such a lack of interest is due to both linguistic currents considering polissemy as a marginal phenomenon, one that is never regular and systemic. Both considered that, in the relation between form and meaning, the predominant lexical norm was the combination of monossemy (the "single meaning approach") and homonymy, that is, the formal coincidence in two lexical units which share a common denomination but have separate meanings.

It is only when cognitive linguistics arises, throughout the 80's and the 90's, that polissemy starts to play a central role in describing lexical meaning (cf. Lakoff e Johnson, 1977; Langacker, 1991; Fauconnier, 1994; Taylor, 1995; Ungerer e Schmid, 1996, and many others). All of these approaches shared one same principle: that lexical units, as well as word classes and grammatical constructions, are conceptual categories which should be studied as a reflex of general cognitive principles, seen as more than merely formal linguistic phenomena. Cognitive linguistics, by including work and methods from other academic disciplines (philosophy of language, experimental psychology), was better equipped to describe polissemy as a regular phenomenon of language.

To sum up, cognitive linguistics describes lexical units as categories of interconnected meanings around a prototype (Rosch, 1973), by means of semantic associations or "family resemblances" (words well put by Wittgenstein). Thus, the meaning of a lexical unit would no longer have a unitary, monossemic value, in a given profound structure, and it would become a group of interconnected meanings by means of cognitive processes such as metaphorization, metonymy, specialization or generalization.

Up until then, in the dominant paradigm, a polissemic word's meanings were described as derivations of a main meaning (usually etymologically motivated), whereas in the constructivist paradigm, one meaning (or several of the meanings) of a word can be more relevant ("salient") than the rest. Here, however, different meanings do not derive from each other; instead they connect to one another through the processes we already mentioned.

In this pilot study, carried out by Mineiro *et al.* (2008)[3], we account for interrelations between the different meanings of a number of LGP signs, aiming at explaining family resemblances amidst them. We will show that, apart from cases where the mechanism involved is metonymy *stricto sensu*, we can also find others that are as yet hard to include in any of the semantic mechanisms proposed in literature, namely, metaphor, metonymy, specialization and generalization.

2.1. Corpus used

The *Corpus-LGP* contains one hundred signs. They were collected bearing in mind the signs registered in *Gestuário*[4] and in didactic[5] material used in Deaf Education, because these are the most used sources used by LGP signers. We chose signs that are commonly used in daily communication, separated into the following themes: animals, fruit, the four seasons, transports, countries and cities.

The *Corpus-LGP* was put together in five different phases. In the first phase, one hundred signs were selected from *Gestuário* and split into the themes mentioned above. In the second phase, using a written list, seven profoundly deaf subjects (with early LGP acquisition and literate in Portuguese) were requested to produce the signs, and such production was captured on video. In the third phase, two hearing fluent LGP signers and two deaf signers selected signs that were potentially polissemic into a sub-corpus (cf. Table 1), based on their linguistic competence. In the fourth phase, using digitalized images representing the elements in the sub corpus, each informant was asked to comment freely on the images, so that contextualized production of the signs could be recorded and not just the isolated units. After the several signed productions had been analyzed, a week later, the same seven informants were asked to repeat the fourth phase of the process, so to try and quantify variation in the potentially polissemic denominations.

2.2. Methods

After building the *Corpus*-LGP, we verified the polissemy possibility in every signed *item* – using the linguistic knowledge of two LGP fluent signers (hearing) and two LGP signers (deaf) as reference.

Having reached conclusions on the items which were potentially polissemic, we asked the informants to sign the polissemic units in acceptations differing from the initial corpus unit. We verified that certain signs were indeed presented identically for the several acceptations, while others were presented with syntactic and morphophonologic variations. In addition to such proof of variation, the truth is certain signs sometimes appeared with variations and other times were presented identically to the initial form, or the "motivating" form. In order to describe the variation observed and quantify occurrences in the two competing forms, it was necessary for the informants to again undergo a filmed signing process of the polissemic units in a natural context.

This study was based on a descriptive methodology and on data observation, an approach that intends to be *data-driven* and *bottom-up*, that is, steered by the data and constructed in terms of classifying it through corpus results observation.

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[3] The complete original study can be found in Mineiro, A, Duarte, L.P. Carvalho, P.V. Tebé, C. & Correia; M. "Aspectos da Polissemia nominal em Língua Gestual Portuguesa" *In*: Polissema, Vol 8, Porto, pp.37-56 , 2008.

[4] *Gestuário* is a compilation of basic LGP signs, using written contents and images, and it is similar to any oral language dictionary. *Gestuário* was coordinated by António Vieira Ferreira and Adalberto Fernandes and published by the *Secretariado Nacional para a Reabilitação e Integração das Pessoas* (National Secretariat for Rehabilitation and the Integration of People with Disabilities), in Lisbon.

[5] The didactic materials' author is Paulo Vaz de Carvalho, and they were created based on the signs that are intuitively used the most in daily communication, as well as those present in Faria, I. H., Ferreira, J. A., Barreto, J., Martins, M., Neves, N., Santos, R., Vilela, S. (2002b). *+LGP – Materiais de Apoio ao Ensino da Língua Gestual Portuguesa: O Mundo*. Laboratório de Psicolinguística, FLUL. Publicação em CD-Rom, versão 1.0.

2.3. Results

Bearing into mind what is generally known on languages' polissemy phenomenon, we verified that LGP shows signed polissemy processes, which we will describe in the following paragraphs.

2.3.1.Polissemy by metonymy

Traditionally, metonymy and metaphor are two similar processes[6], to the extent that they both represent systematic conceptual mapping of a source-domain and a target-domain. The distinction between these two similar processes lies in the fact that metaphor establishes *similarity* connections, whereas metonymy is built on connections of *contiguity*. Both processes make a decisive contribution in creating, through *extension*, language polissemy.

In the case of the corpus collected, we found metonymic polissemic signs. In 1995, Correia had already called our attention to cases of metonymy in LGP signs that are part of the *Gestuário*. From what we know so far, metonymy is probably the most productive process in generating polissemy in LGP – and even in other sign languages.

