rba Revista Brasileira de Alfabetização

ICONICITY AND VISUAL REPRESENTATIONS IN CHILDRENS' NARRATIVE

ICONICIDADE E REPRESENTAÇÕES VISUAIS NA NARRATIVA INFANTIL

Maria Mertzani
Instituto de Educação, Universidade Federal do Rio Grande
maria.d.mertzani@gmail.com

Abstract

The study examines the creation of a childrens' visual book based on the reading of an indigenous text story. In particular, it demonstrates that the ratio of labial versus nasal sounds in a text predicts a difference in its meanings, as it is perceived by its readers, signers and non-signers. Texts that have a relatively high frequency of labial sounds are more likely to express high activation, whereas a relatively high frequency of nasal sounds indicates a low activation. These sounds seem to relate to specific mental representations, which are mapped to particular handshapes across sign languages. Thus, the study suggests that the higher frequency of specific phonemes may connect to certain signed representations, which the design of children's picturebook can take into consideration, since the two-dimensional image can relate to the three-dimensional materialisation of SLs and their constructs.
Keywords: picturebook, visual image, Sign Language, indigenous narrative, iconicity.

Resumo

O estudo examina a criação de um livro visual para crianças com base na leitura de uma lenda indígena em texto escrito. Em particular, demonstra que a proporção de fonemas labiais versus nasais em um texto pressupõe uma diferença em seus significados, conforme é percebida pelos leitores, sinalizadores e não sinalizadores. Os textos que têm uma frequência relativamente alta de fonemas labiais, têm maior probabilidade de expressar alta ativação, enquanto uma frequência relativamente frequente de fonemas nasais indica uma baixa ativação. Esses fonemas estão relacionados a representações mentais específicas, que são mapeadas por formas de mãos específicas nas línguas de sinais. Assim, o estudo sugere que a frequência mais alta de fonemas específicos pode se conectar a certas representações sinalizadas, que o desenho do livro infantil pode levar em consideração, uma vez que a imagem bidimensional pode se relacionar à materialização tridimensional das LSs e suas construções.
Palavras-chave: livro de imagens, imagem visual, Língua de Sinais, narrativa indígena, iconicidade.

Introduction

The recent curriculum publications of the Brasilian Sign Language (Libras) as a first language in the elementary education (PREFEITURA DA CIDADE DE SÃO PAULO, 2019; MERTZANI; TERRA; DUARTE, 2020) pave the way for instructional material that can rely exclusively on the visual, including the sign language (SL) *per se*, thus constricting and/or diminishing the written language in them (e.g., written Portuguese).

This paper presents a case study of the ongoing research project *PESQ 748 - Visual books for the learning of languages* in the Institute of Education, at the Federal University of Rio Grande (FURG), RS-Brazil, which creates wordless picturebooks[1] of Guarani and Kaingang stories to be used by spoken and signed languages. In particular, its focus was on the creation of the *Story of the gold* (MERTZANI; MEDEIROS, 2020). Specifically, it examined: (i) how the sound iconicity of the text can be associated with the creation of a book's imagery; and (ii) how the sound iconicity of the text can be associated to the iconicity of a SL (such as Libras), by mainly using the book's created imagery. To present, there is no research that focuses on how graphic image elements (people, places, things, etc.) may relate to countable linguistic features (spoken and signed) and textual meaning, therefore the study aimed at fulfilling this gap. In particular, it seeks to open the discussion whether specific sound structures of a written text may predict how they will be perceived in a SL (morpho-phonologically) and in a visual book. In doing so, the study suggests the use of iconicity across language modality for the creation of visual materials.

The existence of a non-arbitrary (hence, iconic) link between form and meaning is well-attested (for an overview: LOCKWOOD et al., 2016). Thus, the classical arbitrary view of the sign (e.g., the relation between the sound and meaning of lexical items is arbitrary) is at odds with growing research in spoken and SLs (to mention a few: PERNISS et al., 2010; AURACHER et al., 2011; D'ONOFRIO, 2014; VINSON et al., 2015). Such iconic relationships are prevalent mainly in indigenous languages (cf. HINTOL et al., 1994), and in SLs where the visual-manual modality provides many opportunities for non-arbitrary sign-referent mappings (cf. TAUB, 2001). In fact, iconicity is subtle, exists throughout the conventional lexicon, people do not consciously detect it, and may vary across different conceptual categories of words (cf. IMAI; KITA, 2016). The study examines this phenomenon in narrative texts, taking also into consideration the fact that iconicity affects online processing of language such as word learning (CROFT, 1978; VINSON et al., 2015; IMAI; KITA, 2016; LOCKWOOD; et al., 2016).

Picturebooks and SL narrative

In wordless picturebooks the image is the "means for setting up an affective relationship between child and book" (PAINTER; MARTIN; UNSWORTH, 2012, p. 15). In the case of deaf children, this relationship is even deeper considering the visual-kinesthetic nature of SL and the fact that their learning occurs through the visual communication channel.

As a visual literacy genre, the picturebook requests the deaf child to develop certain linguistic devices[2]to describe its events from different perspectives. In fact, the perspective is an important characteristic of its design that can have versatile forms (e.g., an eye level perspective; an aerial perspective) for the depiction of events from several angles at the same time and even in one single picture (OITTINEN; KETOLA; GARAVINI, 2018, p. 63). These different perspective forms also mean that there are many ways of positioning the deaf child (as a reader) to view the target content from particular angles.

1 The terms *picturebook* and *visual book* are used interchangeably throughout this paper.

2 Such as, the use of nominal, temporal and spatial reference; the use of viewpoint including constructed action, dialogue and the narrator's perspective; the use of prosody; the use of grammatical elements including classifier constructions; and the use of signing space.

As picturebooks are flat as drawn, their images must be legible by the deaf child who uses a three-dimensional (3D) language. Their image design should boost his/her ability to search the info (by what he/she sees) and to identify and replicate the image content in his/her signing. Overall, they must teach the child the skill to communicate the point-of-view, "the way in which something is viewed" (EASTMAN; NORETSKY; CENSOPLANO, 1989, p. 30). For instance, a linear sketching perspective (e.g., the parallel lines of railroad tracks that join at a single vanishing point at the horizon) requires a 3D representation by using depth in SLs, such as the depth and width morphemes (cf. VALI; LUCAS, 2005, p. 82). In a size drawing perspective, as the objects get farther away, they decrease in size, therefore the deaf child will need to sign for instance, whole entity morphemes using certain classifier constructions (see below). As Table 1 displays, deaf children develop such SL narrative abilities by age.

In SL narratives, signers make a varying use of the signing space. Firstly, they establish a location-reference for the target character in the signing space, and construct subsequent actions and discourse by using a shifted first person perspective (RATHMANN; MANN; MORGAN, 2007, p. 189). In this way, they assign entities (characters and objects) to locations in the signing space and refer back to them by directing signs or eye gaze towards these locations, or by turning the upper body or head towards them. Thus, signers do not only employ constructed dialogue by reproducing signed utterances of the characters, but also they express the characters' actions and emotional states directly. They systematically assume the role of them and reproduce them, using the upper part of their body and non-manual signing (BECKER, 2009, p. 119).

Table 1: *Deaf children's development of SL narrative structures*

Age of deaf child	Narrative structure	Sign Language	Research
3 years old	Use of reference is unclear. The deaf child is unable to use sign space to clarify characters or actions. Characters are often introduced into the story without clear indication of who they are. Areas of sign space are not divided up for different characters appropriately leading to interlocutor misunderstandings.	British Sign Language	Morgan (2002) Morgan & Woll (2003)
4 years old	With respect to global story structure, the deaf child is at the same stage as a 2-year-old hearing child.	Canadian Sign Language	Vercaingne-Ménard et al. (2001)
4-6 years old	Classifiers begin to be used within sentences, but not referentially within sign space across sentences. The deaf child uses the same location for many different referents. There is a lack of clarity when changing character through reference shift. The deaf child may focus on one character only when there are several in the story. The deaf child has difficulty introducing sub-plot complications, with their own time frames, into the overarching plot.	British Sign Language	Morgan (2002) Morgan & Woll (2003)
6 years old	The deaf child has already caught up with his/her hearing peers.	Canadian Sign Language	Vercaingne-Ménard et al. (2001)

7 years old	With respect to affective marking of narratives, deaf children produce stories that are structurally more coherent. However, the stories are effectively quite at and limited to the local level of the narrative. Deaf children do not generalize their earlier acquired proficiency with emotional facial behaviour to the appropriate linguistic context.	American Sign Language	Reilly (2001)
7-10 years old	The deaf child improves ability to mark reference in stories, but he/she still shows difficulties maintaining this reference across long stretches of discourse. In events where more than one character is involved, the deaf child still describes different characters' actions sequentially rather than switching between overlapped events.	British Sign Language	Morgan (2002) Morgan & Woll (2003)
10-11 years old	Deaf children integrate emotion into their stories both manually and non-manually. Their evaluations, like those of deaf adults, additionally function at a global level, serving to structurally emphasize sections in the story.	American Sign Language	Reilly (2001)
10-12 years old	Deaf children (native signers) consistently mark reference to the characters of the narrative. They do not fully reach the adult's competence and prefer the same strategies to control reference. They apply these strategies without additional validation. Deaf children (non-native signers) predominantly use lexical identification to refer to characters. They make use of constructed action, spatial forms, and proforms, but they often fail in establishing clear reference by making appropriate use of the signing space. They have problems with continuing reference. They show reduced dramatic impression of narratives. They are less proficient in using the signing space overall.	German Sign Language	Becker (2009)
11-13 years old	Full mastery of narrative devices	British Sign Language	Morgan (2002) Morgan & Woll (2003)
11-14 years old	Deaf children (non-native signers) require a considerable amount of support in the conversational stories on personal experiences.	German Sign Language	Becker (2009)

SLs appear to have two systems of signer's perspective (cf. ENGBERG-PEDERSEN, 2010; VALLI; LUCAS, 2000). The first system corresponds to the reporting viewpoint (the *observer perspective*), when the narrator-signer stands outside the events and comments on them, and represents the general location of objects and events. The second system corresponds to the experience viewpoint (the *character perspective*), making specific reference to the signer perspective. Both systems have three basic levels, the low, middle and high, which are determined by the relative vision perspective of the signer (VALLI; LUCAS, 2000, p. 92).

