

Syntactic Categorization in Sign Languages*

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Abstract

Human language can be signed or spoken. Thus, we should only consider as fundamental those properties of language that hold in both of these equipotential modalities. Modality-specific properties of either sign or speech must instead be attributed to the interaction of the linguistic system with the systems of production and perception. This chapter explores both the modality-independent and the modality-dependent properties of syntactic categorization in sign languages. Categorization of linguistic expressions and the use of categorical properties to determine syntactic distribution and guide syntactic structure building appear to be modality-independent properties of language, as are the broad categorical divisions attested (e.g., lexical vs. functional, noun vs. verb). When the examination turns to fine-grained categorical or sub-categorical distinctions and the actual morpho-syntactic patterns that distinguish these categories within a given language or class of languages, however, certain patterns of modality-dependence do emerge, such as the sign language preference for simultaneous (vs. sequential) structure. Nevertheless, as in other areas of language study, the patterns attested in syntactic categorization in sign languages overlap significantly with those documented in spoken languages. This provides

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further support for the proposal that the properties of human language are not primarily driven by the modality of transmission but are only secondarily beholden to it.

Key Words

sign language, syntax, morpho-syntax, modality, categories, lexical, functional, noun, verb

1. Categories across modalities

A question of paramount importance in the language sciences is whether the principles and generalizations of the field – principles and generalizations developed primarily on the basis of spoken language data – are applicable to sign languages. Signed languages are undeniably natural human languages that parallel spoken languages in terms of both developmental trajectory and ease (Newport and Meier 1985; Bellugi 1988; Meier 1991; Petitto and Marentette 1991) as well as the primary areas used for psycholinguistic processing and neural storage (see Emmorey 2002 as well as Dye 2012 and Corina and Spotswood 2012 for an overview of findings in this area). Moreover, since the earliest works in contemporary sign language research (Stokoe 1960, Klima and Bellugi 1979), linguistic study has regularly revealed parallels in the structure of language across its two modalities. Thus, language as a function of the human mind is not dependent on the modality of transmission. This means that the only acceptable generalizations about language are those that hold for both sign and speech. Differences across the modalities and patterns that hold only for speech or only for sign must then be attributed to the fact that our capacity for language necessarily interacts with and is constrained by the production and perception systems that happen to be used. Here, it is important to remember that both sign and speech are equally susceptible to modality-specific effects: there may be patterns in spoken language that arise due to the constraints and affordances

of aural-oral transmission just as there may be patterns in sign language that arise due to the constraints and affordances of visual-gestural transmission. Importantly, so-called modality-specific effects may take the form of patterns of preference across the two modalities. That is, differences across the modalities may not be differences of kind, but may instead be differences in which typological patterns are more commonly attested in sign versus speech. Given the focus of the present chapter, it is the modality-specific properties of sign languages that will be highlighted.

This chapter explores the modality-independent and modality-dependent properties of syntactic categorization in sign languages, a fundamental property of language (Jackendoff 2002) that has consequences for morphological, syntactic, and semantic structure. In the domain of syntactic categorization, linguistic findings must be critically evaluated on two dimensions to assess their portability to sign language study. First, are the methodologies used to identify and distinguish syntactic categories appropriate to the study of signed languages? The evidence traditionally used in the study of syntactic categorization are the distributional behaviors — where an element ‘goes’ in the sentence in terms of its syntactic placement and morphological markers — that characterize a given category and distinguish it from other categories in the grammar. This type of evidence proves to be appropriate for the study of language, regardless of modality, though the specific behaviors and patterns used to distinguish categories may be influenced by modality. Second, do sign and spoken languages have the same syntactic categories? Though similarity of category inventory is a controversial topic even within the study of spoken languages, as discussed in the chapters by Travis and Gil in this volume, the claim here will be that the primary categorical distinctions proposed for spoken

languages are also evidenced in sign languages. Indeed, variation in the categories attested in sign languages is well within the variation attested in spoken language. Section 2 discusses the distinction between lexical and functional categories (evident even in Gil's discussion of Riau Indonesian) and the chapter turns next to distinctions within the group of lexical categories, presented in section 3. One predominant cross-linguistic pattern in sign languages, focused on in section 4, is the systematic, morpho-phonologically marked alternation between certain categories, primarily nouns and verbs. Throughout the discussion, a theme that emerges is that sign-level units are themselves likely to be morpho-syntactically complex, as addressed in section 5. Clearly, the analysis of sign languages is necessary to develop an understanding of human language. In undertaking this analysis we do find some interesting differences between sign and speech but also many striking parallels across the modalities.

2. Lexical vs. functional categories in sign languages

One broad categorical distinction in human language is the one that separates elements of lexical categories from those that are members of functional categories. Lexical categories are the more contentful, relatively open-class items that may include nouns, verbs, and adjectives as well as sub-classes within these categories. Functional categories are the comparatively less contentful and relatively closed-class items that may include elements such as articles, auxiliaries, and degree markers. As this non-exhaustive category listing suggests, lexical and functional elements may be viewed as coming in pairs of lexical elements and their corresponding functional categories: e.g., nouns and articles, verbs and auxiliaries, or adjectives and degree markers.¹ Lexical categories bear the brunt of the

¹ Like the initial category lists, these pairings are also non-exhaustive.

