A Practical Writing System for Sign Languages

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Abstract

This paper discusses the problems involved in writing sign languages and explains the solutions offered by the Alphabetic Writing System (*Sistema de Escritura Alfabética,* S.E.A.) developed at the University of Alicante in Spain. We will ponder the syllabic nature of glottographic or phonetically-based writing systems, and will compare practical phonological knowledge of writing with notions of syllables and sequence. Taking advantage of the ideas of sequentiality contributed by the phonology of sign languages, we will propose a sequential writing model that can represent signers' practical phonological knowledge.

1. Sign Languages and Writing

Except for semasiographic systems, such as the *winter counts* of the Dakota people, and visual instructions for the use of certain machines, which "state ideas directly", all writing systems are glottographic (Sampson, 1997: 42). In other words, "they […] use visible marks to represent forms of a spoken language". Writing systems that had initially been considered pictographic, such as Egyptian hieroglyphics, Chinese writing, Mayan glyphs, or the Easter Island tablets, were later shown to be glottographic, or "true writing", as underlined by the greatest scholar of writing systems, Thomas Barthel.

Ever since it was discovered by Sumerian culture, alphabetic writing has been based on syllables, involving a phonological analysis of the chain that bases representation on the different components of each syllable: consonants and vowels. Other glottographic writing systems, known as logographical writing systems, are based on significant parts of words, or morphemes. This is the case of Chinese for example, although in this case the significant parts of the words, the morphemes, generally coincide with syllables, meaning that logographic writing may also be considered syllabic. There are also cases of 'motivated' logographic writing systems, such as the phonological-featural alphabet of Korean Hangul. However, in this phonological-featural alphabet also, based on infra-phonemic elements, "the essential graphic distinction is between vowels and consonants" (Sampson, 1997:179). In practice, different writing systems can be combined, as we do when we use morphological symbols such as numbers or percentage symbols, present on all keyboards, in alphabetical texts.

The distinction between Consonant and Vowel has proven to be an excellent criterion for phonological representation: it is immensely practical, as it represents the syllable at the same time. In other words, and this is the essential idea of our proposed writing system, **Consonants and Vowels are represented as stages of articulation.** Non-segmental phonology, specifically feature-geometrical phonology (Clements, 1985) or Prosodic Phonology, on which the most complete model of ASL phonology, devised by Brentari (1998) is based, have resolved the CV difference in other minor differences, so that V or C is a relative question, arising from the assignation of features; the notions of V or C can be replaced by the notion of auto segment, or even by a phonological rule, thereby giving a more explicative model for certain phenomena such as tone, vocalic harmony or the vocalic morphology of certain oral languages. However, it has to be said that tonal languages and others that have been put forward to justify a non-segmental conceit in prosodic phonology (Venda, Turkish, Hebrew), are currently written in alphabetical, segmental writing.

From a scientific point of view, the practical phonology that gave rise to writing is full of imperfections, creating an unreal image of languages (Olson, 1991:285). However, this image has historically been identified with knowledge and culture, and writing, with all its imperfections, has become an irreplaceable practical skill for consigning knowledge. The reason for this is, doubtless, the way it represents the speech process.

Therefore, if sign languages, from the point of view of linguistic typology, are comparable to oral languages in many morphological and syntactical aspects, it would appear logical to extend this comparison to the syllable as the basic phonotactic unit of writing, although the concept of syllable is also currently questioned in non-linear phonology (Wilbur, 1990). If letters (characters) represent the kind (and stage) of articulation of the sounds in a syllable, so that the speaker can not only make the sounds but also distinguish the order in which they are produced, in sign languages (LSs) letters may also represent the kind (and stage) of manual articulation, and the order of the letters can represent the order of production of signs by the signer.