In either systems, SL narratives use the classifier constructions to portray spatial relations between people, animals, or objects; the direction of motion; or the manner of movement of entities in a particular event (cf. MEIR; SANDLER, 2008; VALLI, 2005). Classifiers are morphemes that classify nouns into groups according to some shared characteristic, such as the physical properties of the object (e.g., size and shape). Specifically, their handshapes may represent objects with shapes (e.g., cylindrical, flat) but not specific objects (e.g., a cup, a piece of paper). In addition, they represent the shape of the hand as it holds the object that the noun stands for; or they may be related to the semantics of the noun, for instance, whether it is a human, an animal, a vehicle, and so on. Moreover, the movement in a classifier construction usually represents real-life motion and manner of motion (MEIR; SANDLER, 2008).

In classifier constructions, there is a schematized visual correspondence between selected parameters of the referent and the signed representation. Hence, a one-to-one mapping of every point of a referent to every point of the signed representation is only one form of visual analogy or visual representation. Thus, the aim of their signing is not a realistic depiction but a pictorial realism, as it happens in drawing (COGILL-KOEZ, 2000a; 2000b) and, by extension, in picturebooks.

The study

This study considered previous research in sound iconicity, which provides strong evidence for a connection of:

(i) plosive sounds (p, t, b, and d) with positive feelings and an active state; and of nasal sounds (n, m) with negative feelings and passivity (AURARCHER et al., 2011);

(ii) the consonant /k/ with meanings of closure, containers, crevasses (MAGNUS, 2001), and with angular/jagged shapes (SPECTOR; MAURER, 2013; NIELSEN; RENDALL, 2011; NOBILE, 2015);

(iii) the vowels /o/, /u/ with largeness and ellipses, and the vowels /i/, /e/ with smallness and triangles (HU, 2010; NIELSEN; RENDALL, 2011; O'BOYLE; TART, 1980);

(iv) the vowel /u/ with roundness (KATZ, 1986; NOBILE, 2015); and

(v) the vowel /a/ with dodecagons and white stimuli (PARISE; PAVANI, 2011).

Hence, the aim was to analyse whether the relative occurrence of such sound categories (e.g., plosive vs. nasal phonemes) can help to detect specific meanings (e.g., /i/: small vs. /o/: largeness) in the given narrative text, the participants' words (written and signed), and in the image design. Furthermore, it sought to map such sound - meaning relationships to certain manual-kinesthetic SL features (e.g., handshapes, movement).

Research design

The study followed a mixed-methods research approach (CRESWELL; CLARK, 2018), combining quantitative and qualitative methods in two phases. The first phase examined how the sound structures of a narrative text creates imagery in eight hearing participants, postgraduate students in the Institute of Education-FURG, who had no previous SL knowledge. In doing so, the study chose randomly the Guarani story of Curupira by Donato (2010, p. 134-140). In individual semi-structured interviews (Appendix A), participants were asked to provide ten key-words that summarised the meaning of the story, which were then had to represent in pantomime[3] and to

3 The term is used as in Nispen et al. (2017, p. 2). Thus, pantomime differs from gesticulation (i.e., gestures that spontaneously accompany speech); has a discrete form and can be concatenated into meaningful strings; and is more like signs, which when used for a longer period of time within a certain community, they can evolve toward signs in a SL.

associate with a geometrical shape. Thus, the study hypothesised that the participants would produce similar phonemes (spoken and signed; for example, closed vs. open phonemes) under certain semantic domains following research (i) to (v). Participants' pantomime was compared to the corresponding signing of each key-word, using the online database Spread The Sign (2018) that involves more than 28 international SLs. In the second phase, participants' pantomime was also compared to the signing of two Libras interpreters in FURG (see below). Moreover, the study required a geometrical shape for each given word, since SLs represent visually the shapes of their referents through classifier constructions, and sound iconicity research (i) to (v) associates phonemes to shapes.

The second phase accompanied the actual production of the visual book and followed the same methodology as in phase I, although it did not involve the pantomime. It focused on how the sound structures of the "Gold story" were associated with the graphic and signed imagery of the text. Thus, the participants of this phase were the project team itself, involving the author (as the principal investigator), four volunteer illustrators, graduate students in the Departments of Language and Arts and Oceanography in FURG; and two members of the Indigenous Collective FURG, Kaingang and Guarani. The team read the narrative text, and developed thirteen illustrations (according to its meaning) (Appendix E) and a key-word glossary that referred to the content of each image. Two Libras interpreters in the Language and Arts Department of FURG volunteered to sign in Libras each image. It was hypothesised that the produced words and signing would share common phonological symbolism under specific meanings following (i) to (v); and that SL iconicity would be mapped to the image design due to shared visual representations.

All participants gave their consent to participate anonymously.

Data analysis

Data are reported quantitatively (e.g., using descriptive and referential statistics) and qualitatively, with a focus on the consonantal words. Specifically, it examined the statistically more-than-chance appearance of the phonemes (e.g., the plosive:nasal ratio) in the narrative text and the participants' produced words.

The signed version of the narrative was analysed following a *philology* approach, which scrutinizes the recreated text by examining how the visuals carry the narrative and their logical relations (e.g., time, cause), and the language *per se* (grammar, syntax, etc.) (cf. MERTZANI, 2020). The signing of each image was examined as a series of static visual images with similarities to painting (SUTTON-SPENCE, 2017, p. 362). Where the visual iconicity is discussed, the analogue-building model by Taub (2001) is adopted, according to which the creation of an icon item is based on three cognitive stages; (i) on the selection of a sensory image to stand for the entire denoted concept; (ii) on the schematization of this prototype image (so that it is representable by SLs); and (iii) on the encoding of the schematic image into specific linguistic forms. Thus, "when modifying the image or "translating" it into linguistic form, one makes sure that the new image preserves the relevant physical structure of the previous stage" (TAUB, 2001, p. 44).

The analysis of the illustrations followed the *visual grammar* by Painter et al. (2012), and Kress and Van Leeuwen (2006).

Results

Word analyses of both stories demonstrated a significantly different use of the consonantal words (Table 2). Hence, the first story appeared to use more frequently the labial and alveolar consonants, whereas the second story the alveolar and velar ones.

Table 2: The consonantal words in the two stories

	Labial	Alveolar	Velar	Nasal	Lateral	Total
Story 1	130 (31%)	114 (27%)	91 (22%)	57 (14%)	27 (6%)	**419**
Story 2	48 (16%)	80 (27%)	95 (32%)	55 (19%)	19 (6%)	**297**

$X^2_{(4, 716)}$ = 25.19007; p-value < 0.000046. The result is significant at p <.05.

Further analyses (see below) demonstrated that this difference was related to the meanings expressed in each story. Hence, the first story appeared more active than the second one, since it expressed meanings of intention, physical activity and goodness, whereas the second one focused on meanings of nature (e.g., water, forest) (see Appendix C).

Results from phase I

The Curupira story consisted of 541 words[4] (419 consonantal; 101 vowel words) of which the labial ones occupied the first position (Table 3). Semantically, they mainly denoted activity (physical, mental, physiological), life and living beings (father, woman, children, animals, etc.), anything relating to limbs and edges (hand, legs, footprints, stick, etc.), and pointed referents (arrow, nailed, penetrated) (Table 4). In addition, the labial words with the vowel /a/ (in their initial syllables) found to differ statistically significantly ($X^2_{(3, 119)}$ = 33.18; p < .05) from those with the vowels /e/ and /i/, which clearly expressed referents of thin, straight, elongated and pointed form.

Table 3: Consonant word frequency in the Curupira story

Consonants	Back vowels	Central vowel	Front vowels	TOTAL
Labial	45	26	59	**130**
Dental-Alveolar	27	19	68	**114**
Velar	52	31	8	**91**
Nasal	20	23	14	**57**
Lateral	10	4	13	**27**
TOTAL	**154**	**103**	**162**	**419**

$X^2_{(8, 419)}$ = 69.022; p-value < 0.00001. The result is significant at p < .05.

After reading the text, participants provided 60 key words (Appendix B), of which 46 existed in the story and 14 were invented. A qualitative analysis demonstrated that the participants produced those words that appeared frequently in the story, and/or had frequent synonyms (Appendix C).