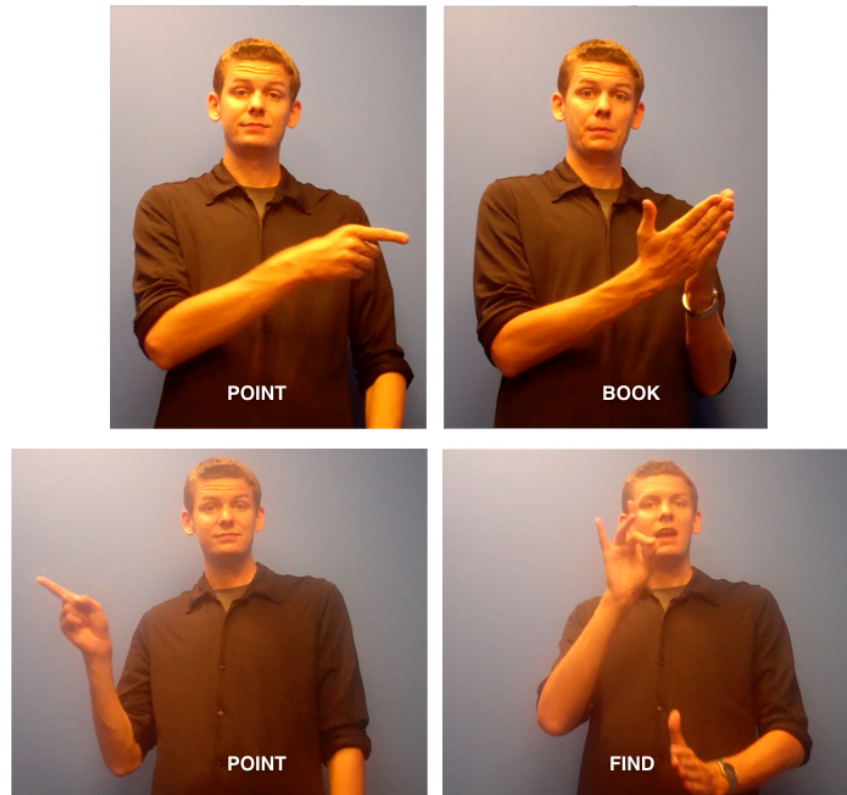


Figure 1. Examples from ASL of a pointing sign co-occurring with an overt nominal (top) as part of a nominal constituent (NP/DP) or as a standalone item with a pronominal function (bottom) serving as the argument of a predicate (FIND).

burden when it comes to providing the content of linguistic expressions. Functional categories are responsible for building the morpho-syntactic skeleton of these expressions, though the functional categories are not entirely devoid of semantic meaning. The picture here is somewhat simplified and the division between lexical and functional material is, in reality, somewhat blurry. Nevertheless, a division like this seems to be generally true in human language.

Furthermore, this distinction is present regardless of the language modality. A distinction between lexical and functional categories is not only present in sign languages but these lexical and functional categories seem to be paired as part of the same domain of morpho-syntactic structure, just as they are in spoken languages. Though no documented sign language makes use of an obligatory article such as those familiar from Indo-European

languages (a locus of variation well-attested in spoken languages), functional material of the nominal domain is attested in sign languages. As illustrated in Figure 1, indexical pointing signs frequently co-occur with overt nouns and may also be used alone with a pronominal function (see Steinbach this volume).² These functions of pointing signs may have roots in gestural communication and are likely a sign language universal, attested even in sign languages that have not grammaticalized other uses of space (see Aronoff et al. 2005 for ABSL and de Vos 2012 for Kata Kolok). Though there is controversy as to the exact syntactic status of indexical pointing, especially when it co-occurs with an overt nominal, there is little doubt that it is part of the functional nominal domain and increasingly convergent evidence that pointing signs in many sign languages function on a par with demonstratives (see Abner to appear *a* for a recent overview). In many sign languages, these pointing signs may also be used to indicate possessive relations. For example, a point to the signer (POINT₁) followed by the noun sign FATHER may express the possessive relation ‘my father’ in Flemish Sign Language (De Weerdt and Vermeerbergen 2008). This may be one of several strategies for expressing possession in the language and oftentimes there are functional signs with a specifically possessive meaning (see contributions to Zeshan and Perniss 2008). Question formation is a universal property of human language and sign languages all exhibit a closed-class of items with an interrogative meaning (see Zeshan 2004 for an overview), though the inventory of items with this function may vary across (sign) languages (Aboh, Pfau, and Zeshan 2005). Across sign languages, there are overt

² The labels in the figure and in the remaining examples use the convention of glossing signs with their spoken language (here, English) translation equivalent (e.g., FIND). To disentangle glossing from linguistic analysis, analytically-neutral form-based glosses (e.g., POINT) are sometimes used. Where multiple words are necessary to capture the meaning of a single sign, they are connected with a hyphen in the gloss (e.g., PUT-ON-RING).

morpho-syntactic means for marking degree and degree comparison (e.g., Aristodemo and Geraci 2015), conjoining and disjoining linguistic constituents (e.g., Davidson 2013), marking the relation between clauses (see Tang and Lau. 2012 for an overview), indicating the time or aspect of a predication (e.g., Zucchi 2009), and even, in some cases, marking the gender of predicate arguments (Osugi 1999, Smith 1990) or functioning as a copular element (Jónsson et al. 2015). Thus, functional signs and functional morphology are robustly attested in sign languages.