In the following pairs: *CAFÉ*[7] (drink – coffee) e *CAFÉ* (place where you can have coffee – a cafe), *CEREJA* (cherry) and *FUNDÃO* (name of a Portuguese village)*; BACALHAU* (codfish) *and SEXTA-FEIRA* (Friday – the day when children ate codfish at the Deaf School); and *CAVALO* (horse) and *CARCAVELOS*[8] (name of a village – place where there was a farm with many horses, at the time the sign was crafted) we found the same sign being produced to denominate both referents in each pair. In the case of *BACALHAU* the sign is produced, in some of the occurrences, using the non-dominant hand. This happens when the sign is produced out of context, whereas when it is produced in context, it is identical to *SEXTA-FEIRA*. In the case of *CAFÉ*, we do not know if its polissemy is based on a metonymic process or in the linguistic contact there is between the written Portuguese language and Portuguese Sign Language. This is a possible explanation.

Other signs were found that tend to assume metonymic polissemy. *PÁSCOA* (Easter) and *AMÊNDOA* (almond) only differed in one of the phonologic parameters: non manuals. The pair *PEIXE* (fish) and *TERÇA-FEIRA* (Tuesday – the day when the main course at the Deaf School was fish) also exhibited a close proximity, thus it can come to constitute a polissemic unit. The only difference found between the two (*PEIXE* e *TERÇA-FEIRA*) was reduplication[9] in *TERÇA-FEIRA*. The trio *UVA*(grape)-*SETEMBRO*(September)-*PALMELA*(Portuguese village) has also shown a tendency for metonymy motivated polissemy, and the variations in these three signs are situated in the syntactic plan (proximal and medial distance).

2.3.2. Polissemy by stereotype effect

LGP has several resources for the formation of common and concrete names.

For instance, the attribution of sign names is done, within the Deaf community, through an internal and democratic negotiation process based on several types of systems, as we can read in Carvalho's description (2006). One of the systems for attributing sign names is the "salience effect", meaning that it is the selection of a physical evident trait (e.g. big nose, small eyes, etc.) or a psychological trait (expressivity, shyness, etc.) that leads to the sign name's attribution.

Another process, which is similar to this one, refers to what happens with concrete names of countries and cities. The name is created from one icon that is consensually considered as representative (stereotype) of a given location (country or city). In the corpus collected in this study, we found several signs for countries and cities built polissemically, through stereotype effect. We will use this notion, in the way Kleiber (1990) conceived it, distinguishing

[6] In the context of the schematic network model for categorization, made popular by Langacker (1987/1991), both metaphor in its similarity, and metonymy in its contiguity, are presented as *extension* connections, opposite to *schematization* connections (generalization) and *specification* (Silva, 120 and following).

[7] Signs are represented in capital letters because they are glosses of LGP into written Portuguese. Despite the article's translation into English, these glosses are kept in Portuguese throughout this article because it favors comprehension of some of the linguistic aspects described.

[8] In the first published version of this study (Mineiro *et al.* 2008) the pair CAVALO and CARCAVELOS was not considered as metonymic. It was interpreted as caused by reading deviation, taking into account the global reading level of Deaf people. On the occasion of the presentation of this pilot study at an International Conference, in Brazil, May 2009, Amílcar Morais defended that this sign should be classified as metonymic due to its history and its crafting. Hence, we accepted this re-reading of the polissemic process, integrating it in this article.

[9] Here we use the term *reduplication*, meaning the process through which the repetition of a whole sign or the repetition of a part of a sign occurs.

it from the notion of prototype (better specimen of a conceptual or linguistic category). Thus, countries and cities are named based on a sign that already exists and which represents a stereotyped, typical form of that same location, as we can see in the following examples.

BRASIL (Brazil) is named after *TELENOVELA* (Soap Opera) (with a variation: reduplication in *BRASIL*). Both referents are named using the same sign, only differing in the sign's repetition, in the case of *BRASIL,* a unit constructed from *TELENOVELA*. The same happens with *ARGENTINA* and *BOI* (Ox), where the reduplication happens in *ARGENTINA*.

Totally identical signs are *IRLANDA* (Ireland) and *HARPA* (harp), *ESCÓCIA* (Scotland) and *GAITA-DE-FOLES* (bagpipes), *GUIMARÃES* (a Portuguese city) and *CASTELO* (castle).

With variation in one phonological parameter (facial expression), we find the pair *TERRAMOTO* (earthquake) and *ITÁLIA* (Italy), where the differentiating facial expression appears in the sign *ITÁLIA*. With no variation, we find the pair *ITÁLIA* e *ALGÉS* (Portuguese village), where the exact same sign is presented for both referents in all occurrences.

2.3.3. Polissemy by linguistic contact

In the collected corpus, we think that for signs that are already formed and stabilized, creation of new semantic content can also happen through contact between LGP and written Portuguese. It is a known fact that Deaf people have difficulties in learning to read and in written production of Portuguese. This is described in literature on LGP and Deaf education (Baptista: 2008), and the common "errors" or "deviations to the written norm" are portrayed. For this reason, we present the hypothesis[10] that reading influences the formation of the derived acceptation in the pre-existent sign.

The process that we present here holds two interesting variants, linguistic contact with no reading deviation and deviant linguistic contact. The fact that we consider the process we present here as polissemic instead of homonymic comes from having operatively limited the notion of polissemy and using this concept whenever there is an intentional and rational connection between the various acceptations of a linguistic *item* (sign/word). In this case, we consider that there is a relation of linguistic contact[11] between two languages in one community – Portuguese is the "written" language of Portuguese deaf people and it promotes, through the reading channel, an interpretation of two *items* as related to one single form.

A possible example, which illustrates the creation of an acceptation within a pre-existent sign, due to a reading deviation [12] in Portuguese, is the pair *BRISTOL* and *PISTOL(A)* (gun). In this pair we see a similarity in writing, between the groups of consonants and vowels used in *BRISTOL* and *PISTOL*, which can lead to the creation of an acceptation based on the pre-existent signifier-signified relationship.

There are cases, such as the pairs *PERU* (animal) and *PERU* (country), and *CAFÉ* (coffee – the drink) and *CAFÉ* (location where one drinks coffee), where the similarity of the two signs in each pair seems to be anchored in a reading process of written Portuguese, with no deviations. As we said before, it is impossible to perceive whether *CAFÉ* (the drink) and *CAFÉ* (location) are polissemic forms by metonymy within LGP, or if reading in Portuguese has influenced naming these two referents using the same sign.