4 The words were recorded based on their noun and infinitive forms following Taft (1979).

For example, the words referring to "mother" appeared twenty three times (e.g., the Guarani word "ci"[5]), including the ten appearances of the word "mãe" (mother). Additionally, the word "Tupana" (as the father of all) appeared twenty times, a frequency that justifies the participants' word "father" as synonymous to it. Overall, the labial words (e.g., para [direction/intention]; posso [can]; fazer [to do/to make]; passar (to go/pass); proteger (to protect); bem [good, well]) referred to direction, physical activity, and to goodness. In the words "filho, bicho, flecha, pes" and the labio-nasal "menino", the vowels /i/ and /e/ denote smallness and linearity/angularity, a result that corroborates previous research (see above).

Table 4: Labial word meanings in the Curupira story

MEANINGS	TEXT WORDS	vowel /a/	vowels /e/, /i/	TOTAL
Activity, motion (with hands, feet, mental and mouth physiological activity): to go, to walk, to make/do; practice; to drink, to think, to see, to perceive; direction/intention, scope	bater; beber; brincar; fazer; passar; para; penetrar; pensar; perceber; praticar; vão; veem	56	19	75
Life, living beings, to be present, to live	bicho; família; fêmea; filho; peixe; vida	4	20	24
Limbs, edges; arrow; nailed, penetrated	beira; braços; flecha; pegadas; pés; plantas; pregadas; ventre; verdes	5	15	20
Firmness, to stay/remain, strong	firmeza; ficar; vigoroso		5	5
Witchcraft, to loose, to need, preso	feitiçaria; precisar; preso		5	5
First, front, near, breast	peitos; perto; primeiro		4	4
Fast, wind	veloz; vento		4	4
Goodness, easiness	bem; fáçil	1	2	3
Plurality, various	bastante; vários	2		2
Small	pequeno		1	1
Ugly	feio		1	1
Mud	barreiro	1		1
TOTAL*		**69**	**76**	**145**

The nasal words expressed negativity (e.g., não, mas, mal) as it was expected and the nature/place to be (e.g., mato, mundo, na); and the velar/glottal words expressed persons (e.g., caçadores, guarani, curupira, homem).

Concerning the attributed shapes to each word (Appendix D), participants clearly regarded the "world" (mundo), "creation" (criação), and "sun" (sol) as round, as they assigned them the circle, a choice that was justified in the interviews on the natural round/round-like shapes of the sun and earth. Words relating to human beings (hunters, Curupira, father, foot, etc.) were perceived linear and/or square, and the word "forest", triangular or square, due to the cone form of the trees, or due to the perceived density of the trees/foliage (when one looks at the forest from a distance).

5 The word is pronounced /si/ and is also written çy, *chi* e *sy*.

Only the word “mother” did not generate homogeneous responses, as each participant related it to three different shapes: the circle, triangle, and square. This variety occurred because the participants related “mother” to other words, which then motivated their geometrical choice. For example, participant 1 related the word to his mother’s plumpness and shortness[6] which were considered square; and participant 8 associated it with the word “heart” which was perceived as triangular.

Figure 1: Participants pantomiming “persons”

Figure 2: Participants’ pantomime for “mother”

6 Participant 1 characterized his mother as short and chubby.

It was also shown that words referring to people and/or a deity (e.g., homem [man], pai [father], filho [son], criador [creator]) were pantomimed using the B-handshape (Figure 1), which in SLs very often represents entities and objects (e.g., humans, animals, vehicles) (VALLI; LUCAS, 2000). For example, the human figure was performed as the "agent" sign of certain SLs that outlines the human body, and/or with the B-Handshape only. Conceptualising as anthropomorphic the creator, also explained the choice of the specific handshape for this word. Interestingly, participants perceived as rectangular forms the aforementioned words, hence their pantomime agreed with their geometric choice and the signing of the words. Moreover, word phonology (labial and velar/glottal consonants with open vowels) appears to match the openness of these handshapes.

Concerning the pantomime of "mother" (Figure 2), participants 8 and 4 imitated the holding of a baby, and participant 1 produced a pantomime with a bent gesture on his cheek. None of the given pantomimes corresponded to the sign MOTHER of the SLs in the Spread The Sign. In fact, the majority of SLs express this sign with open handshapes (e.g., 14 SLs use the B-handshape) rather than with closed ones (e.g., 10 SLs use the index handshape). However, the "baby" pantomime corresponded strongly to the sign BABY.

Figure 3: Participants' pantomime for the word "hunter"

Figure 4: Participants' pantomime for the word "foot"

In the pantomime of the velar word “caçadores” (hunters), the participants produced handling gestures, using semi-closed/closed hand configurations and linear movement (Figure 3). Thus, they conceptualised the hunter as the person who holds an arm (e.g., an arrow, a gun) or acts against another person (e.g., punching with closed fist). For the pantomime of the word “foot”, the participants preferred the V-handshape, which in SLs is a classifier representing a man walking (Figure 4). Only one participant produced the B-handshape, which, almost universally, SLs use for signing FOOT (Figure 5). These two pantomimes demonstrate some phonological agreement. For instance, the CL-V carries partial openness as it denotes the legs of a person moving (as linear referents). Thus, this handshape corresponds to words (e.g., pé [foot]) that connote linearity through the vowels /i/ and /e/.

Figure 5: Examples of signing “foot”

Regarding the word “forest” (e.g., mato/mata, floresta, selva), participants produced similar pantomime, which, in turn, converged and/or approximated its signing (Figures 6 and 7). In particular, its phonology (as closed consonant words with open vowels) was partially mapped to the open 5-Handshape of the participants’ pantomime and the SLs of the Spread The Sign. It is worth noting that the majority of SLs express the “forest” through the use of the sign TREE in plural, which also appeared in the pantomime as participants used both hands to denote “many trees”.

Figure 6: Participants’ pantomime for the word “forest”

Figure 7: Examples of signing FOREST

Overall, this phase demonstrated that the participants produced certain imagery (pantomime and shapes), which mapped to the ratio of specific sound categories in the text, under certain meanings (e.g., the labial consonants for action; the /i/ and /e/ vowels for linearity). The second phase wanted to investigate such mapping further, by examining the sound categories of a text in association with the image design and its signed representation.

Results from phase II

The Gold story was given in writing, in Portuguese, totaling 408 words, of which 257 were consonantal words. Of these, velar/glottal words dominated the text, combined with central-to-back vowels (Table 5), mainly denoting the "other" (e.g., other than self, an animal, a thing), its state (e.g., a start, an end, an on-going process); trees and branches, and container (Table 6).

Table 5: The word frequency of the Gold story

Consonants	Back vowels	Central vowel	Front vowels	TOTAL
Dental-Alveolar	24	14	42	**80**
Velar	37	33	25	**95**
Labial	11	17	20	**48**
Nasal	18	13	24	**55**
Lateral	2	1	16	**19**
TOTAL	**92**	**78**	**127**	**297**

$X^2_{(8, 297)} = 30.8423$; $p = .00015$. The result is significant at $p < .05$.

Table 6: Meanings of the velar words in the Gold story

MEANINGS	TEXT WORDS	vowel /a/	vowel /e/	vowel /o/, /u/	TOTAL
The other, the state of other	coisa, condição, com, cobra, convidou, começou, continuou, conclusão			17	**17**
Container	caixa	13			**13**
Tree, branch	kafág, galho	10			**10**
Reference	que, quem		10		**10**
Quantity				04	**04**
Water				03	**03**
Time				02	**02**
Largeness	grande	02			**02**
Possession	hà, conseguir	01		01	**02**
Hunting	caça	01			**01**
TOTAL		**27**	**10**	**27**	**64**

Further analysis of the scenes (as they were registered in the projects' meeting proceedings) demonstrated that the "active" scenes differed significantly from the "passive" ones (Table 7). The active scenes were formed by labial and lateral consonants, a finding that confirms the results in phase I; and the passive scenes by the nasal consonants, a result that corroborates previous research. The team also assigned a key word for each scene and constructed a glossary of 14 words in Portuguese, Kaingang and English (Figure 8). Five of the most frequent words appear in the glossary (Appendix C), whereas two words were replaced by their synonyms (assustador = medo [fear]; Rẽgá - Kafág = meninos [boys]). Thus, as in phase I, the keywords were selected following their frequency in the text.

Table 7:Consonants and scenes in the Gold story

Scene Type	Dental-Alveolar	Labial	Lateral	Velar	Nasal	Total
Passive	15	11	17	15	26	**84**
Active	15	37	23	15	24	**114**
Total	**30**	**48**	**40**	**30**	**50**	**198**

$X^2_{(4, 198)} = 10.765$; p-value < .029336. The result is significant at p < .05.

Figure 8: The Gold story glossary

KAINGANG	PORTUGUESE	ENGLISH
ka	árvore	tree
Kafág	pinheiro	pine
kãgka	vento	wind
gīr **ag**	meninos	boys
goj	água	water
goj **óré**	banhado	pond
goj **né**	caixa	tank
jamã	aldeia/terra	land
jēsī	pássaros	birds
jãnkamu	ouro	gold
Pósī	pedrinha	pebble
pỹn	cobra	snake
nãn	mato/mata	forest
mumeg	medo	fear

Kaingang
Velar: 5
Alveolar: 3
Labial: 2
Nasal: 3
Vowel words: 1

Portuguese
Labial: 5
Nasal: 3
Velar: 2
Vowel words: 4

English
Labial: 7
Velar/glottal: 3
Dental-alveolar: 3
Lateral: 1

As aforementioned, this story differed significantly from the first one (see Table 2), since its meanings referred greatly to nature through the velar and nasal words. In fact, such meanings seem to be denoted through the use of middle-to-back phonemes across the three languages, especially through the central vowel /a/. In this phase, the study wanted to explore whether such sound structures map to specific visual representations, which might have governed the design of the thirteen images. Therefore, the study compared the signing of the keywords using the Spread The Sign, and the two signed versions of the story that were, overall, visually analogical to the content of the images.