Nevertheless, there are certain morpho-syntactic markers that are characteristically rare or unattested in sign languages. Case morphology has not been documented in sign languages (see Meir 2002 for a potential counterexample), nor has the use of obligatory tense and number marking, and evidence for gender marking and overt copulas is likely limited to the aforementioned cases. A morpho-phonologically marked distinction between second and third person appears to be lacking across sign languages (Meier 1990) and, while sign languages frequently exhibit agent omission structures with passive-like meaning, no equivalent of passive morphology has been documented. Consequently, sign languages are frequently associated with a relative dearth of functional material. As suggested above, however, this is not a distinction of kind. Rather, languages seem to fall along a grammatical spectrum from those that make extensive use of overt functional elements and intricate morphological paradigms to those that make relatively little use of such items. Sign languages simply cluster near one end of this spectrum, as is observed in other typological classes.³

³ This preference may be influenced by the interaction of working memory limitations with the relatively slow rate of sign language production due to the size of the articulators involved (Klima and Bellugi 1979, Chapter 8).

Interestingly, the distinction between lexical and functional elements is also reflected in patterns in the phonological structure of these two types of linguistic elements. Just as lexical elements tend to be the more semantically contentful elements of language, they also tend to be the more phonologically contentful, whereas functional elements tend to be phonologically reduced across languages. Not only is the lexical-functional divide present in sign languages, but the distinction between these two categorical types in sign is also reflected in their phonological asymmetry. Functional material in sign languages tends to be phonologically reduced and evidence from language acquisition suggests that this asymmetry in phonological size may be an integral part of language design. Stack (1999) researched the language development of Jamie, a deaf child of hearing parents whose parents were exposing her to Signing Exact English (SEE II). SEE II is an artificially created manual communication system intended to represent English with the hands and therefore to serve as a scaffold for a deaf child's acquisition of English. SEE II uses the basic vocabulary of ASL and introduces new signs to fill any gaps in both the content and functional vocabulary. In many cases, the functional material of English is represented as a sequence of independent signs from the fingerspelling system. For example, the progressive ending *-ing* would be represented as the fingerspelled sequence -I-, -N-, -G-. Not only do systems like SEE II frequently fail to make use of the seemingly natural grammatical strategies of sign languages, such as the incorporation of space and facial expression for grammatical purposes (see below), but such attempts to fill in the 'gaps' in functional vocabulary (spoken languages are known to vary in regards to which functional distinctions are overtly marked) blur the phonological divide between functional and lexical material. A fingerspelled sequence such as -I-, -N-, -G-, for example, would be

comparable to a trisyllabic sign. Functional material such as this is phonologically large, especially for a class of languages that strongly prefers monosyllabic lexical items (Coulter 1982). While Jamie was able to acquire the more linguistically natural components of SEE II, and to do so along a relatively normal developmental time course, her acquisition of these linguistically unnatural functional elements was severely impaired. Moreover, in their place, Jamie sometimes innovated phonologically reduced functional material similar to that found in natural (sign) languages, confirming that the language system does indeed exhibit biases in the pairing of phonological form and category type.

One of the mechanisms of phonological reduction of functional material in sign languages is the simultaneous (vs. sequential) production of morpho-phonologically complex material. In the manual channel, a single phonological parameter (handshape, movement, location, palm orientation) may be used to mark a significant distinction as part of a monosyllabic albeit morphologically complex sign (Sandler 1989, Sandler 1993, Sandler 1999). For example, many verbs in sign languages move across space as part of their phonological specification (_{start}MOVEMENT_{end}), a property that derives from little more than simply how the physics of movement works. However, the properties of movement may be modified in linguistically significant ways. For example, the starting or ending point of the spatial trajectory may be used to indicate verbal agreement with an argument (e.g., _{subject}MOVEMENT_{object}). Functional material is also frequently produced simultaneously with the manual signs as part of the non-manual channel of sign language communication. For example, many sign languages have been observed to allow sentences to be grammatically negated with only a non-manual headshake and no accompanying manual grammatical marker of negation (Zeshan 2004). This may be a difference of kind, and one that is almost

certainly grounded in the modality. However, a cross-modal parallel likely exists between the non-manual channel of sign languages and the suprasegmental features of spoken language, such as tone and prosody, which may be used to mark functional distinctions.

3. Lexical categories in sign languages

Within the domain of lexical categories, a primary distinction may be made between categories which are nominal and those that are non-nominal. Differing explanations have been offered for this pattern (see, for example, Baker 2003 and Kayne 2008), many of which draw on the observation that this grammaticalized distinction reflects the primacy of the conceptual distinction between objects in the world and relations or actions (Gentner 1981, Bloom 1990). The former are most naturally encoded as nominal categories, which serve a primarily referential function, and the latter as non-nominal categories, which serve a primarily predicative function. The conceptual basis of this distinction suggests that it will be relatively immune to modality-specific effects, a suggestion that is borne out by the empirical findings. In fact, the distinction between nouns and verbs is present even at the earliest stages of language development. Goldin-Meadow et al. (1994) found evidence that a child homesigner⁴ distinguished nouns and verbs in his gestural communication system and, moreover, that this distinction was not fully attributable to a conceptual object-action distinction and was more appropriately characterized as the emergence of a grammatical noun-verb contrast. Thus, sign languages and emerging sign communication distinguish nominal and predicate categories. Here, I note some of the morpho-syntactic properties that characterize these two category types across sign languages.

⁴ A homesigner is a deaf individual who cannot acquire the ambient spoken language due to his or her deafness and is not exposed to a conventional sign language. Consequently, the individual innovates an idiosyncratic gestural system to communicate with the (hearing) people in his or her life.