In this paper we will present a proposed writing system based on this possibility. Annotation systems currently used to transcribe signs, such as the *HamNoSys* system devised by Siegmund Prillwitz and his group at Hamburg University, or *SignWriting* devised by Valery Sutton at San Diego University, may not be processed as writing. *SignWriting* showed the very possibility of writing and is a historic contribution to the culture of the signing community, but the alphabetical writing system we present is based on a principle of phonological economy, while *SignWriting,* because of its openly visual nature, is based on simultaneity and the supposed analogical or iconic nature of the signs. The problems with alphabetical writing are precisely the advantages of *SignWriting*: the supposed simultaneity of the signs and their analogical nature, particularly obvious in non-manual expression. We will now see that the notion of simultaneity goes hand-in-hand with the notion of syllable and that they have compatible sequential processes.

2. Syllable, Sequence and Simultaneity

Although the current phonology of sign languages still suffers from many problems, as can be seen from the

different phonological models that have been devised one after the other in recent years (Liddell, 1984, 1989, 1990; Sandler, 1989; Perlmuter,1988; Brentari ,1998, 2002), there is still sufficient consensus, in our opinion, to justify a proposed writing system that could be used as a skill, rather than a phonological model.

As we have pointed out, the basic unit of glottographic writing is the syllable, as this is the minimum unit in which sounds can be distinguished and combined. Accordingly, in spite of certain pending questions (such as the phonological interpretation of repetition and lengthening), the phonology of sign languages already gives a good idea of the phonological components of the syllable and its limits. It is also generally agreed that two successive movements, even when they are local, correspond to two syllables, and rules have been made for elision, epenthesis and gemination (Liddell, 1989). However, the main problem with these methods is that they continue to consider that, except for the movements, which, by definition, are sequential, the syllable is simultaneous.

In 1933 the vocal apparatus was filmed in operation for the first time, and the great linguist Roman Jakobson was very impressed by the result. In the first of his *Six leçons sur le son et le sens,* given in New York in 1942, he remembers the film and states (1988: 396) that when he saw it he understood that "the act of speaking is a continuous, uninterrupted movement… there are no position vs. transition sounds; they are all transition(...) Strictly from the point of view of articulation, the sequence of sounds does not exist. Instead of following each other, sounds link up with each other; and one sound, which our acoustic impression tells us comes after another, can be articulated simultaneously with it or even partially before it(...) It is not possible to classify, or even, I would say, to describe the different articulations accurately, without continuously asking what is the acoustic function of such and such motor action" .

Syllables are acoustic units determined by the level of merging and influence of vowels and consonants (Malmberg, 1955), which are, therefore, relative segments. Syllables are recognised by the transitions of a vowel or nucleus due to the effect of the consonant(s) of the syllable.

Thus, as its etymology indicates, the syllable is a paradigm of simultaneity. In written representation, we would point out that literate speakers recognise segments of this transition; a segmental sound is an articulation with stable parameters, insofar as there are changes between the sounds that allow us to identify them. Accordingly, the real effect of the operation is simultaneity, while segmentality is an operation of the mind, which I have described above as practical phonological knowledge, distinguishing between CV and types of both.

So what segments should be represented in writing an SL, in our case Spanish Sign Language (LSE)? The linguistics of sign languages was born with the discovery of its phonemes (Stokoe, 1960), initially called phonological 'aspects' or 'cheremes' and later, 'parameters', a term which has spread to most current phonological models (e.g. Brentari, 2002). Until the 80's, these constituents, which we believe should simply be considered phonemes, were seen as simultaneous with monosyllabic signs, i.e., syllables. A fourth parameter, Orientation, was added to the three proposed by Stokoe (1960): Location, Hand Shape and Movement, sometimes called the major parameters, and the difference between path movements and local movements was specified (Liddell, 1989). Additionally, the passive hand should be specified as the location L of the sign when it acts as such, with its own Q and O, or as an element of symmetry with the active hand. Lastly, our writing system represents possible contact with the body, C, as a specification of location. These are the constituents that we represent.