2.3.4. Polissemy by imagetic synonymy

One of the processes for "recycling" signs for inexistent referents was what we thought to have found through visual image. This process seems to be particularly interesting, for it is believed that vision is one of the highly developed senses in Deaf People. Consequently, processing the "image world" will linguistically be an operative process and, namely, an LGP process. The signs' morphological composition processes are most of all visually motivated, generally referential (indicating indirectly the parts of the body or pronouns), iconic (delineated representation of the object or using hand shape to represent the object itself) and metaphorical and

[10] To think that the written form in Portuguese motivates the creation of LGP signs, through polissemy, is a plausible interpretation but yet to be proved. In order to understand if this is a recurring process, we would have to verify this hypothesis in a statistical study that would allow us to reach a trustworthy conclusion.

[11] We must enphasize that the word creation in oral languages, through linguistic loans (linguistic contact), is also done through the unit of origin's "linguistic deformation" (e.g *abajur, quivi, líder*, among others). On this matter, one can consult works on European Portuguese, such as the ones by Rebello de Andrade and Lavouras Lopes (2003).

[12] We think that this process is common to other sign languages, namely Brazilian Sign Language (LIBRAS) and British Sign Language (BSL). This hypothesis can be further looked into in future studies.

metonymical (cf. Hub-Faria *et al.* 2001: 87-98). It seems to us that the "imagetic synonymy" process proposed here fits in LGP's tendency to create signs that are visually motivated.

In this case, we found pairs concerning brand names where their symbol is a sign that already exists, such as in *ELEFANTE* (elephant) and *JUMBO*[13] (supermarket brand); *ESTRELA* (star) and *AMADORA* (location in Lisbon) (due to the influence of there being a Football Club called "Estrela da Amadora"). Imagetic synonymy (the representative symbol and its referent), in these cases, leads to the attribution of a sign that is identical to its source, resulting in a similar form with several meanings (in the cases above, *ELEFANTE* equals *JUMBO,* and *ESTRELA* equals *AMADORA*).

2.4. Description of potentially polissemic sign variation

Within natural languages, variation is systemic. LGP's youth can be a promoter of such an internal facet in languages. We can find this in literature, described for example by Henriques (2006), concerning nominal variation in the "história da rã" (the frog story).

An interesting issue was raised during data collection; we acknowledged that in such a young language as this one, there are indeed potentially polissemic linguistic forms. Still, in this context, they haven't yet reached a state where they are completely stabilized.

In that case, if some of the collected signs are clearly polissemic linguistic forms, that is, one same sign for several co-relatable meanings, other signs compete with each other to become enveloped in this phenomenon.

We think that the "linguistic economy" factor that Aristóteles[14] spoke of, referring to the reasons for which polissemy exists, can make a decisive contribution for polissemic forms' "natural selection" do be done to the detriment of its variants.

There were signs which were undoubtedly polissemic (100% of occurrences in the collected corpus), while other signs presented some type of variation, whether concerning syntactic parameters – the same sign being produced in different distances in the syntactic space (proximal, medial and distal); whether relating to morphophonology (such as the sign's reduplication or a noticeable difference in facial expression).

The truth is that signs which presented derivations in relation to their original form (proofing to be according to our opinion, competing variants) do not seem to be yet stable in their differentiated form and have shown occurrences where the two forms are identical (cf. Table 2). Only LGP's future history will be able to shed some light whether on one form prevailing over the other, or both forms remaining in usage.

To sum up, the signs that were presented in every occurrence with one same form were:

BRISTOL – PISTOL(A); CAVALO – CARCAVELOS; CEREJA – FUNDÃO; CASTELO – GUIMARÃES; CAFÉ (location) – *CAFÉ* (drink); *ELEFANTE – JUMBO; ESTRELA – AMADORA; HARPA – IRLANDA; ITÁLIA – ALGÉS; GAITA-DE-FOLES – ESCÓCIA; PERU* (animal) – *PERU* (country).

The signs that presented variation were:

BACALHAU – SEXTA-FEIRA; BOI – ARGENTINA; ESTRELA – AMADORA; UVA – PALMELA – SETEMBRO; TERRAMOTO – ITÁLIA; PÁSCOA – AMÊNDOA; PEIXE – TERÇA-FEIRA; TELENOVELA – BRASIL.

2.5. Concluding Remarks

This work presented here is one first systematic approach of this theme. We recognize this study's "embrionary" nature, but we think it already presents some relevant aspects. It is a work of observation and data description on the polissemy phenomenon, an analysis that as far as we know has not yet been conducted concerning LGP. It is an attempt to classify processes that are subjacent to polissemy in LGP, processes that seem to be a feature of this language. We believe that the causality hypothesis we have enunciated connecting the polissemic form to the polissemy's origin, particularly in the case of sign formation through reading words in the Portuguese language, need to be developed in future research.

[13] Jumbo is a supermarket chain which symbol is an elephant.

[14] Aristóteles finds a correct reason – linguistic economy, meaning the recycling ability of linguistic matter in the face of new referential stimulli (objects, concepts) – to explain polissemy, when he states that:
Names exist in a limited number, as well as the plurality of enunciates, whereas this are finite. It is therefore inevitable that the same enunciate and that one same single word means several things. (Aristóteles, *Elencos Sofísticos*, 165a 10-13, *apud* Silva, 16 – translated by the author).

3. Specialization of meaning: terminology in LGP

A language's lexicon progressively expands in new forms, many of which are built from forms that already exist. These new forms result from linguistic creativity as well as human creativity in other fields. Neologisms created in science, technology or art provide us with a linguistic passage to have access to new concepts, therefore accompanying the evolution of societies. We will see that these new linguistic forms are words or signs which contain specialized meaning; they are used in certain linguistic communicative contexts (e.g. science, technology, arts) and obey to the same linguistic creation rules than common lexical items (although there are preferential processes for term formation described for languages in the oral modality).

Nowadays, there is an enourmous gap between the interest in LGP terminology and elaboration of terminological work. Studies such as *Terminologia da Análise Linguística da Língua Gestual (Terminology of Linguistic Analysis of Sign Language)* (Prata;1994), *Emergência de uma Terminologia Linguística em Língua Gestual Portuguesa (the Emmergence of a Linguistic Terminology in portuguese Sign Language* (Delgado-Martins; 1998), and digital thematic dictionaries such as *A Casa (The House)* (Faria et al;2001), *O Corpo (The Body)* (Faria et al; 2002) and *O Mundo (The World)* (Faria et al;2002) are some of the very few works done in this field.