3.1 Nominal Categories

As noted above, linguistic characteristics of nominal elements may arise from their primary function as individual-denoting referential expressions. For example, individuals can be organized in specific quantities and in ASL only nouns can be modified by quantifier expressions such as SCADS, SMALL-AMOUNT, and numeral signs (Padden 1988). A related pattern has also been observed in emergent sign languages. In both Zinacantecan family homesign (Haviland 2013) and Al-Sayyid Bedouin Sign Language (ABSL, Tkachman and Sandler 2013) signs for objects commonly co-occur with a separate classifier-like sign that indicates the size and shape or the method of manipulating the object referred to by the noun – for example, LIPSTICK STRAIGHT-OBJECT (ABSL, adapted from Tkachman and Sandler 2013:270) or SMALL-OBJECT CHICKEN TWO (Zinacantecan family homesign, adapted from Haviland 2013, Figure 15). Again, these classifier-like signs serve as a grammatical means of indicating the individuation of the nominal. Likewise, many sign languages use reduplication as a morphological means of marking plurality in the nominal domain (see Steinbach 2012 for an overview), whereas it functions in the predicative domain as a marker of pluractionality. Finally, as canonically individual-denoting referential expressions, nouns are commonly distributed in argument positions across languages, both signed and spoken, though a detailed discussion of word order patterns in sign languages is outside the scope of the present chapter.

Because nominal elements are clustered semantically around individual denotation, they also resist the morpho-syntactic properties associated with predicative categories. For example, nouns in Quebec Sign Language cannot co-occur with the headshake that functions as a negation marker (Bouchard et al. 2005). In Israeli Sign Language (ISL, Meir

2004), however, there are distinct signs for negating nouns (NEG-EXIST), verbs (ZERO), and non-verbal predicates (i.e, property signs, NOT). Nominal elements are also distinguished in their use of referential space. Whereas predicate elements may incorporate an established spatial location to indicate agreement with an argument, nominal elements may be associated with their own spatial location. That is, association with spatial location is dependent in the predicative domain but independent in the nominal domain.

3.2 Predicate Categories

Again, as predicates with syntactic arguments, predicative categories in sign languages may make use of dependent referential space. As noted above, predicates may move between two distinct meaningful spatial locations to indicate both subject and object agreement (e.g., _{subject}MOVEMENT_{object}). However, they may also meaningfully move toward only a single location to indicate agreement with only a single argument (Meier 1982, Padden 1988). Alternately, predicate signs may be relatively statically located in meaningful spatial locations. That is, instead of moving between or toward spatial locations, the predicate may be wholesale displaced to a spatial location associated with a referent. This process is common with adjectival and intransitive predicates and has recently been analyzed as another variant of argument agreement by Costello (2016). Typologically, sign languages tend to exhibit little evidence of a categorical distinction between adjectival and verbal predicates (again, a pattern attested in many spoken languages). If the spatialization present in adjectival predicates is indeed exponents of the same syntactic process observed with verbal predicates, then this too provides evidence for the distributional similarity of these predicate types.

Other morphologically meaningful uses of space are also found in the predicative domain. For example, reduplicative processes may be used to indicate pluractionality and other aspectual information (Fischer 1973, Klima and Bellugi 1979, Rathmann 2005, Wilbur 2009) and these processes are similar, though not identical, in many sign languages. In fact, like the noun-verb contrast, reduplication for pluractional meaning has also been documented in homesigners (Coppola et al. 2013). Wilbur (2010) proposes that processes like this in sign languages may be cross-linguistically similar in both form and meaning due to the affordances and pressures of the visual-gestural system and its greater potential for iconicity. For example, event structural properties of predicates are frequently marked in the surface form of the predicate sign (Wilbur 2003). One common, though not universal (Malaia, Wilbur, and Milković 2013), pattern is to associate atelic predicate signs with repeated movement and telic predicate signs with movement that is bounded in form or end-marked. The non-arbitrary form-meaning connection in these event structural markings is evidenced by the fact that even hearing non-signers are sensitive to them and able to infer information about telicity from the form of a sign (Strickland et al 2015).

Argument structure distinctions may also be reliably marked in the form of signs. For example, in ASL certain predicates may use handshape to encode distinctions in argument structure. As in the ABSL and Zinacantecan family homesign patterns mentioned above, these handshapes are part of the classifier system. Single argument predicates with an agentive argument (unergative) may be produced with a handshape that represents a body part, such as a fist handshape to represent the head of a human. Single argument predicates with a non-agentive argument (unaccusative) may be produced with a handshape that represents the size and shape of the whole object, such as an extended

index finger handshape to represent a whole human body. Finally, predicates with both an agentive and non-agentive argument (transitive) may be produced with a handling handshape that represents how the agentive argument manipulates the non-agentive argument, such as a cupped hand to represent a human holding a book. These findings have also been replicated in Italian Sign Language (Mazzoni 2009) as well as Nicaraguan homesign and Nicaraguan Sign Language (Brentari et al 2015, Goldin-Meadow et al. 2015). Because these handshape distinctions are incorporated into the predicate sign, they also exemplify the strategies sign languages use to increase morphological complexity without adding to the phonological size of a sign.