We are not going to deal here with the phonological or featural nature of these components, but briefly to justify their sequential representation and the use of the Hand Shape as the nucleus of the syllable, as the basis for an economical writing system.

2.1. Sequentiality

Several sequential models have been proposed since the 80's: Liddel (1982, 1989), Sandler (1986, 1989, 1990), Perlmutter (1988), Brentari's prosodic model (1998), etc. In this last one, Hand Shape, Location, Orientation and Movement are treated as types of (geometric) features, rather than segments. It considers that, "It is sufficient to make reference to distinctive features, in syllable initial and syllable final positions, and there is no support for any further internal segmental divisions... no intermediate segments are recognized by the signers". Moreover, Brentari (2002: 45) considered that simultaneity is a characteristic of sign languages, "Cs and Vs are realized at the same time in sign languages, rather than as temporally discrete units"; (2002:47): "If sign language Cs are properties of the IF tree and sign language, Vs are properties of the PF tree, the major difference between sign and spoken languages in this regard is that in sign languages IFs and PFs occur at the same time"

Liddel's model conceived of Hold and Movement as segments, so that its syllabic model consisted of a hold-movement-hold sequence; the Hand Shape and Orientation features, along with contact and Location L, formed part of specific tiers, represented as simultaneous. Sandler's model is also partially sequential, based on Location and Movement segments; this model also recognises the segmental nature of Q (Sandler, 1990:20 "hand shape is a distinct and temporally autonomous phonological element in ASL"). In our proposal, sequentiality will be extended to all the other parameters, although we insist that our aim is not to present a phonological model, but rather a model of written representation. This model, which we call the Alphabetical Writing System for Spanish Sign Language (Sistema de Escritura Alfabética de la Lengua de Signos Española - SEA.), is available in book form (Herrero and Alfaro, 1999; Herrero, 2003) and on the internet (cervantesvirtual.com/portal/signos); all we can do here is describe its essential elements in relation to the problems that practical phonology based on writing may raise when approaching theoretic phonology. The system has been successfully taught to several signers in a few weeks.

For our writing system, we start off by taking the basic sequence proposed by Sandler (in its turn a specification of the one proposed by Liddell): the Location-Movement sequence. There are several pairs of signs that show the sequential incidence of Movement:

AMOR .....LASTIMA

love *pity*
DIFÍCIL .....ANUNCIAR
difficult *to announce*
JUNTOS.....MESA
together *table*
LISTO .....SABER
clever *to know*
TELEFONO ...LLAMAR POR TELEFONO
telephone *to phone*
ARBOL.....BOSQUE
tree *forest*
SILLA .....SILLAS
chair *chairs*
MIRAR .....VER
to look *to see*
ARRIBA..... .MANDAR
up *to command*
LLAVE ..... ESPADA
key *sword*
CASA ..... CASA GRANDE
house *big house*
PROBAR..... ARADO
to try *plough*

Using this elemental sequence, which refers only to two phonemes or parameters, Location and Movement, the remaining parameters are written in the following order:

S L(.)QODF

Where

- S represents the left hand (as in ESCRIBIR , *to write*) or active two-handed signs (as in VIAJE, *journey*).
- The point (.) that may follow Location indicates that there is no contact with the part of the body taken as reference for signing (the temple, in TEORIA, *theory*)
- Hand Shape Q and Hand Shape Orientation follow after Location and before Movement
- Movement M is differentiated, as is normal in all phonological models, into Path Movement (D) and Local Movement (F), which are not obligatory, may be simultaneous and, when simultaneous, give rise to two syllables. The simultaneity of D and F will be represented by adding the direction feature to the F symbol, i.e., making a kind of D out of DF.
- Non-manual elements that accompany the signs will only be represented if they have morphological value (e.g., adverbial intensification, although most signers know lexical forms of representing this intensification; or simultaneous affirmation and negation).