The lack of specialized signs is felt not only by LGP interpreters but also by Deaf students who now have access to higher levels of education, and thus need specialized signs to refer to concepts that are specific of their training area.

The goal of this pilot study undertaken by Duarte *et al.* (2007)[15] was to build an inventory of LGP signs collected in a classroom, and to analyze the formation processed used by Deaf students. Due to the impossibility of exploring a wider corpus, on area was chosen for scrutiny: Natural Sciences, a subject present in the "Ensino Básico" (Basic Education) *Curricula* .

3.1. Method

In a first phase, contact was established with every "Unidades de Apoio Educativo a Alunos Surdos" (Units for Educational Support of Deaf Students) in the Portugal – more commonly known as UAEAS. They were a total of thirty two, according to the information provided by DGIDC – "Direcção-Geral de Inovação e de Desenvolvimento Curricular" (General Board for Innovation and Curricular Development). This information was gathered at the UAEAS National Meeting, in December 2005.

In a second phase, criteria we established for selecting schools. These included all of the important variables to take into account in this sort of study:

- Schools which included one UAEAS;
- With one or more LGP interpreters;
- With one or more LGP teachers;
- With classes that had the largest number possible of signing deaf students, in the subject of Natural Sciences/ Sciences of Nature, Biology/ Geology and Geology, with an LGP interpreter in the classroom;

The defined conditions reduced our universe of study because not every school that could participate in this study showed interest to do so. Therefore, our universe was cut down to 8 students, from the 7th and 8th grades, with ages between 13 and 19 years (in Coimbra).

In a third phase, video recordings were made at the only school that filled the requirements set by us in the beginning. These footages carried out in 6 classes, with a duration of 45 minutes each.

In a fourth phase, researchers proceeded to sign collection and analysis, based on the terminological lexicon the students produced in the classroom.

Finally, on a fifth phase, the results obtained (the terms registered in the footages) were analyzed, with the assistance of a deaf native LGP signer.

3.2. Corpus collected

Atmosfera (atmosphere); CFC (clorofluorcarbono) (chlorophluorocarbons); Chuvas ácidas (Acid rain); Epicentro (Epicenter); Hipocentro (Hipocenter); Maremoto (Seaquake); Marés negras (Black Tides); Ozono (Ozone); Poluição (Polution); Sismo (Seism); Tsunami; Raios Ultravioleta (Ultraviolet Rays).

[15] The complete study was originally published *in* Duarte, L., Mineiro, A "Terminologia em Língua Gestual Portuguesa: Uma necessidade para a tradução? Processos de formação de Gestos em Ciências Naturais" *In:* Encontro Comemorativo dos 50 anos do Centro de Linguística da Universidade de Lisboa (CLUL), Lisboa, 2007. http://www.clul.ul.pt/artigos.php.

3.3. Results

The analysis of the results obtained focused on two different parameters: a qualitative parameter and a quantitative parameter. In both cases the analysis was limited to a descriptive observation of the data. In the future, we hope to widen the corpus so to obtain results that can allow us to withdraw broader conclusions on the resourcefulness and creativity of the formation processes found.

Following the qualitative parameter, the obtained signs were classified according to the type of formation they presented whereas in the quantitative parameter, the signs were analyzed according to descriptive statistics data.

The methodology used in our corpus qualitative analysis was similar to the one presented in the study of Raquel Delgado Martins (1998). We considered that quantitative analysis can be an interesting option if this study is broadened in the future, which is why we decided to include it in our work.

3.3.1. Qualitative descriptive analysis

The sign formation processes produced by the students were scarce since some LGP sign formation processes are not represented here. Formation processes such as **derivation, initialization**[16], **paraphrasis** or **external loan** were not found.

On the one hand, we think this is due to the reduced dimension of the collected corpus and, on the other hand, to its thematic limitation because it is confined to one specific area of knowledge.

The sign formation processes found were:

(1) Dactilology: process through which the term is shaped by manual configurations corresponding to the manual alphabet. This process involves some knowledge of written Portuguese, which might not happen in the case of deaf people with a low educational level.

In the universe of this study, signs formed by dactilology were:

A-T-M-O-S-F-E-R-A; C-F-C; E-P-I-C-E-N-T-R-O; H-I-P-O-C-E-N-T-R-O; M-A-R-E-M-O-T-O; O-Z-O-N-O; T-S-U-N-A-M-I; R-A-I-O-S U-L-T-R-A-V-I-O-L-E-T-A.

(2) Internal Loan: process of reusing an existent sign in the common LGP lexicon, conferring a specific meaning of an area of specialty to it.

The sign formed through internal loan was: SEISM.

In the case of *Seism,* students used the sign for *Earthquake* to refer to *Seism*.

Although there seems to be a dim line dividing the concepts *seism* and *earthquake*, there are indeed differences. Concerning the concept of *seism*, we can say that it refers to a quake or vibration that occurs inside the Earth and results from breaking elastic tensions. However an *earthquake* refers to land shifting. The same process occurs for the term seaquake, which means the existence of underwater movement.

We can therefore consider, in this case, that there is a semantic hierarchical connection, where *seism* appears as a hyperonim of *earthquake* and *seaquake*.

(3) Composition (sign + sign and sign + sign + sign): process where the concept is expressed through the junction of existent signs, with no morpheme loss.