4. Categorical alternations in sign languages

The grammaticalized distinction between nouns and verbs is a fundamental and likely invariant property of language. What is potentially variable across languages are the morphosyntactic properties that characterize nouns and verbs. One such morphosyntactic property that is common across sign languages is the existence of noun-verb pairs that are related in form. Sign languages with this property contain a class of semantically related noun-verb pairs (e.g., [N FLY], [V AIRPLANE], shown in Figure 2) that are also morpho-phonologically similar and, moreover, consistently use specific morpho-phonological markers to mark the lexical category of each member of the pair. This type of noun-verb relatedness was first documented by Supalla and Newport (1978) for ASL. In ASL, the movement properties of the verbal members of the pairs may vary, but the movement of the nominal members is consistently shorter than their verbal counterpart, repeated, and produced with increased muscular tension. Though Supalla and Newport documented this phenomenon for verbs and corresponding concrete object-denoting nouns, subsequent



Figure 2. A pair of formationally and semantically related verb (left) and noun (right) signs in ASL.

work by Klima and Bellugi (1979), Launer (1982), Brentari (1998), and Abner (2012, to appear *b*) extended the class to include noun-verb pairs in which the nominal member has an abstract referent (e.g., COMPARE/COMPARISON).

Comparable patterns are attested in spoken language (e.g., *có*vert, *convért*), but the phenomenon in sign languages seems to be not only typologically robust and highly productive, but also quite cross-linguistically similar. Repetition of movement is also used to mark the nominal member of similar noun-verb pairs in Russian Sign Language (RSL, Kimmelman 2009), Australian Sign Language (Auslan, Johnston 2001), and Jordanian Sign Language (LIU, Hendriks 2008). In LIU and Israeli Sign Language (ISL, Tkachman and Sandler 2013), nominal members of the pairs also exhibit the increased muscular tension observed in ASL. Likewise, in RSL, Auslan, and Italian Sign Language (LIS, Pizzuto and Corraza 1996), the verbal members of the pairs are produced with larger movements relative to the nominal members. The pattern is not, however, universal. There is cross-linguistic variation in whether or not a given sign language exhibits this kind of noun-verb distinction, which noun-verb pairs are part of the paradigm, and the specific formational

characteristics used to distinguish nouns and verbs. In Turkish Sign Language (TİD, Kubus 2008) and the Sign Language of the Netherlands (NGT, Schreurs 2006), the absence of movement repetition characterizes nominal members of such pairs, while in LIS, Austrian Sign Language (ÖGS, Hunger 2006) and TİD the pairs are additionally distinguished by the longer duration of the verbal members. In ÖGS, Auslan, RSL, ISL, and Quebecois Sign Language (LSQ, Voghel 2005), nominal members of the pairs are also more likely to co-occur with a mouthing corresponding to the spoken language equivalent of the sign.

Similar noun-verb contrasts have also been documented in emergent sign systems. Examining the homesign of a child in the United States, Goldin-Meadow et al. (1994) and Hunsicker and Goldin-Meadow (2013) found that the child homesigner, like signers of many conventionalized sign languages, tended to use bigger movements with verbs and to vary the handshape of his gesture dependent on whether or not it was labeling an object or action. These distinctions persist in adult homesign as recent work by Abner et al. (to appear) shows. Abner et al. used video stimuli to elicit object (noun) and action (verb) labels from adult homesigners in Nicaragua as well as three successive cohorts (~generations) of Nicaraguan Sign Language (NSL) users. In all four groups, nouns were distributionally distinguished from verbs in both word order (verbs occur utterance-finally) and form properties. All language groups tended to produce nouns with smaller movements than verbs. The two later generations of NSL users were also more likely to produce nouns with repeated movement. This pattern was not evident in the first generation of NSL users but was present in adult homesigners, though only for nouns with a semantically repeatable verbal counterpart. Moreover, in verbal signs, all groups were more likely to use the non-dominant hand to represent an additional argument of the