Before going deeper into the writing system and giving examples, we would first like to make a few comments on the decisions that we have taken and that we have just summarised.

a) The initial writing of the passive hand when it acts as Location (but not in two-handed signs or as the moving hand) is justified by articulatory and perceptive reasons: while making the sign, the dominant hand addresses the *previously* moving passive hand (ESCRIBIR, *to write*; POR QUÉ, *why*; OBJETIVO, *aim*). As far as I know, this sequentiality has so far gone unnoticed.

b) We also consider it proper to represent active two-handed signing (symmetric, asymmetric and displaced symmetric signs) at the beginning for reasons of processing, as two-handedness affects the articulation of all the other components from the beginning.

c) We have already said that there is a general consensus as regards the Location-Movement sequence. The Hand Shape and Orientation components are represented between the two. On the one hand, it would appear obvious that what Movement does is to modify Location, in the case of Path Movement D, or Hand Shape Q and/or Orientation O in Local Movements; these components should be specified before M as they are a part of the Hold (in Liddell's model).

d) The LQO order is an interpretation of the articulation of bringing the hand from a part of the body or from the signing space with an articulation Q. The hand then remains in that Location with a certain Orientation and, in dynamic signs (most of them), carries out a movement.

e) The precedence of L over Q is clear when L is the passive hand. Another indication is given by the fact that when the sign is made in the mouth (SILENCIO, *silence*; ODIO, *hate*; ROJO, *red*) the position of the lips goes before Q, and when the sign is made with a non-manual component (DELGADO, *thin*), this component goes before Q. In general, this place is guessed "before" Q, as a root which Q will specify. As a matter of fact, the initial process of articulation in many signs is similar to an oral CV syllable, insofar as the articulation takes the Hand Shape of Q as that of the Vowel, while the occlusion occurs. We use the term 'occlusion' here in the sense of visual perception studies, as occlusion (interposition) of one object by another, in this case, the body by the hand (Kanisza, 1986: 283). What is not seen is not so much a mental representation as a 'found detail in an non-modal complementation, with clear functional effects on the perception of fragmented objects.

f) One last clarification regarding sequentiality: Movement, whether path or local, does not generally have a specified ending place. The sign does not necessarily stop in one place (IDEA, *idea*; ENFADADO, *angry*) and, if it does, does not do so in a lexical Location L (but rather in a precisely moved place), or with a Hand Shape Q or an orientation O other than those foreseen by M, these Locations, Hand Shapes and Orientations being moreover subject to strict constrictions. M consists precisely of leading to that end. Another thing is two successive movements (ESPADA, *sword*), or two phonological places (PADRE , *father*), which we consider disyllabic, but in monosyllabic signs the economy of the writing system makes it possible to end the sign in its movement. The incidence of certain Ms, specifically in local Fs, which modify Q and/or O, seems comparable to glides in oral languages. D movements, on the other hand, do not change Q and can be compared to consonants. The incidence of M is phonetically very varied.

We now give some arguments for considering Q the syllabic nucleus, and thus justify its being written in the centre of the syllable.

2.2. The Nuclear Character of Q

We agree with Brentari (1998: 313) that "the formal role of distinctive features, syllables, and segments as building blocks of a grammar with constraints is the same for

signed and spoken languages, but the substantive definitions in both types of languages –those that are more phonetic and less grammatical- depend on conditions of naturalness in each modality", although we believe that the identity of the formal role should be translated as the difference between nucleus, onset and coda (or between onset and rhyme), which is immensely important, as far as writing is concerned. This is the difference on which the writing system is based, and, although the model is not the most scientifically suited for the phonological description of sign languages, as neither is it for oral languages (according to non-linear phonology), it may be applied to sign languages with similar criteria as to spoken languages. This opinion is defended by Wilbur (1990).