Two of these analogies concerned the words “forest” and “tree”, since this story (as the first one) is taking place in a forest, the natural environment of many indigenous villages in Brazil. Therefore, this examination concerned the way the specific signs are used in the signed narrative, in relation to the images of the book (see below). Also, this second story repeated the use of the CL-V for the representation of the word “boys” (meninos), which, as a labio-nasal word, is classified under the semantic domain “life and living beings” that is expressed by the vowels /e/ and /i/.

The reader is introduced to the forest in scene 03, in which the two boys are represented to walk (Figure 9). One of the interpreters preferred the structure in which the trees are established as the locus where the action takes place, using the left hand as a reference, and the CL-V as the verb; that is, FOREST TWO-OF-THEM (left hand)TREE (right hand)TO-WALK (“the two boys walk in the forest”). The second interpreter produced a one-to-one correspondence of the boys’ movement in the forest, using the CL-V with both hands, so as to imitate the two persons’ walking action; that is, FOREST TWO BOYS (both hands) CL-V TO-WALK. Thus, the specific image generated two separate structures in Libras, making use of the target words-signs (forest, boys). The first though, by holding the sign TREE as a referent-locus, functions in a similar fashion to the green background of the forest in the image as it “embraces” the CL-V. Hence, the trajectory of the CL-V is a spatial analogue of the movement of the human legs, which, in phase I, was met in the pantomime “foot”.

Figure 9: The two uses of the CL-V TO-WALK in the story

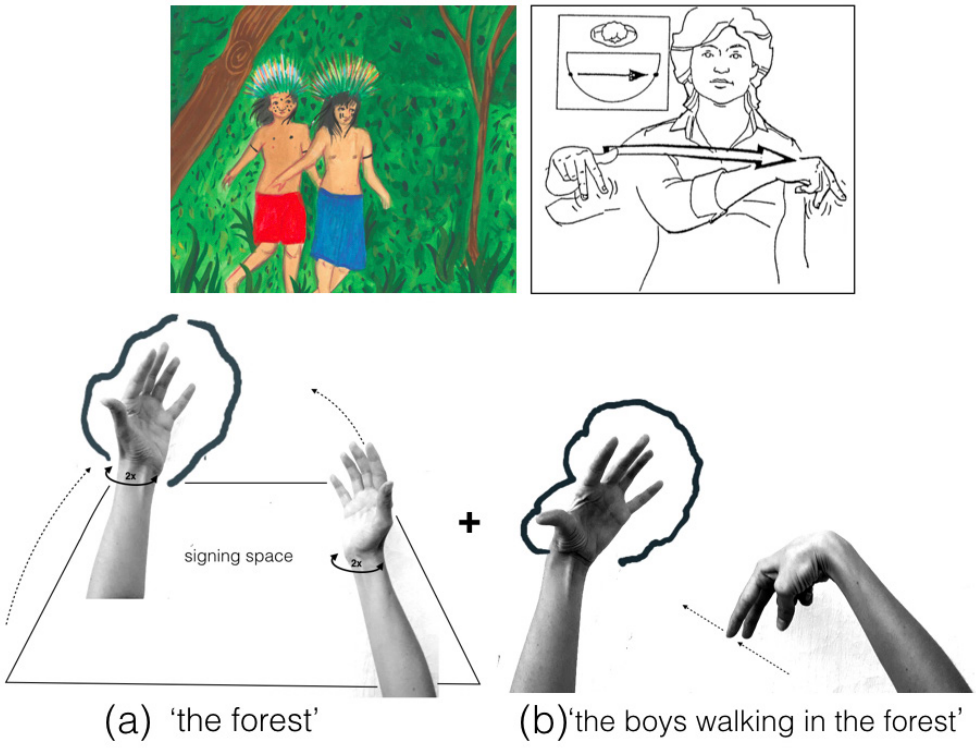
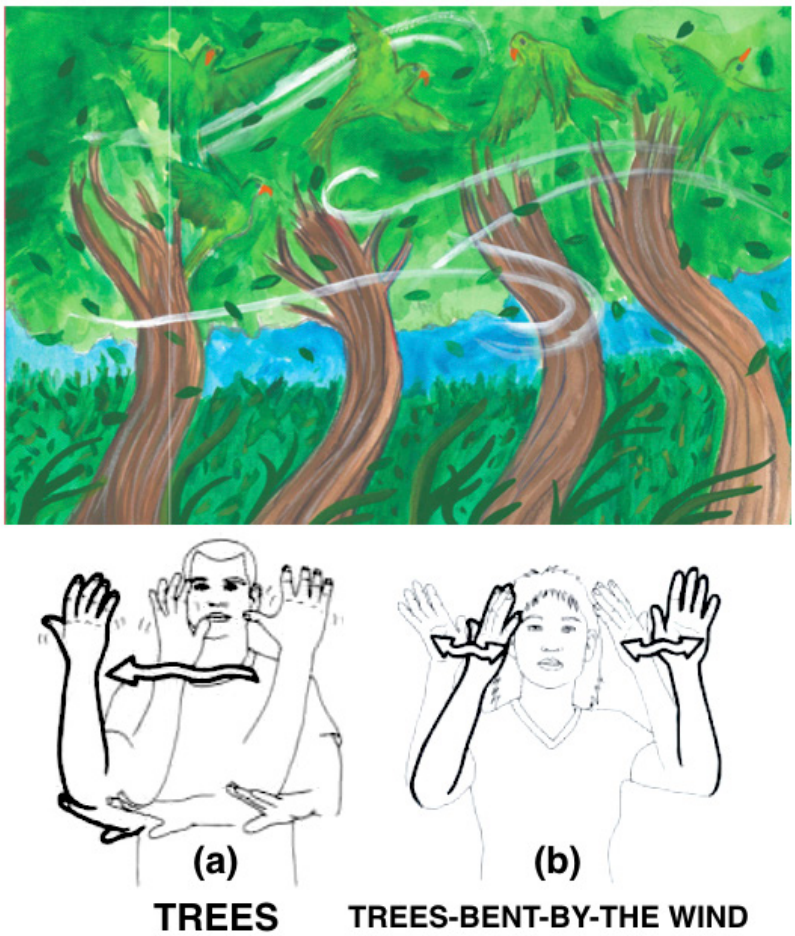
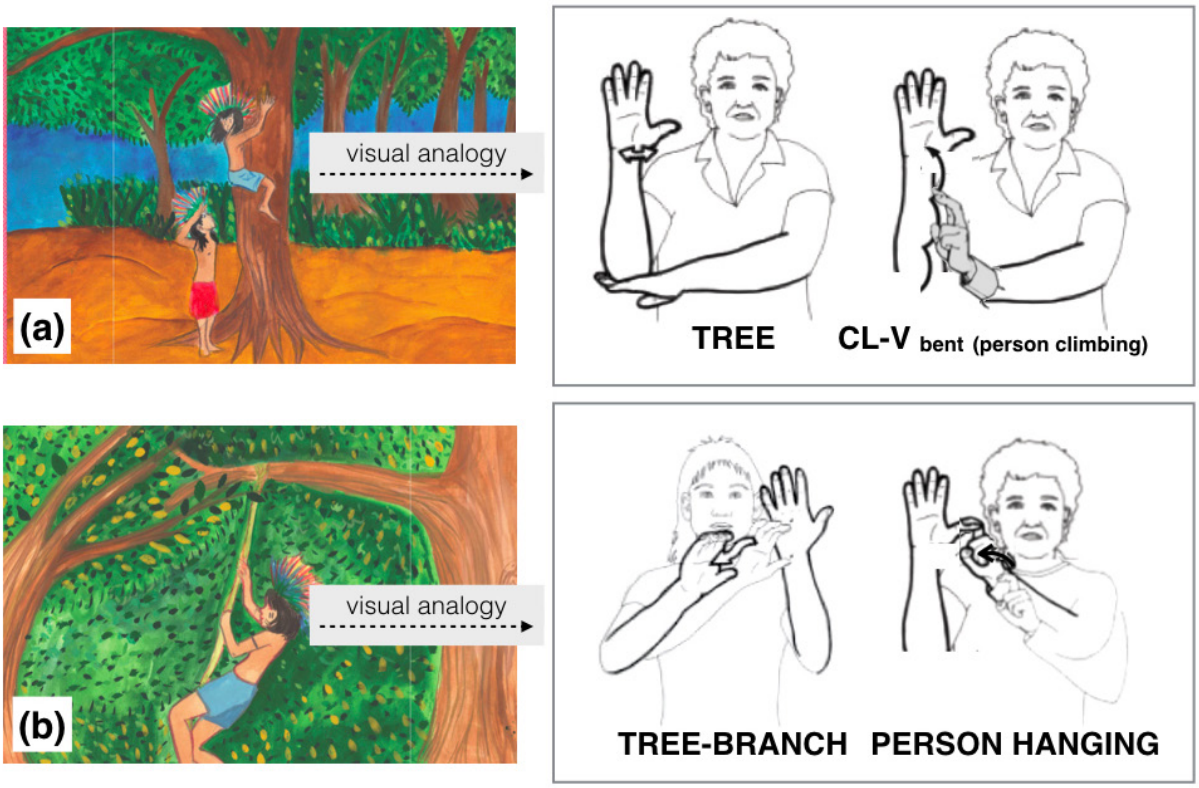