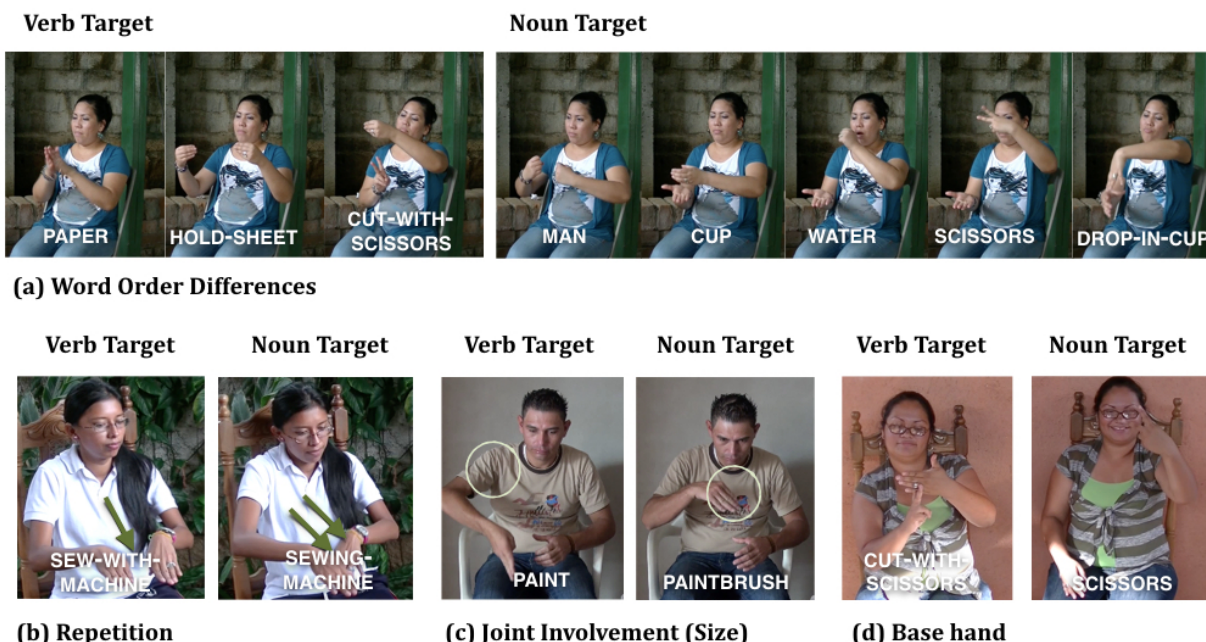


Figure 3. Distinctions between elicited nouns and verbs in adult Nicaraguan homesigners (c) and NSL users (a, b, d). The top image (a) illustrates the distributional difference: verbs (left) tend to appear utterance finally whereas nouns (right) tend to appear in non-utterance-final position. The bottom images illustrate the observed form differences: nouns tend to be produced with repeated (b), smaller (c) movements and verbs are more likely to incorporate the non-dominant hand as a base hand (d). In each of these pairs, the verbal item is on the left and the nominal item is on the right.

predicate ('base hand'), a pattern that grew stronger in later generations. Examples of these formational distinctions are provided in Figure 3. These results both confirm the primacy of a noun-verb contrast in language and show that the marking of this contrast within a language may nevertheless exhibit incremental development.

Despite variation in the specific formational properties used, there remains remarkable similarity across sign languages. First, many of the sign languages studied use a confluence of features to distinguish the nominal and verbal members of these pairs, yielding a system in which a cluster of phonological property provides convergent evidence as to the grammatical category of an item. Second, the convergent phonological properties that signal grammatical category include changes to the movement of the sign in virtually all of the sign languages studied (LSQ distinguishes these pairs only by concurrent

mouthings). Changes in movement have also been observed to underlay other categorical alternations in sign languages. For example, in ASL, some nouns, such as GIRL and BABY, can be turned into predicates that mean ACT-LIKE-NOUN by adding a static hold segment at the beginning of the sign and producing the movement of the sign with increased speed and tension. This verbalization process sometimes results in idiosyncratic meanings such as the alternation between CHURCH and PIOUS (Klima and Bellugi 1979). Within the predicative domain, this may also mark the morphological distinction between stative (RED, SICK) and inchoative (REDDEN, SICKEN) predicates. Findings in this domain reveal that there may be patterns and parameters of privilege when phonological properties are manipulated in morphologically significant ways – for example, there is no documentation of a sign language using location to distinguish grammatical category.

5. What are the categorical atoms?

A challenge for linguistic research is identifying the appropriate level or unit for analysis. A unique and defining characteristic of human language is that it is a generative system that has infinite capacity to productively combine and manipulate the atoms of linguistic structure. To understand such a system it is necessary that we identify what those structural atoms are. This is especially true in the domain of syntactic categorization, where the temptation may be to align categorical atoms with word-level units, akin to the parts-of-speech analysis presented in many educational and literacy discussions of ‘grammar’. Since Stokoe (1960), it has been acknowledged that sign languages exhibit sub-lexical structure and duality of patterning on a par with that exhibited by the phonetic and phonological patterns of speech. That is, sign languages have meaningless phonetic and phonological atoms that are productively combined to create meaningful units. What has

been somewhat more elusive in the domain of sign language study, however, is appropriate identification of systematic sub-lexical structure that is meaningful. Here, the study of sign languages benefits from the decompositional turn in syntactic analysis that began with Pollock's (1989) segmentation of the inflectional domain into distinct layers of structure associated with the subject and object arguments. Analyses of this type have increased our understanding of both the functional and lexical categories of human language and have helped to develop fine-grained maps of the syntactic structure underlying linguistic expressions, thereby expanding our ability to pinpoint and explain loci of cross-linguistic variation.

Decompositional analysis has revealed that what were once thought to be the atoms of syntactic structure may themselves be compositionally derived from smaller morpho-syntactic units. As the discussion to this point has foreshadowed, decompositional approaches are ideal for sign languages, where the compositionality may be obscured by the fact that meaningful pieces are frequently phonologically bundled as part of the same sign unit.⁵ For example, a single monosyllabic verbal sign may be composed of the multiple event and argument structure morphemes mentioned above: movement across space to indicating event durativity and process, end-marking to indicate event telicity, and handshape to indicate argument structure. Such forms are multimorphemic and highly compositional, as first noted by Supalla (1982) and recently explicitly connected to decompositional approaches to syntactic analysis. This is one area where the structural properties of sign languages may provide evidence of a unique kind. Event and argument

⁵ An additional methodological challenge in sign language research is taking care not to be analytically biased by the spoken language glosses, a concern that is also present in spoken language study when working with glossed and translated data.

structural properties have long been viewed as componential aspects of the syntactic structure, albeit with components that are rarely discretely identifiable in the speech signal. Sign languages, however, do frequently provide discrete evidence of syntactic componentiality and may provide crucial evidence for fine-grained structural patterns. Thus, not only does research reveal that the categorical parity across modalities is overwhelming, but even areas of apparent modality-specific effects can nevertheless shed light on universal and modality-independent properties of human language.