The composed signs were:

CHUVA ÁCIDA (Acid rain); MARÉS NEGRAS (Back Tides) and POLUIÇÃO (Pollution)

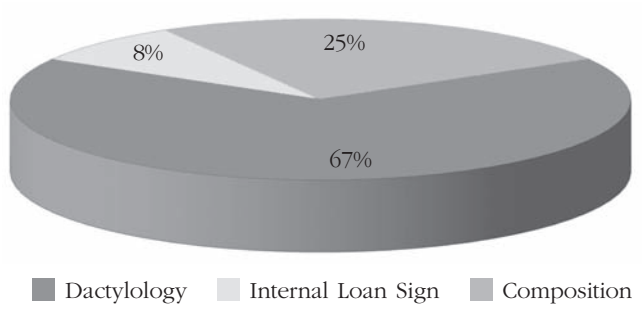
In the case of *acid rain*, the students used the signs CHUVA (rain) and SUJO (dirty) aggregated sequentially. This composition seems to derive from a visual linguistic motivation, since proximity between the object and its denomination is perceivable. It is also important to mention that the concepts were transmitted by the subject's teacher through strategies that included explanation, usage of pantomimic gesture, the image referring to the object, and the presentation of negative and positive effects of the concepts. Hence, for *acid rain* students used CHUVA (rain) + SUJO (dirty) (because of the visible degradation caused to monuments) and for *black tides* BARCO (boat) + PARTIR (depart) + DERRAMAR (spill) (because of the visual image of the oil tankers).

For *pollution*, students opted by the combination of the signs SUJO (filthy) + ESPALHAR (spread). This association allows us to say that these two signs, clustered together, transmit the perfect understanding of the concept, since *pollution* is related to *filth* and is not something that is fixed in one particular location.

[16] This term, already used in various studies in LIBRAS (Brasilian Sign Language), was used by us in alternative to the syntagmatic term "*initial dactilologic configuration*", proposed by Amaral, Coutinho and Delgado Martins (1994) because we think it to be more economical from a linguistic point of view and conceptually more transparent.

3.3.2. Quantitative descriptive analysis

So to better visualize statistical distribution of the formation processes in the collected corpus, we present the following graphic:



As we can see, 67% of the signs were produced through dactylology. We also observe that composition of signs obtained a 25% result whereas the internal loan process attained 8% of the occurrences.

These results show a clear predominance of dactilology as a privileged sign formation process in this area of knowledge. The reasons for this result can be connected to the fact that, when the footage was being captured, students were being exposed to these concepts for the first time. So, there might not have been "enough time" to create processes that are endogenous to LGP and are alternatives to dactylology. The dactilology sign formation process is natural in a school community because it involves strategies of identification written Portuguese. If the target population was made of Deaf people with a low level of education or illiterate subjects, results could have shifted and LGP neology would manifest itself in other formation processes.

Sign composition seems to be an alternative to the previous process with some representativity. This can be due to available linguistic material (existent signs) being used to create new denominations, which demonstrates LGP's ability to recruit economical morphological processes. Like any other language whether of an oral or signed modality, LGP has a set of rules that allows it to generate an infinite number of enunciation and signs.

The internal loan process presents a result of 8%.

3.4. Concluding Remarks

We can consider the collected corpus as an early stage of our study, which scope should be broadened not only within this same thematic area, but also in other curricular areas that interest the Deaf community and every professional that works with LGP.

We come to the conclusion that the formation processes used in this study are parallel to those found in oral languages. From a linguistic point of view, this reinforces what biolinguistic studies have been demonstrating: sign languages are true linguistic systems that only differ from oral languages in the modality used for expressing and perceiving them.

Even though dactilology was the sign formation process that was the most used by our subjects, we think that happened because LGP signers, in the classroom context, hadn't had time to completely assimilate the concepts so that more specialized signs would arise naturally, using formation processes which were endogenous to LGP's morphological system. This result replicates the one described in Amaral, Coutinho & Delgado Matins (1994).

We believe that if the students had been filmed during a longer period in time, alternatives dactilological signs would have been found in the classroom context. The dactylology process can be compared to what happens when, in the Portuguese language, we first receive a term belonging to a foreign language. Such a term is not immediately integrated. Firstly, it is used just as it arrived to us: in the form of the language of origin. The integration phase and assimilation occurs latter on.

4. The history of signs in the semantic field of family

«The history of a word is the history of its culture and structure;
Both aspects should really be described in relation to each other,
as if they were two sides of a same coin[17]*»*
(Helmut Ludtke, 1968)

Although Portuguese Sign Language (LGP) is more than two-hundred-years-old, the truth is it was only formally recognized in 1997, having become a legally acknowledge language in the Portuguese Constitution.

Signs used in daily communication are easily changeable, ever evolving into new forms, and this often steals away the historical background of the signs themselves. Processes of linguistic economy tend sometimes to simplify the original signs, transforming the lexical cluster of sign languages.

[17] Translated by the authors.

In this exploratory study, conducted by Pereira *et al* (in press)[18] we intend to retrace the historical path and the etymology of a semantic field: family.

4.1. Methods and Materials

Data collection was obtained with the participation of 15 Deaf signers, LGP natives which were divided into three age groups: (i) more than 10 years of age, (ii) more than 25 years of age, (iii) and more than 45 years of age. Subjects were selected using high LGP fluency as a main criteria and the research team tried to make the sample as heterogeneous as possible in terms of each of the participants' language acquisition and educational background.

Our sign corpus included 32 family ties, for which we intended to search etymology explanations. The concepts used were: *mother, father, grandmother, grandfather, son, daughter, uncle, aunt, godfather, godmother, godson, goddaughter, brother, sister, cousin (masculine), cousin (feminine), brother-in-law, sister-in-law, father-in-law, mother-in-law, stepson, stepdaughter, stepfather, stepmother, nephew, niece, daughter-in-law, son-in-law, great-grandfather, great-grandmother, grandson and granddaughter.*

Subjects were asked to explain the origin of each sign, using a written list of the words above. Proposals of origin for the signs were registered and accounted for. The most mentioned etymology proposal was registered, as well as its level of cohesion, depending on the number of participants who had suggested it; **Weak** [1 to 5]; **Medium** [5 to 10]; and **High** [10 to 15]. Within these categories we also identified others: **Weak–** [1 to 2]; **Weak*** = 3; **Weak+** [4 to 5]; **Medium–** [6 to 7]; **Medium*** = 8; **Medium+** [9 to 10]; **High–** [11 to 12]; **High*** = 13; **High+** [14 to 15]. Where no answer was obtained results were named **Null.**

4.2. Results

According to the most mentioned etymology proposal by our informants, a list of proposal for the etymology of each sign was elaborated (see Table 3). We intend to apply such a list in further research using a wider sample of Portuguese Deaf participants, so to determine etymology more accurately in this semantic field. However, and although our informant group was small, some aspects were noticed and are worthy of reflection. These issues pointed in six directions, which can constitute future research hypothesis, to be confirmed through upcoming studies.