Figure 10: Signing forest with wind



In scene 04, the reader is engaged in a motion perspective, where white wavy forms contrast the green colour of the trees to represent the blowing of the wind (Figure 10). Thus, the tree trunks are illustrated with bent forms, and the birds are drawn flying in a scattered manner. For this scene, the interpreters provided two sentence structures as well. In the first, interpreter 01 produced the sign FOREST (as a topic in the sentence), which she repeated to imitate the bending of the trees (Figure 10a). In between, she produced the sign WIND. Interestingly, this repetition of the TREE structure is also met in the Kaingang word "wind" (kãgka), which is composed by the reduplication of the word "tree" (ka). Interpreter 02 used the sign FOREST with both hands, maintaining the open 5-handshape to present the bending of the trees (Figure 10b). In this second version, she made use of the movement epenthesis (VALLI; LUCAS, 2000, p. 42), while the hands were transiting from the sign TREE-BEND-BY-THE-WIND to become the sign BIRD (the wings of the bird). Thus, there was a smooth transition from the 5-Handshape of the TREE to the B-Handshape of the BIRD. In this latter structure, the interpreter used the body shift three times (from left to right and vice versa) to perform the flying of the birds. Both iconic structures, meant to replicate analogically the content of the specific image, therefore the participants imitated real-world motion and referents.

Figure 11: Classifier constructions produced in two tree scenes



In scenes 07 and 08 the tree is a main structural element. Specifically, in scene 07, one of the boys climbs a tree in an attempt to reach the water tank; and in scene 08, the same boy is hanging from a rope from the tree. In scene 08, interpreter 01 signed TREE-CL-C:BRANCH and then the CL-X to denote the boy hanging from the rope (literally, it is the rope that is hanging) on the tree's branch (Figure 11b). Thus, this sentence structure involves two phonological correspondences. Firstly, it involves the openness of the 5-Handshape of the tree with the openness of the vowel /a/ in the target words (e.g., ka, galho, arvore). Secondly, the closedness of the CL-C:BRANCH corresponds to the closedness of the velar consonant /g/ of the word "galho".

For both scenes the interpreters used the experience viewpoint, as both images employed an aerial perspective, which, in turn, called for the use of the signer's perspective, signing low and/or high. For example, for the scene where the boy climbed the tree, the interpreters signed at the waist level, establishing that the signer (as one of the boys) is looking down from the tree, thus simulating the character's gaze from high-up (from the tree) to the boy under the tree. One of the interpreters produced the following structure: (left hand) TREE (right hand) CL-V$_{\text{(bent; representing the boy climbing up the tree)}}$ TO-CLIMB$_{\text{(to climb a tree)}}$ Role-shift: gaze down (Figure 11a). The same perspective and structure was used in scene 09, in which the boy looks down from the tree to the water tank. Specifically, in this sentence of scene 08, both interpreters signed the verb LOOK-AT at the low level, and the verb TO-HOLD$_{\text{(to hold a rope)}}$ at the high level. They also made use of the role-shift, as they had to present the boy who looks up to the tree, without replicating the character's gesture in the image.

Figure 12: CL-V for the representation of the SNAKE.

Figure 13: The sign LAND in SLs

The CL-V appears bent in the scenes 10 and 11, in which the snake rises and chases the boys. In particular, in scene 11, the two boys are presented smaller than the snake, running front on to the reader's sight so as to escape from it, which is depicted as a gigantic one in the background. Both interpreters produced the sign SNAKE first (as the topic of the sentence), using the CL-$V_{(bent)}$ to imitate its real-world slithering movement and its hostile rising towards the boys. The SL comparison demonstrated an almost universal use across SLs for the representation of a snake's head, or better, its forked tongue (Figure 12). Interestingly, the closedness of the specific classifier corresponds to the closed phonemes of the word "snake" in Kaingang and Portuguese (see Figure 8). In their signing, both interpreters located the SNAKE in the high perspective of the signer to indicate the size of it. Their head then, in a role-shift perspective, was turned to the right, imitating a face-to-face contact with the snake, hence replicating visually the body posture of both characters in the image.

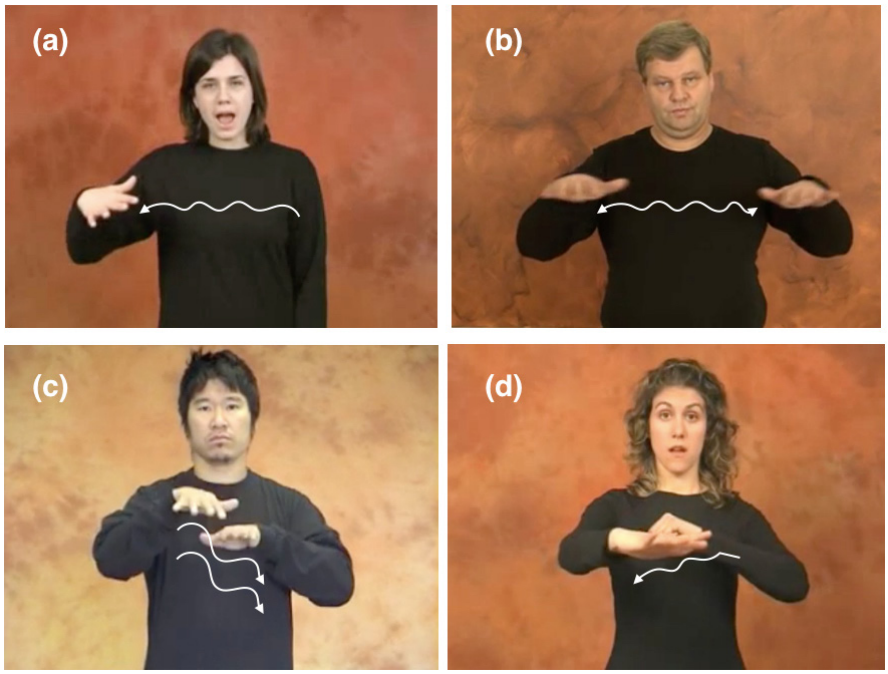
Regarding the word "land", its phonological openness (due to the vowel /a/) seems to correspond to the open handshapes (the 5-Handshape and the B-Handshape) of the sign LAND across the SLs under comparison (Figure 13). However, the specific sign did not appear in the signed story for the following reason. To represent the Portuguese word "aldeia/terra" in the images, the illustrators draw two houses in the two first scenes as reminders of a contemporary Kaingang village. Thus, following the content of these two images, both interpreters produced the sign HOUSE in the following sentence: $HOUSE_{(village)}$+++ INDIGENOUS TWO $CHILD_{(masculine\ agent)}$++ $TO\text{-}SIT_{(both\ hands)}$. This structure was produced only once, for the first scene, functioning thus as an introductory location at the beginning of the story. Hence, the LAND sign did not appear anywhere else in the signed narrative, in contrast to the signs FOREST and TREE that were presented in the aforementioned scenes.

Figure 14: The pointing gesture in scene 02

Figure 15: Example of a 'front on' image design

Furthermore, the signing of the above phrase demonstrated the use of the B-Handshape to denote the boys as children. Specifically, the articulation of the sign CHILD refers to the shortness of a child when compared to an adult's height (children are shorter than adults). Similar signing was performed in the pantomime of participant 03 to represent a small human figure (see Figure $1_{(2)}$). Hence, taking into consideration the rectangle/square shape that the participants appointed to a man's figure, the performance of this sign represents the imaginative upper side of these shapes. In addition, the word "menino" (boy) belongs to the labio-nasal words that combine with the vowels /e/ and /i/ to denote living beings and elongated/small referents. Such linear representation is also performed in the signing of the HOUSE, in which the B-Handshape is mapped to the triangular and flat shape of a roof.

Figure 16: Shared iconicity for "water" (sea, lake)



As the story deploys, the reader maintains a close relationship to the characters (the birds, the boys, the snake, etc.), for the image design involves variation in visual angle and focalisation. For example, in scene 02, the focus is on the pointing of the bird, as this gesture is positioned in the centre of the image (Figure 14). Then, the green bird is drawn as flying, in contrast to the pecking of the white one at the right side of the image. In other words, the image recreates part of a structure - the indexing that SLs frequently use - calling the signer to reproduce it: BIRD-FLY $_{\text{(body shift and eye gaze to the left)}}$ TO-POINT. Both interpreters actually used it, which means that the image saliently reinforced its occurence. In this reproduction, the sign BIRD was signed with the B-Handshape by both hands, imitating the open winds and the bird's flying motion, an imitation different from the one that can be performed for the white bird, which requires the sign BEAK to imitate its pecking.

Such gesture reproduction also happened in scene 05, where one of the characters is facing the reader 'front on' with his palm touching his cheek so as to indicate the emotion of "surprise mixed with fear" (Figure 15). Both interpreters signed the depicted gesture, using non-manual features and mouthing /o/ to express the character's emotion.