References

- Abner, N. to appear. Determiner Phrases – Theoretical Perspectives. To appear in J. Quer, R. Pfau, A. Herrmann (Eds.), *Routledge Handbook of Theoretical and Experimental Sign Language Research*. Routledge.
- Abner, N. to appear. What You See Is What You Get. Get: Surface Transparency and Ambiguity of Nominalizing Reduplication in American Sign Language. To appear in *Syntax*.
- Abner, N. 2012. *There Once Was a Verb: The Predicative Core of Possessive and Nominalization Structures in American Sign Language*. PhD thesis, University of California, Los Angeles.
- Abner, N., M. Flaherty, K. Stangl, D. Brentari, and S. Goldin-Meadow. The Noun-Verb Distinction in Established and Emergent Sign Languages. Unpublished manuscript, Montclair State University & University of Chicago.
- Aboh, E., R. Pfau, and U. Zeshan. 2005. When a wh-word is not a wh-word: The case of Indian Sign Language. *The yearbook of South Asian languages and linguistics, 2005*, 11-43.

- Aristodemo, V. and C. Geraci. 2015. *Comparative constructions and visible degree scales in LIS*. Presentation at Formal and Experimental Advances in Sign Language Theory (FEAST). Pompeu Fabra University, Barcelona, Spain.
- Aronoff, M., I. Meir, C. Padden, and W. Sandler. 2005. Morphological universals and the sign language type. In Booij, G. E., and J. van Marle (Eds.), *Yearbook of Morphology 2004*. Dordrecht: Springer, 19-39.
- Baker, M. C. 2003. *Lexical categories: Verbs, nouns and adjectives* (Vol. 102). Cambridge: Cambridge University Press.
- Bellugi, U. 1988. The acquisition of a spatial language. In F. Kessel (Ed.), *The development of language and language researchers: Essays in honor of Roger Brown*. Hillsdale, NJ: Lawrence Erlbaum Associates, 153–185.
- Benedicto, E. and D. Brentari. 2004. Where did all the arguments go? Argument-changing properties of classifiers in ASL. *Natural Language and Linguistic Theory* 22:1-68.
- Bloom, P. 1990. *Semantic structure and language development*. PhD thesis, Massachusetts Institute of Technology.
- Bouchard, D., C. Dubuisson, and A-M. Parisot. 2005. Categories in Quebec Sign Language: Reflections on Categorization Across Modalities. In Cohen, H. and C. Lefebvre (Eds.), *Handbook of Categorization in Cognitive Science*. Amsterdam: Elsevier, 381-400.
- Brentari, D. 1998. *A prosodic model of sign language phonology*. Cambridge, MA: MIT Press.
- Brentari, D., S. Di Renzo, J. Keane, and V. Volterra. 2015. Cognitive, cultural and linguistic sources of a handshape distinction expressing agentivity. *TopCS* 7(1): 95-123.

- Coppola, M., E. Spaepen, and S. Goldin-Meadow. 2013. Communicating about quantity without a language model: Number devices in homesign grammar. *Cognitive Psychology* 67(1): 1-25.
- Corina, D. and N. Spotswood. 2012. Neurolinguistics. In Pfau, R., M. Steinbach and B. Woll (Eds.), *Sign Language: An International Handbook*. Berlin: Mouton de Gruyter, 739-762.
- Costello, B. 2016. *Language and modality: Effects of the use of space in the agreement system of lengua de signos española (Spanish Sign Language)*. PhD Thesis, University of Amsterdam & University of the Basque Country.
- Coulter, G. 1982. On the Nature of ASL as a Monosyllabic Language. Presentation at the *Annual Meeting of the Linguistic Society of America*. San Diego, CA.
- Davidson, K. 2013. 'And' or 'Or': General Use Coordination in ASL. *Semantics & Pragmatics*, 6(4), 1-44.
- De Vos, C. 2012. *Sign-spatiality in Kata Kolok*. PhD Thesis, Nijmegen, Radboud University.
- De Weerdt, D. and M. Vermeerbergen. 2008. Observations on possessive and existential constructions in Flemish Sign Language. In Zeshan, U. and P. Perniss (Eds.), *Possessive and existential constructions in sign languages*. (Sign Language Typology Series No. 2). Nijmegen: Ishara Press, 195-211.
- Dye, M. 2012. Processing. In Pfau, R., M. Steinbach and B. Woll (Eds.), *Sign Language: An International Handbook*. Berlin: Mouton de Gruyter, 687-711.
- Emmorey, K. 2002. *Language, Cognition, and the Brain: Insights from Sign Language Research*. Mahwah, NJ: Lawrence Erlbaum Associates.

- Gentner, D. 1981. Some interesting differences between verbs and nouns. *Cognition and Brain Theory*, 4, 161-178.
- Goldin-Meadow, S., D. Brentari, M. Coppola, L. Horton, A. Senghas. 2015. Watching language grow in the manual modality: Nominals, predicates, and handshapes. *Cognition* 136: 381-395.
- Goldin-Meadow, S., C. Butcher, C. Mylander, and M. Dodge. 1994. Nouns and Verbs in A Self-Styled Gesture System: What's in A Name?. *Cognitive psychology*, 27(3), 259-319.
- Haviland, J. B. 2013. The emerging grammar of nouns in a first generation sign language: Specification, iconicity, and syntax. *Gesture* 13(3): 309-353.
- Hendriks, B. 2008. *Jordanian Sign Language: Aspects of grammar from a cross-linguistic perspective*. PhD Thesis, LOT, Utrecht.
- Hunger, B. 2006. Noun/Verb Pairs in Austrian Sign Language (ÖGS). *Sign Language & Linguistics*, 9(1-2), 71-94.
- Jackendoff, R. 2002. *The Foundations of Language*. Cambridge, MA: MIT Press.
- Johnston, T. 2001. Nouns and verbs in Australian Sign Language: An open and shut case?. *Journal of Deaf Studies and Deaf Education*, 6(4), 235-257.
- Jónsson, J., R. Sverrisdóttir, K. Thorvaldsdóttir, and S. Guðbjörnsdóttir. 2015. *BIDD: A sign language copula*. Presentation at Formal and Experimental Advances in Sign Language Theory (FEAST). Pompeu Fabra University, Barcelona, Spain.
- Kayne, R. 2008. Antisymmetry and the lexicon. *Linguistic Variation Yearbook* 8:1-31.
- Kimmelman, V. 2009. Parts of speech in Russian Sign Language: The role of iconicity and economy. *Sign Language & Linguistics*, 12(2), 161-186.