The following are the main reasons why we will consider Q the nucleus:

a) The nucleus is a necessary constituent of every syllable. Some phonologists have stated that the necessary, nuclear, constituent is Movement. Brentari (2002:44), for example: "regarding minimal word constraints, no sign is well formed unless it has a movement of some type", but, in Spanish Sign Language at least, there are fairly evident counter-examples of signs without M: one-handed signs such as OJO *(eye)*, ALTO *(tall)*, ANCHO *(wide);* and two-handed signs such as PELOTA *(ball)*, GAFAS *(glasses)*, CRUCIFIJO *(crucifix),* which neither have movement nor undergo an epenthesis of movement, as Brentari states. On the other hand, the only signs without Q are the non-manual signs (Dively, 2002). These signs are generally gestures (emblems, etc.), and have no lexical entity. When they act with related morphological value, they are represented at the end of the sign.

b) While Location or Movement can be reduced in rapid signing (IDEA, *idea*, can be signed in a slightly higher place, although not at the temple; or the movement of EMPEZAR, *to begin*, can be reduced to a slight, local waving movement), Hand Shape cannot usually be reduced.

c) We agree with Coulter (1990: 125) that stress is "the notion that greater articulatory effort is involved", i.e. as muscular tension, so that, according to Wilbur (1990: 99) "stressed signs were temporally shorter than unstressed". In prosodic phonological models, the nuclear nature of Movement means that it carries prosodic marks such as duration, but I believe that this is not the same as stress. In this regard, it is very significant that the emphasis on some signs normally made with binary repetition eliminates this repetition while tensing the articulation. We believe that our point of view is compatible with the well-known Straka Rule, "under the effect of reinforcing articulatory energy, consonants close and vowels open; on the contrary, under the effect of articulatory weakening, consonants open and vowels close" (Straka, 1963: 35)

d) Lastly, it should be noted that when Sign Languages are interpreted for deaf-blind people, they are reduced to Q, insofar as fingerspelling is a part of Sign Languages.

Considering Q the nucleus also resolves the problem of Hand Shape double behaviour in prosodic models. As regards this double behaviour Corina (2002: 91-92) has said, "that is, that hand shapes may be a constituent of the syllable nucleus or not" or, in other words (Corina, 2002: 94) "in instances when the hand shape changes, hand shape is functioning more like a vowel. In those signs with no change in hand shape, hand shape serves a more consonantal function". Brentari (2002:30) has also referred to this double status, "Depending on whether the posture of the hands remains constant throughout a sign – in which case the dynamic portion of the signs comes from path movement-or whether the posture of the hands changes while the other parameters are held constant, hand configurations can be thought as non nuclear (C) or nuclear (V) in a sign syllable". We could also ask about simultaneous changes in hand shape and path movement (as in COMPRENDER, *to understand*), which would involve a new treatment of hand shape. However, its unified treatment as a nucleus avoids these dysfunctions.

In our model, the components or phonemes of Location, Hand Shape, Orientation and Movement can be considered structurally or syntactically as the [Onset] [Rhyme (nucleus, coda)] elements of the syllable. This model has the asymmetrical conditions that characterise linguistic constructs, as regards syllabic structure (Carstairs-McCarthy, 2001).

3. Economy of the Writing System: Projection Model, Featural Elements and Rules for Simplification

When the Greeks imported Semitic writing, they gave the characters the Greek names closest in sound to their Semitic names (aleph / alpha), and adapted them to represent their own sounds (many of which, particularly learned words, were borrowed from Semitic languages). In sign languages, the alphabet may not be imported based on reasons of perceptive analogy, but on general semiotic values associated to different types of sounds.

Moreover, although the exact number of phonemes of each type (places on the body or in the signing space, hand shapes, types of orientation, types of movement) is not closed, at least in Spanish Sign Language, we know enough to propose a representation open to new symbols. What we do know is that the number of phonemes, understood like this, is clearly greater in Sign Languages than in spoken languages: 32 parts of the body, 10 parts of the signing space, 31 hand shapes, four orientations for each hand shape; as regards M, the number depends on the consideration of features. This complexity will be resolved by what means of what we call the projection model. In any case, this property of sign languages leads to a phoneme: morpheme ratio of almost 1:1.

