Lexical processing in Spanish Sign Language (LSE) ☆

Manuel Carreiras [a,*], Eva Gutiérrez-Sigut [a], Silvia Baquero [a,b], David Corina [c]

[a] *Instituto de Technologias Biomédicas, Universidad de La Laguna, 38205 Tenerife, Spain*
[b] *Universidad Nacional de Colombia, Colombia*
[c] *University of California, Davis, USA*

Abstract

Lexical access is concerned with how the spoken or visual input of language is projected onto the mental representations of lexical forms. To date, most theories of lexical access have been based almost exclusively on studies of spoken languages and/or orthographic representations of spoken languages. Relatively few studies have examined how lexical access takes place in deaf users of signed languages. This paper examines whether two properties, lexical familiarity and phonological neighborhood, which are known to influence recognition in spoken languages, influence lexical access in Spanish Sign Language—*Lengua de Signos Espanola* (LSE). Our results indicate that the representational factors of lexical familiarity and phonological neighborhood can be observed in native and non-native deaf users of LSE. In addition, the present data provides evidence for the importance of sub-lexical properties in sign language processing.
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A psycholinguistic theory of lexical access is a theory about how language users map acoustic or visual linguistic tokens onto mental lexical representations. Theoretical models of lexical access are constrained by the exact realization of this process as it occurs across contexts, modalities and languages. To date, most theories of lexical access have been largely based on studies of spoken languages, or the orthographic representations of spoken languages (mainly alphabetic orthographies). Relatively few studies have examined how lexical access takes place

in users of sign languages and no formal models of sign language lexical recognition currently exist. The existence of languages expressed in different modalities (i.e., oral-aural, manual-visual) provides a unique opportunity to explore and identify those properties that all human languages share and those that arise in response to the modality in which the language is expressed. This paper examines whether two well-documented lexical-representational properties known to affect recognition in spoken languages, lexical familiarity and phonological neighborhood,[1] influence lexical access in Spanish Sign Language—*Lengua de Signos Espanola* (LSE) (see Muñoz, 1999; Rodríguez, 1992 for sources about LSE). The results of these studies provide novel insights into how structural and experimental factors may interact with lexical recognition. Documentation of these findings is important for the emerging field of sign language psycholinguistics, to help guide the development of formal models of sign recognition. In addition, the data are discussed in relation to well-accepted properties of the current models of spoken languages.

Signed languages of deaf communities

Signed languages of deaf communities are naturally-occurring human languages. Signed languages are not universal and, just as there are many different spoken languages, there are also many separate, autonomous signed languages. Despite the differences in language form, signed languages have formal linguistic properties like those found in spoken language.

However, linguistic and especially psycholinguistic research of sign languages is still in its infancy. For example, American Sign Language (ASL), the most studied sign language in the world, has been regarded as an autonomous and linguistically-complex language only for about 30 years (Klima & Bellugi, 1979; Lane, 1984; for a recent review, see Emmorey, 2002). The seminal work of William Stokoe classified each sign according to the shape of the hand, location in relation to the body, and movement in space (Stokoe et al., 1965). These separate dimensions of sign formation came to be known as "parameters." Subsequent work by Battison (1978) argued for the inclusion of handshape orientation as an additional parameter. The use of these parameters to describe the world's sign languages is now common practice. Over the last few decades, researchers have elaborated linguistic models of ASL

structure, proposing models that encompass its phonological, morphological, syntactic, and prosodic properties. Descriptions of sign languages from these formal linguistic models help to identify those properties of sign languages common to all human languages, as well as to isolate the properties reflecting the unique structure of a human language which is manually articulated and visually perceived (see Sandler, 1993).

In spoken languages, words are comprised of segmental phonemic units (i.e., consonants and vowels) and languages vary in the inventory and composition of the phonemic units they employ. In signed languages, *handshape, location, movement* and *orientation* are the essential building blocks of sign. Signed languages vary from one another in the inventory and composition of the elements drawn from these formational parameters. Formal descriptions of spoken and signed languages permit theoretically-driven statements of structural similarity. For example, in spoken languages, it is possible to categorize words that have a "long e" sound or the phoneme sequence /a/ /t/, while in sign languages one may categorize signs that contain a "five" handshape, or touch the chin, or have a repeated circular movement. By making use of these structural descriptions of sign languages, we can begin to explore the impact of the lexical properties of sign language recognition in ways that are similar to studies of spoken languages. For instance, as happens in spoken languages, signed languages contain lexical forms which may be quite similar to one another and which induce finer and more difficult discriminations the more similar they are (see Hildebrandt & Corina, 2002 for some discussion, and Fig. 1 for an example of the contrastive power of handshape in LSE). Therefore, as in spoken word recognition, similarity between signs may have processing consequences.

Psycholinguistic studies of sign recognition

Sign languages present an opportunity to explore the psychological mechanisms required to decode the linguistic signal when language is expressed in another modality. Ultimately, the comparisons of signed and spoken language processing will be useful for determining whether the mechanisms posited for models of spoken language recognition are unique to speech processing or reflect general properties of the language recognition system. However, only a few psycholinguistic studies of on-line processing in signed languages exist (see Emmorey, 2002 for a recent review of psycholinguistic studies of ASL) and only a small subset of these have directly addressed lexical recognition. Some general properties and mechanisms used in models of spoken recognition (e.g., spreading activation, inhibition, thresholds, cohorts, etc.) have been used in explanations of sign recognition phenomena. It is important to note

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[1] Strictly speaking, the correct term would be *cherological* neighborhood after Stokoe, Casterline, and Croneberg (1965). However, we will use *phonological* neighborhood as it has been used in more recent treatment of structural properties of signed languages.