In scene 06, the water tank in the middle of the lake is depicted in the centre of the image, and the boys who look at it are drawn smaller than it. For signing the water tank, the interpreters used the 5-Handshape curved to represent the cavity of the water tank and its real-world shape. The water tank

was also signed in the last two scenes, in which the snake disappears and the gold remains untouched inside it. Both interpreters signed first the WATER sign (as the topic of the sentence), which also shares the same iconicity across SLs (the sea or lake water, not the drinking water) as it represents the wavy surface of it (Figure 16), and then the sign MIDDLE, which met a universal iconicity in terms of its location and movement (but not in terms of its handshape). This openness of WATER seems to agree phonologically with the open phonology of the vowel /o/ in the "water" words (across the three languages).

Table 8: Signed phonemes of the Gold story

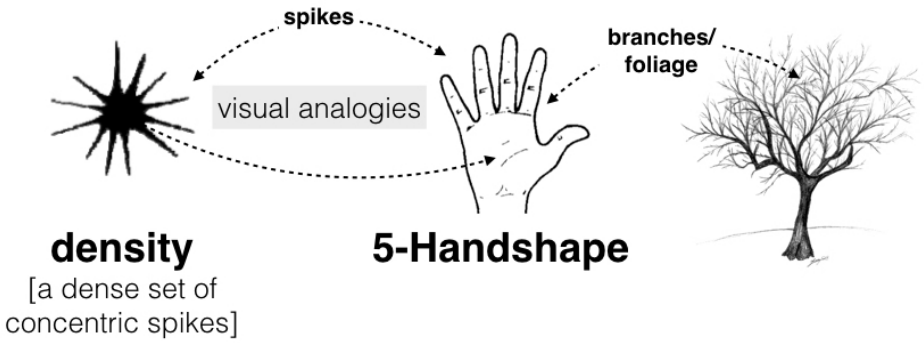
HANDSHAPE	MOVEMENT	SIGN	GLOSSARY WORD
 5-Handshape	semi-cyclical semi-cyclical & cyclical semi-cyclical wavy semi-cyclical	TREE FOREST LAND WATER (sea, lake) CONTAINER	tree forest land water water tank
 B-Handshape	straight (upward-downward) straight (downward) diagonal	BIRD BOY HOUSE	bird boy _____
 CL-V	straight (forward) straight (all directions)	TO-WALK TO-LOOK-AT	boy
 CL-V(bent)	straight (downward) cyclical straight (upward)	SNAKE TO-SIT TO-CLIMB-A-TREE	snake
 INDEX-Handshape	straight (all directions)	TO-POINT	_____
 CL-X	straight (downward)	CL-X: hanging rope	_____

Table 8 summarises the shared iconicity of the target items in this second story. Overall, the classifier constructions dominated in the action scenes representing entities acting (e.g., the boys, the snake). In the passive scenes, in which nature dominates, the 5-Handshape was preferred.

Discussion

The present study shows that certain phonological mapping exists across language modality, which can be used in the construction of wordless picturebooks, especially when the latter serve as instructional material for SLs. When the source of a picturebook is a written narrative - currently the most frequent practice in the production of SL learning materials - the study demonstrates how phonological symbolism may function in the creation of its imagery. Firstly, the analyses suggest semantic differences among the two stories that depend on the ratio of phoneme categories. As the first story contained more labial consonants, it denoted meanings of activity and intention, whereas the second story, as it contained more velar consonants, it referred to entities (human and animals) and natural elements. This second story appeared more "passive" due also to the fact that there was a higher ratio of nasals, which referred to meanings of negativity and nature. Hence, data confirmed the hypothesis that plosive sounds, such as the labial consonants of the first story, connect with an active state, whereas the nasal sounds with negative feelings and low activation/passivity (Auracher et al., 2011).

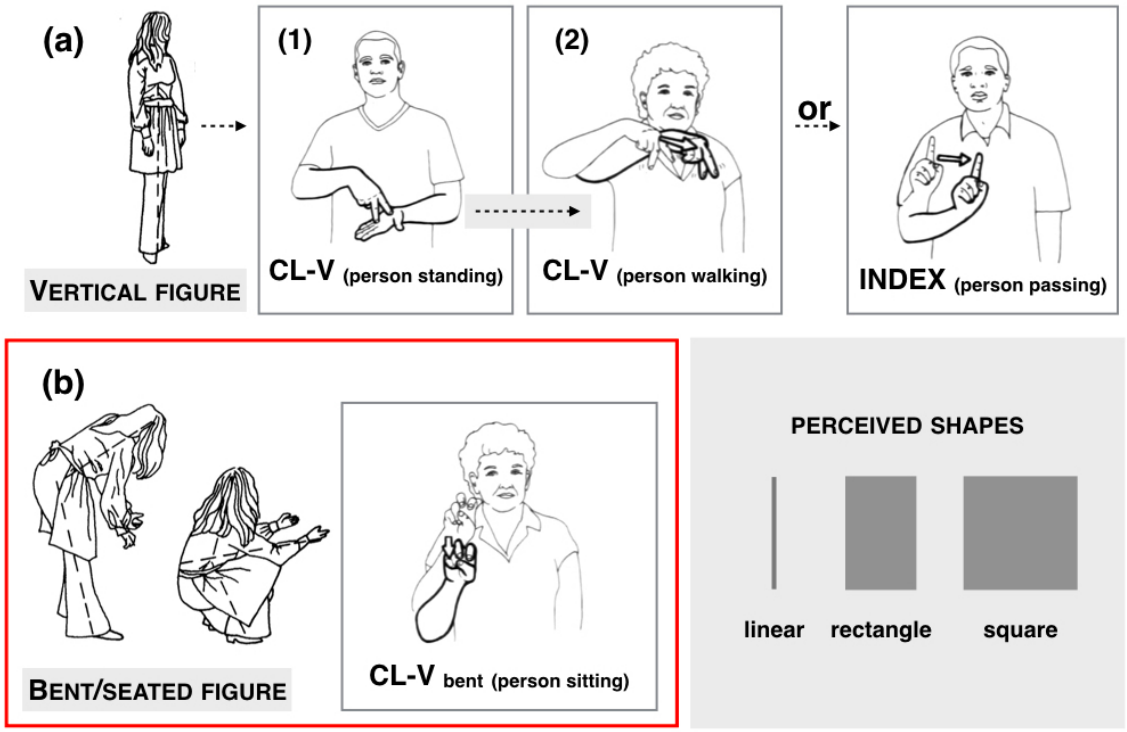
Figure 17: Visual analogy among graphic density and the 5-Handshape in the TREE



Note: The graphic image used in Nobile (2015). The fingers of the 5-Handshape correspond to the dense set of spikes, and the palm centre, to the roundish core of the graphic. In particular, the 5-Handshape corresponds to the density of the branches and foliage of a tree.

Concerning the labial consonants, there was also a clear indication that the meaning of activity is expressed with the central vowel /a/; and the meanings of entities and/or edges (e.g., an arm/leg of a person; a bird's wing) with the vowels /e/ and /i/. This phonological linearity was shown to be mapped to the linearity of the 5-Handshape, B-Handshape, and of the CL-V. Since the indigenous villages maintain a strong and close relationship with nature, the word "forest" appeared frequently in both stories, which, again, explains participants' choice as a keyword. In fact, the study demonstrated that the velar and nasal words "forest", "tree" and "branch" (e.g., mata, ka, galho) seem to activate open structures, such as the 5-Handshape and the CL-C that, in turn, may correspond to both angular and round-like referents. For example, the similar manual representations of the word "forest" indicate that people may perceive the forest by the density (and hence, quantity) of its foliage or trees. Interestingly, Nobile (2015) found that dense graphic features (e.g., a dense set of concentric spikes) correlate with nasal consonants, which in Portuguese and Kaingang appear in the nasal words of the "forest". Following Taub's (2001) analogue-building model, the 5-Handshape of the sign FOREST (across SLs) is easily mapped to the density of the trees' branches/foliage (Figure 17). Moreover, Parisi and Pavani (2011) demonstrated the vowel /a/ to associate with dense angularity, to dodecagons in particular, which, geometrically, approximate the cycle. The "forest" and "tree" words carry the vowel /a/, which the participants perceived as angular (see Appendix D).

Figure 18: The geometric perception of the human figure



Apart from the forest, there were more meanings mapped to angular and linear geometric shapes. For example, the human figure, especially the masculine (as expressed in the words: "Guarani", "man", "father") was connected to square and angular forms, a finding that agrees with Liu and Kennedy (1993, 1994, 1997), and Liu (1997), who found the words "father" and "a standing person" to connect to the square shape. This linearity is also evident in the selection of the CL-V for the representation of the walking figure of the boys. Thus, the CL-V imitates the walking legs due to a shared mental image of a vertical body. In contrast, this classifier becomes a closed phoneme, when it imitates a bent body while sitting, climbing, and so on. In SLs, the vertical body is perceived and represented as linear using the index handshape (Figure 18) or the B-Handshape (as aforementioned). Linearity and angularity was also indicated in the meanings of hunting, demons, and enemies (see Appendix C), a result that also corroborates previous research, in which threat, badness and aggressiveness are carried in diagonal, angular and linear forms (ARONOFF, 2006).