The symbols (represented by consonants) for the parts of the signing space, orientation and direction of movement will be further specified by means of vowels, using a hand projection model which associates "up", "upwards" or "towards the signer's face" with the vowel "a" (which also symbolises the thumb); "down", "downwards" or "towards the listener's face" with the vowel "u" (which also symbolises the little finger); "left" towards the left" with the vowel "i" (which also symbolises the middle finger); "in front" or "forwards" with the vowel "e" (which also represents the index finger); "in the centre" or "backwards" with the vowel "o" (which also represents the hand shape that uses the five fingers); and "right" or "towards the right" with the symbol "y". This geometric model has been partially inspired by Friedman (1977).

These specifications are features that allow more analytical representation and easier reading. In the cases of Location, the sub-specification appears before the symbol for the place in space (the central longitudinal plane, symbolised by **l,** and the right longitudinal lateral,

represented by the consonant **b**), so that **al** is the high part of the central plane (as in CIELO, *sky*); **el,** the frontal part of the same plane (as in TU, *you*); **ub,** the "low" part of the lateral plane (as in BAJO, *low*); **ab**, the high part of the lateral plane (CONFERENCIA, *conference*), etc.

In the case of the Orientation, after the consonant **m,** the sub-specifications use a first vowel to indicate the direction of the fingers of the hand (on the open palm); a second one, the orientation of the palm: natural orientation, or following on from the arm, which does not need to be represented and for which the first vowel is sufficient (as in CONFERENCIA, *conference*, **ma**; or in TU, *you,* **me**); orientation towards the signor or upwards (an **a** is added as in PASADO, *past,* **maa**; or in QUE, *what*, **mea**); orientation towards the listener or downwards (a **u** is added, as in COMPRENDER, *to understand*, **mau**; or in COGER, *to catch,* **meu**); and orientation towards the right or inversely to natural continuity with the arm (a **y** is added, as in SEPARARSE, *to separate*, **mey**). The same occurs with the other orientations for the direction of the fingers (**mi, mia, miu, miy; mu, mua, muu, muy** etc..).

In the case of Direction (D), the vowel added to the straight movement symbol (**w**) states the direction: **wa** is upwards, as in FUEGO *(fire);* **we,** forwards, as in CONFERENCIA *(conference)*; **wo**, backwards, as in COMPRENDER *(understand).* Curved directional movements are represented by a **c** followed by two vowels, one for direction and the other for curvature: **cea** would be a direction curve forwards curving upwards, as in DAR *(to give)*; **cya,** curve towards the right curving upwards, as in ARCO *(arch, bow)*, etc. These direction vowels are added directly to the local movement symbols when they are carried out with directional movement. Thus, the extension/flexion symbol **l** is followed by **o** to indicate extension/flexion moving backwards, as in COMPRENDER *(to understand),* which is why this word ends in **lo**; or a trembling movement, symbolised by **t**, is followed by **e** to indicate that it occurs in a forwards direction, as in BOSQUE *(forest)*, which is why this word ends in **te**. Local movements such as waving, beckoning and twisting, indicate the direction of their local movement with the respective vowels.

Some local movements are involved in symmetry (tapping or hitting between the two hands, linking, etc.) and, in this case, may be represented using the two-handed **s** symbol. For example, a symmetric tapping movement between the two hands, such as CONTACT *(contact),* will be symbolised by **sp**, where **p** is the symbol of the tapping F: a symmetric hitting movement, as in HIERRO *(iron),* is symbolised by **sx**, where **x** is the symbol of the hitting F, etc. The signs thereby will have a sequence as follows:

1. S (if it is two-handed) + indicators of the type of symmetry/QO of the passive hand
2. spacing
3. body consonant / vowel + l/b (Location)
4. optional point (Contact)
5. Q (Configuration)
6. m (Orientation) + orientation vowels
7. D consonant + direction vowel/s
8. F consonant/s + direction vowel/s

We have left the representation of Q for the end. To a certain extent, it is the easiest, insofar that every finger, except the ring finger, has a symbol, and it is easy to use diacritical symbols to indicate the features of flexion (´), union (`), contact (^) and link (¨), and to distinguish from the order of the fingers if the shape is open-handed (as in POLVO, *dust*) or close-fisted (as in MINUTO, *minute*).