1 – Most easily identified signs

The signs which origins were most easily identified (or suggested) by the informants were PAI (father), MÃE (mother), BISAVÔ (grandfather), BISAVÓ (grandmother), MADRINHA (godmother), PADRINHO (godfather), AFILHADO (godson), AFILHADA (goddaughter), MADRASTA (stepmother) and PADRASTO (stepfather). These results might have to do with the fact that all these signs refer to direct family members, people that are close to our informants. Perhaps they end up being signs that are more used in signed conversations and, being often part of dialogues and discussions, their origins become more probable to be talked about and transmitted to others.

2 – Gender similarity

From the 32 signs analyzed, made of 16 gender pairs (e.g. father/mother, son/daughter, etc.), 12 pairs (24 signs) matched in terms of similar justifications given in the group. We only registered differing etymology proposals in the pairs PAI/MÃE (father/mother); and ENTEADO/ENTEADA (stepfather/stepmother). It is interesting to observe that gender matches even happened in the pair PADRASTO (stepfather) (PAI-father+SEGUNDO-second)/MADRASTA (stepmother) (MÃE-mother+SEGUNDO-second). In this case gender is not marked adding the sign FEMININO (feminine) in the beginning but using the sign MÃE (mother) instead.

3 – Knowledge vs inventive ability

This study's participants have probably made use of their inventive abilities in order to explain the signs' origin. Since there is no written record of old LGP signs, we accepted that the justifications provided might come from knowledge transmition from the older to the youngest generations. Nevertheless, we must also consider that the etymology proposals collected can also have been mere explanations given in the moment of questioning, based on the presented sign's visual motivations and the informant's sensibility as an LGP signer and member of the Deaf community.

[18] The complete study on diachrony in the semantic field of family is being published in Pereira, J. Morais, I.; Duarte, L. Morais, A. & Ana Mineiro "Diachronic Variation in Portuguese Sign Language" In: Proceedings of the 1st Symposium in Applied Sign Linguistics, University of Bristol, Centre for Deaf Studies, Bristol: UK.

4 – Teaching the language in study

In group (ii), an interesting connection was observed: LGP teachers gave more sign etymology proposals than the rest of the informants. Teaching the language in study might be a factor for having a deeper knowledge on the language's terms etymology.

5 – Historical factor

People in group (iii) (over 45) were educated under the oralist system and during the period Salazar's dictatorship was in power. At the time, before the Revolution of the Carnations (25th April 1974), divorces were scarce and, therefore, signs which express concepts related to the reality of divorce (*stepfather, stepfather, stepdaughter, stepson, children of the stepfather or stepmother*) are always used recurring to dactylology.

This occurs in contrast with what happens in group (i), where the youngest Deaf participants are. In the Portuguese educational system these students already have available Deaf models (Deaf native LGP signers as their teachers), with whom they create a specific dynamic where their language's past is absorbed and its future is shaped. In this process of language creation and evolution, language terms appear which are already adapted to the social conditions of the present time, such as signs of family ties spurring form divorces. In fact, the most part of these youngsters' parents are divorced.

6 – Co-relation bewteen age group and metalinguistic conscience

The group where more participants provided less than 20 answers with no justification, that is, where they just said they did not know the sign's origin, was group (ii) (4 informants), followed by group (i) (3 informants), and at last group (iii) (1 participant). This seems to indicate that in the sample we studied, children and young adults reveal more knowledge on the sign's origins than elder participants. In a way, this contradicts our initial expectations, since we believed the older the participant the more knowledge he/she would have on etymology. This observation, which is opposite to the research team's expectations, can probably be justified by the fact that nowadays LGP is studied and formally taught, which did not happen in the old days. Thus, a metalinguistic conscience arose from acknowledging and teaching the language.

4.3. Concluding Remarks

This exploratory study led us to congregate a list of etymological proposals for signs in the semantic category of family, to be tested against a wider population of participants in the future. We also came up with a few hypotheses that we intend to explore in a near future, namely the correlation between the age group and sign etymological conscience, as well as the didactic interest of Deaf teachers in etymological findings.

5. Final remarks

In this work, which includes three previously published pilot studies, we intend to account for the fundamentally dynamic features of LGP lexicon. By presenting the effects of polissemy or meaning extension, of the form's specialization into naming specialized concepts, and the history of common use signs in three age groups, we provided the reader with a few pieces of the complex puzzle which lies underneath language lexicon, particularly that of LGP.

We therefore wish to have contributed and continue making contributions in LGP lexicon studies, using the hypothesis raised by these preliminary studies.

Such future studies can come to contribute to a better knowledge on LGP and the creation of tools (e.g. vocabularies, dictionaries, grammars) which will be useful for LGP's development as a teaching, cultural and scientific language.

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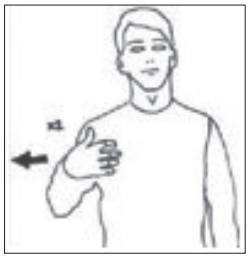
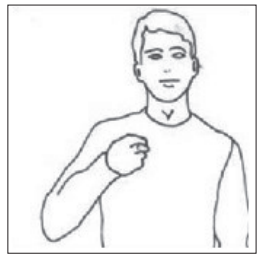
Table 1 – A few polissemic or potentially polissemic signs

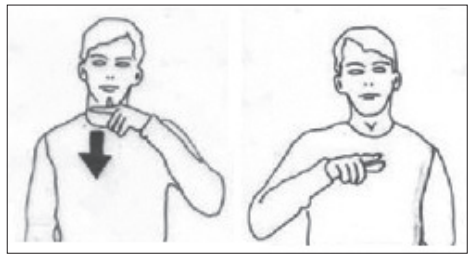


BACALHAU/ SEXTA-FEIRA
(codfish/Friday

BOI/ ARGENTINA
ox/Argentina

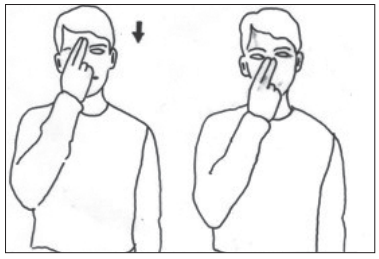


BRISTOL/ PISTOLA
(Bristol/pistol)