By using the frequency of phonemes as the independent variable, the study avoided the subjectivity necessarily arising when interpreting a text. However, the sample concerning the pantomimes and the perceived geometrical properties of the words was small, therefore caution should be given to the generalisation of its findings. In line with this, the study did not aim at finding systematic aspects in how the participants depicted the target words in pantomime. It did not aim either at determining the inherent meaning of single phonemes. Rather, it studied subtle iconicity with the scope to show that phoneme differences have an impact on how readers perceive a text and form imagery in the making of children's visual books. It focused on examining the visual image produced by the pantomime and the perceived shape, and on comparing it with the visual image of SLs and of the picturebook. In doing so, the study demonstrated that there is certain similarity and/or even systematicity in the phonological form of the signs across the SLs and the produced pantomimic gesturing. This systematicity appears in the content of the images, which were created by non-signers (the illustrators of the project) based on the reading of a story.

Hence, the study showed that the higher frequency of a given phoneme is more likely to be noticed by the readers. This finding also shows that a higher frequency of certain phonemes may lead to a 'prominence index' for these phonemes, which, in turn, may link to certain prominent mental representations too. For instance, the higher frequency of the velar and nasal words of the "forest" and the "trees" led to the dominance of the green colour and the trees throughout the picturebook (as passive scenes). The tree images then allowed the production of signed structures, quite similar across the SLs (e.g., the trees bending because of the wind; the tree branch; climbing a tree). In fact, their signed performance was reproduced with great analogy to the content of the images.

Thus, the study suggests that the higher frequency of certain sound structures may connect to certain signed representations, which the design of children's picturebook can take into consideration, since the 2D image must relate to the 3D materialisation of SLs. When a deaf child looks at the image-page of a picturebook, he/she will use the signing space analogically to reproduce the content of that image. Thus, designing an image, the iconic properties of the sign can be made salient so as to activate on-line lexical processing. Hence, the way the signing is performed (whether the hand imitates the performance of an activity; portrays an entity; draws the outline of an object, etc.) needs to be reconsidered in relation to the image drawing techniques (motion perspective, aerial perspective, etc.), and the perspective of the signer. As it was shown, the experience viewpoint of certain images requires complex syntactic phrase skills (e.g., role shift, classifier constructions), which deaf children manage to develop around ten years old.

The next phase of this project is, firstly, to examine such relationships by basing the signed performance on a written text only, read by deaf and hearing participants, without relying on the images of a picturebook. Secondly, the project aims at registering the signing performance of deaf children while reading a wordless picturebook, with the scope to compare their linguistic structures with those produced by adult signers (deaf and hearing).

Appendix A: Interview questions

1. Overall, how do you feel after reading this story? Why?

2. After reading the text, what are the parts of the story that you remember the most?

3. Write 10 words that relate to these parts. List them in order of importance to you. 1: most important - 10: less important (Do not include the proper names mentioned in the text: for example, Tupana, Ci, Curupira).

4. Can you indicate a geometric shape for each selected word? Write the word and its corresponding shape.

5. What motivated you to choose this shape (for each word)? Can you explain?

6. Can you produce a pantomime for each chosen word?

7. What motivated you to create this pantomime (for each word)? Can you explain?

Appendix B: Participants' words

Vowel words (n = 14)

Vowel /a/	Vowel /e/	Vowel /i/	Vowel /o/
alimentar, alimentação (2) avermelhado animais anta arvore	enganar exigências estética eficácia	incêndio inimigos (2) índio	oca orelhas (3)

Consonantal words (n = 41)

Labial	**Dental**	**Alveolar**	**Velar/glottal**	**Nasal**	**Lateral**
beleza peixe proteger planos pai (2) pés (4) **Labiodental-fricative:** filhos forte fogo floresta ventre vida	demônios (3) defesa direção destruição deuses desejar	sol (3) selva sentir semelhanças	cabelo (2) cabeça caçadores (2) criação, criador (3) contemporaneidade cuidar começo guarani, guaranis (3) homem (2) historias	mundo (2) mãe, mães (3) mato, mata (3) mar malfeitorias nascente natureza	reclamar rio

Appendix C: Frequent words in the two stories

Frequent vowel words in the Curupira story

/a/	*/e/*	/i/	*/o/*	*/u/*
as: 20	e: 38	isso: 8	o: 57	um: 12
ao: 10	é: 14	inimigos: 4	os: 38	
arvore: 5	ela, ele: 11		onde: 6	
acontecer: 4	era: 6		olhar: 5	
animais: 4	estar: 6			
assim: 4				

Frequent consonantal words in the Curupira story

Dental	*Alveolar*	*Labial*	*Velar*	*Nasal*	*Lateral*
de: 33	Ci: 23	para: 40	que, quem: 39	não: 25	reclamar: 6
do: 27	seu, sua: 20	posso: 24	caçadores: 17	mato, mata: 14	
Tupana: 20	se: 12	bem: 19	Curupira: 15	na: 14	
	sol: 8	fazer: 13	criação: 10	mas: 11	
	ser: 5	filho: 7	grande: 10	mundo: 10	
	céu: 5	bicho: 6	com: 9	mãe: 10	
	saber: 4	passar: 5	homem: 8	mais: 6	
		proteger: 5	guarani: 7	mal: 5	
		por: 5	gostar: 5	menino: 5	
		flecha: 5	cabelo: 4	mesmo: 4	
		pes: 4	casa: 4		
		precisar: 4	como: 4		
		fruto: 4			

Frequent words in the Gold story

Dental	*Labial*	*Velar*	*Nasal*	*Lateral*	*Vowel words*
de: 9	banhado: 6	caixa: 13	mais: 6	Rẽgá: 12	estou/estava:10
da: 8	primo: 4	Kafág: 9	mata: 4		então: 9
do: 5		que: 9	muita: 4		aquela: 6
d': 5		começou: 5			agua: 5
teve = 4		quando: 4			assustador: 5
		cobra = 4			

Appendix D: The shapes of the words

WORDS	PARTICIPANT	SHAPE	COMMENT
pés (4)	02, 05, 06, 08	02: linear 05: rectangle 06: square 08: linear	
caçadores (3)	03, 05, 06	03: square 05: linear 06: rectangle	
criação, criador (3)	01, 04, 08	01: circle 04: circle 08: circle	
guarani, guaranis (3)	02, 06, 08	02: circle 06: rectangle 08: rectangle	08: índio - rhombus
demônios (3)	04, 05, 07	04: triangle 05: cruz (linear) 07: heptagon	06 - malfeitorias: cruz (linear)
mãe, mães (3)	01, 04, 08	01: square 04: circle 08: triangle	
mato, mata (3)	01, 02, 06	01: square 02: triangle 06: trapezoid	05 - floresta: circle, oval 03 - selva: octagon
sol (3)	01, 02, 03	01: circle 02: circle 03: circle	
orelhas (3)	02, 06, 08	02: rhombus 06: trapezoid 08: square	
pai (2)	01, 03	01: rectangle 03: rectangle	
cabelo (2)	02, 08	02: triangle 08: linear	
homem (2)	03, 06	03: rectangle 06: square	
mundo (2)	01, 07	01: circle 07: circle	
alimentar, alimentação (2)	01, 07	01: cylinder 07: square	
inimigos (2)	02, 07	02: square 07: square	

Appendix E: Scenes of the Gold story

#	Scene	Scene type
01	Dois meninos sentados e conversando na aldeia.	Passive
02	O pássaro voa para a floresta; os meninos apontam para a direção do pássaro.	Active
03	Os meninos na floresta.	Active
04	O tempo muda; vento; os pássaros voam das árvores.	Active
05	Meninos; a expressão do rosto: apreensão, surpresa.	Passive
06	Os dois meninos encontram a caixa d'água no banhado, distanciamento.	Passive
07	Um menino debaixo da árvore para apoio - o outro menino sobe na árvore para alcançar a caixa.	Active
08	Descendo pela corrente e percebendo a cobra protegendo a caixa d'água.	Active
09	Perto na cobra: a cobra se aproxima, enrolando na água; visão de costas do menino segurando a corrente; mostra a caixa semi-aberta, reluzindo ouro, cobra enrolada, mostrar ouro na caixa.	Passive
10	A cobra com boca aberta, ameaçadora, vai para a água, ao redor da caixa, engrandece/monstro - idéia da maldição, menino assustado.	Active
11	Os meninos voltam para a terra e fogem, olhando para a cobra.	Active
12	A cobra evaporando, esvaindo-se, mágica, fumaça.	Active
13	Só a caixa com o ouro reluzindo no banhado.	Passive

References

ARONOFF, Joel. How we recognize angry and happy emotion in people, places, and things. *Cross-Cultural Research*, vol. 40, n. 1, p. 83-105, 2006.

AURACHER, Jan.; ALBERS, Sabine; ZHAI, Yuhui; GAREEVA, Gulnara; STAVNIYCHUK, Tetyana. P is for happiness, N is for sadness: Universals in sound iconicity to detect emotions in poetry. *Discourse Processes*, vol. 48, p. 1–25, 2011.

BECKER, Claudia. Narrative competences of Deaf children in German Sign Language. *Sign Language & Linguistics,* vol. 12, n. 2, p. 113–160, 2009.

COGILL-KOEZ, D. A model of signed language "classifier predicates" as templated visual representation. *Sign Language and Linguistics*, vol. 3, p. 209–236, 2000a.

COGILL-KOEZ, D. Signed language classifier predicates: Linguistic structures or schematic visual representation? *Sign Language and Linguistics*, vol. 3, p. 153–207, 2000b.

CRESWELL, John W.; PLANO, Clark Vicki L. *Designing and conducting mixed methods research*. London: SAGE Publications, 2018.