The method presented here is completed with certain rules for the simplification of location and orientation, based on considering certain locations or orientations 'natural' and not symbolising them. Thereby, writing Spanish Sign Language becomes very easy.

We use the following two rules for the simplification of locations (not written):

a) Simplification of the **ol** central location of most two-handed signs.
b) Simplification of the lateral location (**ab, eb, ib, ob, ob, yb**) when the hand is in its natural position following on from the arm (**òma**, instead of **abòma**; **òmi**, instead of **ilòmi**, etc)

We use the following two rules for simplifying orientation:

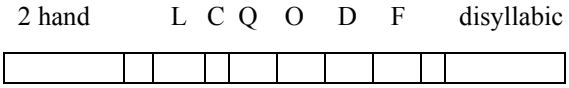
a) Simplification of the orientation when the location is a part of the body, and the palm is oriented towards that location (e.g. **ynò**, rather than **yòmi**)
b) Simplification of the **me** orientation when the sign is made in **eb**, as occurs in many signs such as PISTOLA *(pistol)*, BASTON *(walking stick)*, REGULAR *(regular)*, etc.

Lastly, we simplify L and O by using only diacritical and numerical signs.

The possibility of alphabetical writing has been tested, writing all the signs contained in Spanish Sign Language dictionaries, particularly Pinero's dictionary (1989), and also in the translation of several texts, including poetry, and in teaching the method to groups of signers. However, as we have stated already, writing is not a reproduction of spoken language: it is a representation, a record, with its advantages and limitations, of the spontaneous act of signing. The lack of a prosodic representation of the writing of many oral languages is a limitation, particularly from the point of view of non-literate persons, although this limitation, related with the lack of context and the non-presence of the interlocutors, makes the written message very suitable for reflection, and very open to interpretation.

Writing signed spontaneous conversation generally involves adopting certain other symbols, particularly Location. According to Liddel (1990), in addition to the phonological places where said lexical signs are located (10 in the signing space and 32 on the body), there also exist anaphoric grammatical spaces and descriptive, analogical or topographical spaces, which copy the real situation of objects in real space, and are used in blended spaces in descriptions. There are no problems in applying the projection model to represent grammatical locations; descriptive locations may be represented by means of directional repetitions, but if this is not possible, they will have to be paraphrased by writing "to the left," "crossed," etc. This is also the case with many non-manual expressions describing modality, i.e. doubt, certainty, etc.

We now give the writing for certain Spanish Sign Language signs of different phonological composition. Disyllabic signs are written with a hyphen; L and/or O simplified using the rules mentioned above are written in brackets:



amor (love)		**yn**	**i** (mi)			
cauce (course)	**sm**	(ol)	**ò** (me)	**se**		
rubio (blond)		**c**	**i** (miu)	**zo**		
teoría (theory)		**t .**	**T** (ma)	**wruhob**		
espada (sword)		(eb)	**aë meu**	**cre**	**- we**	
libro (book)	**sc**	(ol)	**ò** (me)	**creb**		
sordo (deaf)		**r**	**e** (mau)		**- v**	
Portugal	**sm**	**pn**	**a miu**	**zuy**		
ayer (yesterday)		**hm.**	**oa** (maa)	**daheb**		
casi (almost)		(eb)	**aë mea**	**grel**		
dar (to give)		**y .**	**aë mo cea**			
China		**yn**	**e** (mo)	**zy**	**- zu**	
bilinguismo (bilingualism)	**so'ami**	**ei mau**	**wu gre**			

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