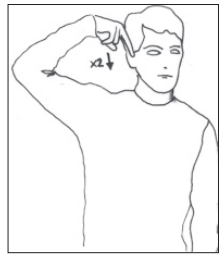


CAFÉ (bebida) / CAFÉ (local)
(coffee-drink/cafe-location)

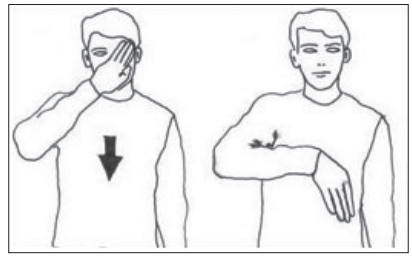
CAVALO/ CARCAVELOS
(horse/Carcavelos)



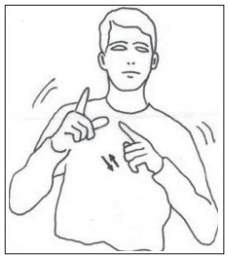
CASTELO/ GUIMARÃES
(castle/Guimarães)



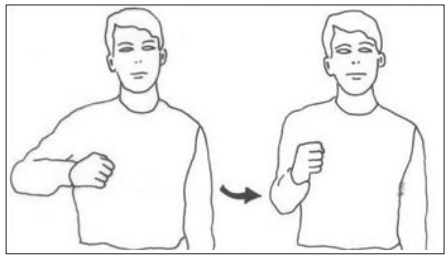
CEREJA/ FUNDÃO
(cherry/Fundão)



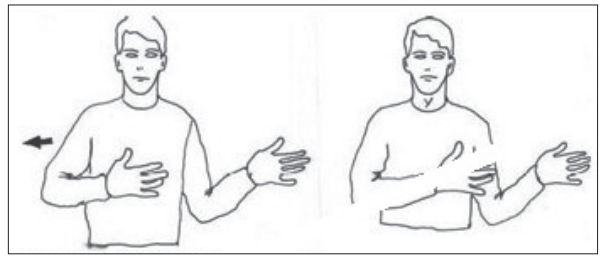
ELEFANTE/JUMBO
(elephant/Jumbo)



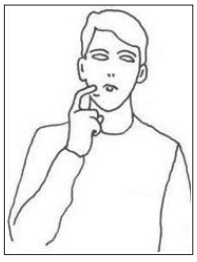
ESTRELA/ AMADORA
(Star / Amadora)



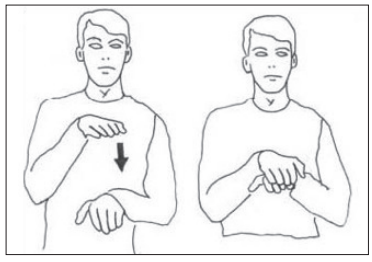
GAITA-DE-FOLES/ ESCÓCIA
(bagpipes/ Scotland)



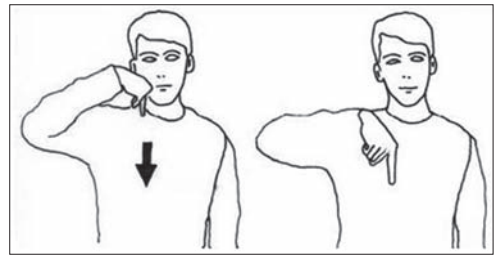
HARPA/IRLANDA
(harp/Ireland)



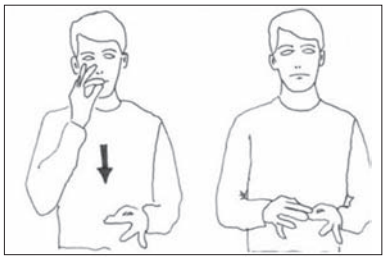
PÁSCOA/ AMÊNDOA
(Easter/almond)



PEIXE/ TERÇA-FEIRA
(fish/Tuesday)



PERÚ (animal)/ PERU (pais)
(turkey-animal/Peru-country)



UVAS/ SETEMBRO/ PALMELA
(grapes/September/Palmela)

Table 2 – Frequency of competing occurences[1]

Signs	Total No. of ocorrences	Production of the same sign	Variation[2]
ALGÉS	7	7	
ITÁLIA (Italy)	8	8	
TERRAMOTO (earthquake)	6	5	1
AMÊNDOA (almond)	9	6	3
PÁSCOA (Easter)	7	6	1
BACALHAU (codfish)	7	7	
SEXTA-FEIRA (Friday)	7	7	
BOI (ox)	9	7	2
ARGENTINA	8	8	
BRASIL (Brazil)	9	6	3
TELENOVELA (soap opera)	7	7	
CAFÉ (coffee-drink)	7	7	
CAFÉ (cafe-location)	7	7	
CAVALO (horse)	8	8	
CARCAVELOS	8	8	
CASTELO (castle)	7	7	
GUIMARÃES	7	7	
CEREJAS (cherry)	9	9	
FUNDÃO	9	9	
ESTRELA (star)	3	2	1
AMADORA	14	8	6
ELEFANTE (elephant)	3	3	
JUMBO	7	7	
GAITA-DE-FOLES (bagpipes)	5	5	
ESCÓCIA (Scotland)	7	7	
HARPA (harp)	4	4	
IRLANDA (Ireland)	9	9	
PEIXE (fish)	10	7	3
TERÇA-FEIRA (Tuesday)	8	8	
PERÚ (turkey-animal)	10	10	
PERÚ (Peru-country)	6	6	
PISTOLA (pistol)	7	7	
BRISTOL	7	7	
UVAS (grapes)	8	8	
SETEMBRO (September)	6	6	
PALMELA	8	6	2

[1] In this column are the signs which presented more occurrences comparing to the column "Variation".
[2] Signs produced with phonological trait variation which does not compromise its meaning.