CROFT, Lee B. The mnemonic use of linguistic iconicity in teaching language and literature. *The Slavic and East European Journal*, vol. 22, n. 4, p. 509-518, 1978.

D'ONOFRIO, Annette. Phonetic detail and dimensionality in sound-shape correspondences: Refining the Bouba-Kiki paradigm. *Language and Speech*, vol. 57, n. 3, p. 367–393, 2014.

DONATO, Hernâni. *Contos dos meninos índios*. São Paulo: Editora melhoramentos, 2010.

EASTMAN, Gilbert; NORETSKY, Martin; CENSOPLANO, Sharon. *From mime to sign*. Silverspring, M.D.: T.J. Publishers, 1989.

ENGBERG-PEDERSEN, Elisabeth. Factors that form classifier signs. In: BRENTARI, Diane (Ed.), *Sign Languages*. Cambridge: Cambridge University Press, 2010. p. 252-283.

FLECKENSTEIN, Kristie, S. Introduction: Teaching vision: The importance of imagery in reading and writing. In: FLECKENSTEIN, Kristie S.; CALENDRILLO, Linda T.; WORLEY, Demetrice A. (Eds.), *Language and image in the reading-writing classroom: teaching vision*. New Jersey: Lawrence Erlbaum Associates Inc., 2002, p. xiii - xviii.

HINTON, Leanne; NICHOLS, Johanna; OHALA, John J. Introduction: Sound–symbolism processes. In: OHALA, John J.; HINTON, Leanne.; NICHOLS, Johanna (Eds.). *Sound symbolism*. Cambridge, UK: Cambridge University Press, 1994, p. 1–12.

HU, Zhuanglin. The image iconicity in the Chinese language. *Chinese Semiotic Studies*, vol. 3, n. 1, p. 40–55, 2010.

IMAI, Mutsumi; KITA, Sotaro. The sound symbolism bootstrapping hypothesis for language acquisition and language evolution. *Philosophical Transactions of the Royal Society B*, vol. 369, n. 1651, 2014. Available at: <http://dx.doi.org/10.1098/rstb.2013.0298>.

KATZ, Albert N. Meaning conveyed by vowels: some reanalyses of word norm data. *Bulletin of the Phychonomic Society*, vol. 24, n. 1, p. 15-17, 1986.

KRESS, Gunther; LEEUWEN, Theo van. *Reading images*. The grammar of visual design. Oxon: Routledge, 2006.

LIU, Chang H. Symbols: cycles and spheres represent the same referents. *Metaphor and Symbol*, vol. 12, n. 2, p. 135 - 147, 1997.

LIU, Chang H.; KENNEDY, John M. Form symbolism, analogy, and metaphor. *Psychonomic Bulletin & Review*, vol. 4, n. 4, p. 546 - 551, 1997.

LIU, Chang H.; KENNEDY, John M. Symbolic forms and cognition. *Psyke & Logos*, vol. 14, p. 441- 456, 1993.

LIU, Chang H.; KENNEDY, John M. Symbolic forms can be mnemonics for recall. *Psychological Bulletin Review*, vol. 1, n. 4, p. 494-498, 1994.

LOCKWOOD, Gwilym; DINGEMANSE, Mark; HAGOORT, Peter. Sound-Symbolism boosts novel word learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. 2016, February 4. Available at: <http://dx.doi.org/10.1037/xlm0000235>.

MAGNUS, Margaret. What's in a word? Studies in phonosemantics. Unpublished doctoral dissertation, Norwegian University of Science and Technology, Trondheim, Norway, 2001.

MEIR, Irit; SANDLER, Wendy. *A Language in Space*. The story of Israeli Sign Language. New York: Lawrence Erlbaum Associates, 2008.

MERTZANI, Maria. Concrete poetry for the sign language classroom. *Calidoscópio*, vol. 18, p. 123-141, 2020.

MERTZANI, Maria; MEDEIROS NOGUEIRA, Gabriela (Orgs.). *A lenda do ouro*. Narrador: Ismael Cardoso. Rio Grande: Editora da FURG, 2020.

MERTZANI, Maria; TERRA, Cristiane Lima; DUARTE, Maria. A.T. *Currículo da Língua Brasileira de Sinais - Libras: Componente curricular como primeira língua*. Rio Grande: Editora da FURG, 2020.

MORGAN, Gary. The encoding of simultaneity in children's BSL narratives. *Sign Language & Linguistics,* vol. 5, n. 2, p. 131–165, 2002.

MORGAN, Gary; WOLL, Bencie. The development of reference switching encoded through body classifiers in British Sign Language. In: EMMOREY, K. (Ed.), *Perspectives on classifier constructions in sign languages*. Mahwah, NJ: Lawrence Erlbaum, 2003, p. 297–310.

NIELSEN, Alan.; RENDALL, Drew. The sound of round: Evaluating the sound-symbolic role of consonants in the classic takete-maluma phenomenon. *Canadian Journal of Experimental Psychology*, vol. 65, n. 2, p. 115–124, 2011.

NISPEN, K. van; SANDT-KOENDERMAN, W.M.E. van de; KRAHMER, E. Production and comprehension of pantomimes used to depict objects. *Frontiers in Psychology*, vol. 8, article 1095. 2017. DOI: 10.3389/fpsyg.2017.01095.

NOBILE, Luca. Phonemes as images: An experimental inquiry into shape-sound symbolism applied to the distinctive features of French. In: HIRAGA, Masako K.; HERLOFSKY, William J.; SHINOHARA, Kazuko.; AKITA, Kimi (Eds.), *Iconicity: East meets West* [Iconicity in Language and Literature 14]. Amsterdam- Philadelphia: John Benjamins, 2015, p. 71-91.

O'BOYLE, Michael W.; TARTE, Robert D. Implications for phonetic symbolism: the relationship between pure tones and geometric figures. *Journal of Psycholinguistic Research*, vol. 9, n. 6, p. 535-544, 1980.

PAINTER, Clare; MARTIN, J. R.; UNSWORTH, Len. *Reading visual narratives*. Image analysis in children's picture books. Sheffield: Equinox Publishing Ltd., 2012.

PARISE, Cesare V.; PAVANI, Francesco. Evidence of sound symbolism in simple vocalizations. *Experimental Brain Research*, vol. 214, n. 3, p. 373-80, 2011.

PERNISS, Pamela; THOMPSON, Robin L.; VIGLIOCCO, Gabriela. Iconicity as a general property of language: Evidence from spoken and signed languages. *Frontiers in Psychology*, 31 December 2010. Available at: <https://doi.org/10.3389/fpsyg.2010.00227>.

PREFEITURA DA CIDADE DE SÃO PAULO; SECRETARIA MUNICIPAL DE EDUCAÇÃO. *Currículo da cidade: Educação Especial: Língua Brasileira de Sinais*. São Paulo: Secretaria Municipal de Educação, Coordenadoria Pedagógica, 2019.

RATHMANN, Christian; MANN, Wolfgang; MORGAN, Gary. Narrative structure and narrative development in deaf children. *Deafness and Education International*, vol. 9, n. 4, p. 187–196, 2007.

REILLY, Judy. From affect to language. Development of evaluation in narratives in spoken English and American Sign Language. In: VERHOEVEN, Ludo; STRÖMQVIST, Sven (Eds.), *Narrative development in a multilingual context*. Amsterdam: John Benjamins. 2001, p. 399–417.

OITTINEN, Riitta; KETOLA, Anne; GARAVINI, Melissa. *Translating Picturebooks*. Revoicing the verbal, the visual, and the aural for a child audience. New York: Routledge, 2018.

SPECTOR, Ferrinne; MAURER, Daphne. Early sound symbolism for vowel sounds. *i-Perception*, vol. 4, p. 239–241, 2013.

SUTTON-SPENCE, Rachel. Constructing visual images in creative sign language in solo and collaborative performance: space and embodiment. *African Studies*, vol. 76, n.3, p. 360-380, 2017.

TAUB, Sarah F. *Language from the body*. Iconicity and metaphor in American Sign Language. Cambridge: Cambridge University Press, 2001.

TAFT, Marcus. Lexical access via an orthographic code: the Basic Orthographic Syllabic Structure (BOSS). *Journal of verbal learning and verbal behaviour*, vol. 18, p. 21-39, 1979.

VALLI, Clayton; LUCAS, Ceil. *Linguistics of American Sign Language*. Third Edition. Washington, D.C.: Gallaudet University Press, 2000.

VALLI, Clayton. *The Gallaudet dictionary of American Sign Language*. Washington, D.C.: Gallaudet University Press, 2005.

VERCAINGNE-MENARD, Astrid; GODARD, Lucie; LABELLE, Marie. The Emergence of narrative discourse in two young deaf children. In: DIVELY, Valerie; METZGER, Melanie; TAUB, Sarah; BAER, Anne Marie (Eds.), *Theoretical issues in signed language research; Signed languages. Discoveries from international research*. Washington, D.C.: Gallaudet University Press, p. 120-132, 2001.

VINSON, David; THOMPSON, Robin L.; SKINNER, Robert; VIGLIOCCO, Gabriela. A faster path between meaning and form? Iconicity facilitates sign recognition and production in British Sign Language. *Journal of Memory and Language*, vol. 82, p. 56-85, 2015.

Recebido em: 15/01/2020
Aceito em: 05/06/2020