Analyzing the relationship between phonological and semantic features in a corpus of astronomical neologisms in LSQ

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Although the study of the sublexical organization of signs is younger than that of spoken words, most sign language phonologists now agree that signs exhibit internal phonological organization (e.g. Sandler, 2012). While the presence of a phonological level is not modality-dependent, modality does have an impact on the phonological structure of languages, as illustrated by the significant incorporation of simultaneity into the organization of sign languages compared to what is found for spoken languages (e.g. Fenlon et al., 2017). Modality also allows a greater representation of iconicity in sign form (e.g. Östling et al., 2018; Taub, 2012). Due to the centrality of iconicity, the link between phonology and semantics seems prominent in some signs, as is the case of classifier signs, which are categorized by Fenlon et al. (2017) as part of the non-core lexicon, in that they are composed of meaning-bearing units, as against the core lexicon. Also known as depicting signs (Liddell, 2003), non-core lexicon signs would allow for a more direct link between the referent and the linguistic form.

Some linguistic contexts are particularly characterized by that direct link between referent and linguistic form. This is the case, for instance, for the lexicon of emerging languages (Coppola, 2020; Horton, 2020), even if they are known to evolve more rapidly than more established sign languages (Meir et al., 2012), and for neologisms where the form of signs can be considered still unfixed or evolving, in the process of entrenchment, conventionalization, and acceptance (e.g. Langacker, 2005; Schmid, 2015). In this study, we focused on the sublexical structure of neologisms in LSQ (Quebec Sign Language). More precisely, we observed the link between phonology and semantics in a set of 99 neologisms in the scientific domain of astronomy. Considering the iconic potential offered by the visual and spatial modality of sign languages, we ask: does semantic motivation, and more precisely iconic motivation, influence the formation of structural components of signs (place of articulation (POA), movement and handshape) for lexical creation of astronomical signs in LSQ? Given the semantic domain for which the neologisms were created, one that denotes physical, concrete objects, we hypothesize that the three major structural components will be driven by iconicity. As astronomy is the science that studies celestial body, spherical objects located in space and primarily in motion, we posit three specific hypotheses: the POA will be distal (H1), the movement will involve a path (H2), and the fingers of the handshape will be curved (H3).

This study is based on a corpus developed by a team of native signers for whom LSQ is the reference language. In collaboration with an astronomer, the team proposed 99 neologisms to name 49 astronomical concepts from the International Astronomical Union list (see this link). Each major structural component was described according to its shape features and, like Pietrandrea (2002), we indicated the semantic contribution of each feature, i.e., whether a feature is meaningful, motivated by the shape of the represented object, or not. We described five handshape features (number of selected fingers, nature of selected finger(s), fingers position, spacing between the fingers, and thumb position), two POA features, area (face, body or signing space) and position (on the *x*, *y*, and *z* plane), and five movement features (nature, geometric form, temporality, oscillation, and direction of the movement). Within a corpus driven approach, we used two types of statistical measures, a statistical method of exploratory factor analysis, the multiple correspondence analysis (MCA) (Sourial et al., 2010), and a chi-square analysis in order to verify whether the difference between the counts of different variables is significant or not.

The descriptive analysis of the phonological features of these neologisms shows that although all signs are semantically motivated, iconicity is not evenly distributed across phonological components and features. We observed a use of classifiers for the creation of new lexical items. All handshapes of these signs include in their sublexical structure at least one

iconic feature, mainly the [curved] feature of the selected finger position. While formed of phonological elements, handshape seems to behave as a morpheme in the creation of new signs, i.e., as a morpheme allowing the classification of a spherical entity. The semantic domain thus influenced the shape features of handshape, confirming hypothesis 3. As for movement and place of articulation, their use in the creation of these neologisms is less prominent. The movement allows, in half of the cases, to iconically represent the shape of the referent or its spatial motion, whereas the POA is mainly realized in the neutral space and does not participate in the representation of the referent, thus refuting hypothesis 1. We find that, in the case of the astronomy neologisms in LSQ, the handshape is an iconic structural component, while the POA is mainly neutral. For movement, the distribution of iconic interpretation is not as clear as for the two other components. This suggests that sublexical components cannot per se be interpreted as bearing iconicity or as being exempt of iconicity. Findings from our analysis echo what has been proposed by van der Hulst & van der Kooij (2021), namely that a feature can be semantically motivated and that "semantic/iconic factors play an overriding role in the emergence of the phonological form of signs" (p. 22). Certain sublexical components are more likely to be iconically motivated, and in the case of astronomical signs, these are handshape and, maybe, movement. It should be noted that the notion of distance included in the majority of the referents in the corpus is represented by, among other things, the arrangement of the hands.

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