Table 3 – Most enunciated etymological proposals for signs in the semantic category "Family"

SIGN	COHESION	ETYMOLOCICAL PROPOSAL
PAI (father)	***Medium+***	Association with the sign HOMEM (man) e BIGODE (moustache), both very similar to the sign PAI (father).
MÃE (mother)	***Weak+***	Related to the old of sons and daughters kissing their mother's hands; Protectiveness of the mothers towards their children.
AVÔ (grandfather)	***Weak-***	Dactilology influence: "A", first letter in "avô" (grandfather) and initial handshape of the sign; Association of the idea of "grandfather" with the concept of "old". The location at the chin comes from the location of the sign VELHO (old).
AVÓ (grandmother)	***Weak-***	Dactilology influence: "A", first letter in "avó" (grandfather) and initial handshape of the sign; Association of the idea of "grandmother" with the concept of "old". The location at the chin comes from the location of the sign VELHA (old).
BISAVÔ (greatgrandfather) (AVÔ+SEGUNDO) (grandfather+second)	***Medium****	It is the second grandfather.
BISAVÓ (greatgrandmother) (AVÓ+SEGUNDO) (grandmother+second)	***Medium****	It is the second grandmother.
FILHO (son)	***Weak-***	Association with the sign MÃE (mother) and the concept *mother*: – "possession of the mother"; – "that is after the mother in the genealogic tree" – "that is born from the mother".
FILHA (daughter) (FEMININO+FILHO) (feminine+son)	***Weak-***	Association with the sign MÃE (mother) and the concept *mother*: – "possession of the mother"; – "that is after the mother in the genealogic tree" – "that is born from the mother".
IRMÃO (brother)	***Weak+***	"someone that lives as an equal" to a brother (the sign for *equal* is the same as for *brother* in LGP); Someone who "grows up with you, and is always near you" Someone who has the "same blood as you".
IRMÃ (sister) (FEMININO+IRMÃ) (feminine+sister)	***Weak+***	"someone that lives as an equal" to a brother (the sign for *equal* is the same as for *brother* in LGP); Someone who "grows up with you, and is always near you" Someone who has the "same blood as you".
TIO (uncle)	***Weak****	Dactilology origin: T-I-O.
TIA (aunt) (FEMININO+TIO) (feminine+uncle)	***Weak****	Dactilology origin: T-I-A.
PRIMO (cousin-male)	***Weak-***	Visual triangle that is formed in the genealogic tree and illustrates the relation between two cousins or two families.
PRIMA(cousin-female) (FEMININO+PRIMO) (female+cousin)	***Weak-***	Visual triangle that is formed in the genealogic tree and illustrates the relation between two cousins or two families.
SOBRINHO (nephew)	***Weak****	Old family ties between nephews/nieces and uncles/aunts. The latter were also godfather/godmother to the first. These people were connected not only by a consanguinity issue but also by the ties imposed by a religious ceremony: baptism. Hence, the location and movement of SOBRINHO (nephew) is the same as the location and movement in PADRINHO/MADRINHA/BAPTISMO (godfather/godmother/baptism).

SIGN	COHESION	ETYMOLOCICAL PROPOSAL
SOBRINHA (niece) (FEMININO+SOBRINHO) (feminine+nephew)	***Weak****	Old family ties between nephews/nieces and uncles/aunts. The latter were also godfather/godmother to the first. These people were connected not only by a consanguinity issue but also by the ties imposed by a religious ceremony: baptism. Hence, the location and movement of SOBRINHO (nephew) is the same as the location and movement in PADRINHO/MADRINHA/BAPTISMO (godfather/ godmother/baptism).
PADRINHO (godfather)	***High-***	Association with the movement from baptism – to poor water onto the baptized person's head.
MADRINHA (godmother) (FEMININO+PADRINHO) (feminine+goddfather)	***High-***	Association with the movement from baptism – to poor water onto the baptized person's head.
AFILHADO(godson) (PADRINHO+FILHO) (godfather+son)	***Weak+***	Comes from the signs PADRINHO/BAPTISMO (godfather/baptism), because the godson is a "son" acquired through baptism.
AFILHADA (gaddaughter) (PADRINHO +FEMININO+FILHO) (godfather+feminine+son)	***Weak+***	Comes from the signs PADRINHO/BAPTISMO (godfather/baptism), because the godson is a "son" acquired through baptism.
SOGRO (father-in-law)	***Weak-***	Dactilology "I", comes from the idea of "important in the family" (explination given as a mere supposition, with no certainties).
SOGRA (mother-in-law) (FEMININO+SOGRO) (feminine+father-in-law)	***Weak-***	Dactilology "I", comes from the idea of "important in the family" (explination given as a mere supposition, with no certainties).
GENRO (son-in-law)	***Null***	----------
NORA (daughter-in-law) (FEMININO+GENRO) (feminine+son-in-law)	***Null***	----------
CUNHADO (brother-in-law)	***Weak****	Association to the sign SEGUINTE/AO LADO (next/next to), which is manifested by similarity in handshape to CUNHADO (brother-in-law).
CUNHADA (sister-in-law) (FEMININO+CUNHADO) (feminine+brother-in-law)	***Weak****	Association to the sign SEGUINTE/AO LADO (next/next to), which is manifested by similarity in handshape to CUNHADA (sister-in-law).
PADRASTO (stepfather) (PAI+SEGUNDO) (father+second)	***Medium****	Combinat6ion of the signs PAI+SEGUNDO (father+second), implying several associations: – a second father; – a false father; – a second person who gets married to the mother.
MADRASTA (stepmother) (MÃE+SEGUNDO) (mother+second)	***Medium****	Combination of the signs MÃE+SEGUNDO (mother+second), implying several associations: – a second mother; – a false mother; – a second person who gets married to the father.
ENTEADO (stepson) (FILHO+SEGUNDO) (son+second)	***Weak+***	Combination of the signs FILHO+SEGUNDO (son+second), implying several associations: – a second son; va false son, one who is not the true son.
ENTEADA (stepdaughter) (FEMININO +FILHO+SEGUNDO) (feminine+son+second)	***Weak+***	Combination of the signs FILHO+SEGUNDO (son+second), implying several associations: – a second daughter; – a false daughter, one who is not the true daughter.
NETO (gradson)	***Weak-***	Association to AVÔ e AVÓ (grandfather and grandmother), which are produced with a chin location, for explaining this sign's location at the chin.
NETA (granddaughter) (FEMININO+NETO) (feminine+grandson)	***Weak-***	Association to AVÔ e AVÓ (grandfather and grandmother), which are produced with a chin location, for explaining this sign's location at the chin