- Klima, E. and U. Bellugi 1979. *The Signs of Language*. Cambridge, MA: Harvard University Press.
- Kubus, O. 2008. *An analysis of Turkish Sign Language (TİD) phonology and morphology*. MA Thesis, Middle East Technical University.
- Launer, P. 1982. "A plane" is not "to fly". PhD Thesis, CUNY.
- Malaia, E., R. B. Wilbur, and M. Milković. 2013. Kinematic parameters of signed verbs. *Journal of Speech, Language, and Hearing Research* 56(5): 1677-1688.
- Meier, R. P. 1982. Icons, analogues, and morphemes: the acquisition of verb agreement in ASL. PhD thesis, University of California, San Diego.
- Meier, R. P. 1990. Person deixis in American Sign Language. In Fischer, S. and P. Siple (Eds.), *Theoretical issues in sign language research, Vol. 1: Linguistics*. Chicago, IL: University of Chicago Press, 175–190.
- Meier, R. P. 1991. Language acquisition by deaf children. *American Scientist* 79, 60-70.
- Meir, I. 2002. A Cross-Modality Perspective on Verb Agreement. *Natural Language and Linguistic Theory* 20: 413-450.
- Newport, E. and R. P. Meier. 1985. The acquisition of American Sign Language. In Slobin, D. (Ed.), *The cross-linguistic study of language acquisition*. Hillsdale, NJ: Lawrence Erlbaum Associates, 881–938.
- Osugi, Y. 1999. The semantic status of 'INDEX+MALE' in Nihon Shuwa (Japanese Sign Language). *Japanese Journal of Sign Linguistics* 15(1-2): 1-14.
- Padden, C. A. 1988 (1983). *Interaction of Morphology and Syntax in American Sign Language (Outstanding Dissertations in Linguistics)*. New York: Garland. (PhD thesis, University of California, San Diego).

- Petitto, L. and P. Marentette. 1991. Babbling in the manual mode: Evidence for the ontogeny of language. *Science* 251, 1493–1496.
- Pizzuto, E., and S. Corazza. 1996. Noun morphology in Italian Sign Language (LIS). *Lingua*, 98(1), 169-196.
- Pollock, J. Y. 1989. Verb movement, universal grammar and the structure of IP. *Linguistic Inquiry* 20: 365–424.
- Rathmann, C. 2005. Event Structure in American Sign Language. PhD Thesis, University of Texas at Austin.
- Sandler, W. 1989. *Phonological Representation of Sign: Linearity and Non-linearity in American Sign Language*. Dordrecht: Foris.
- Sandler, W. 1993. A sonority cycle in American Sign Language. *Phonology* 10: 243-279.
- Sandler, W. 1999. Cliticization and prosodic words in a sign language. In Hall, W. and U. Kleinhenz (Eds.), *Studies on the Phonological Word*. Amsterdam: John Benjamins, 223-254.
- Schreurs, L. 2006. *The distinction between formally and semantically related noun-verb pairs in Sign Language of the Netherlands (NGT)*. MA Thesis, University of Amsterdam.
- Smith, W. 1990. Evidence for auxiliaries in Taiwan Sign Language. In Fischer, S. and P. Siple (Eds.), *Theoretical issues in sign language research, Vol. 1: Linguistics*. Chicago, IL: University of Chicago Press, 211–228.
- Stack, K. 1999. Innovation by a Child Acquiring Signing Exact English II. PhD Thesis, University of California, Los Angeles.
- Steinbach, M. 2012. Plurality. In Pfau, R., M. Steinbach and B Woll (Eds.), *Sign Language: An International Handbook*. Berlin: Mouton de Gruyter, 112-136.

- Stokoe, W. 1960. Sign language structure: An outline of the visual communication system of the American deaf. *Studies in Linguistics Occasional Paper Num. 8*, University of Buffalo.
- Strickland, B, C. Geraci, E. Chemla, P. Schlenker, M. Kelepir, and R. Pfau. 2015. Event representations constrain the structure of language: Sign language as a window into universally accessible linguistic biases. *PNAS* 112(19): 5968-5973.
- Supalla, T. 1982. *Structure and acquisition of verbs of motion and location in American Sign Language*. PhD thesis, University of California, San Diego.
- Supalla, T., and E. Newport. 1978. How Many Seats in a Chair? The Derivation of Nouns and Verbs in American Sign Language. In Siple, P. (Ed.), *Understanding Language through Sign Language Research*. New York: Academic, 91-132.
- Tang, G. and P. Lau. 2012. Coordination and subordination. In Pfau, R., M. Steinbach and B. Woll (Eds.), *Sign Language: An International Handbook*. Berlin: Mouton de Gruyter, 340-365.
- Tkachman, O. and W. Sandler. 2013. The noun-verb distinction in two young sign languages. *Gesture* 13(3), 287-308.
- Voghel, A. 2005. Phonologically identical noun-verb pairs in Quebec Sign Language (LSQ): Form and context. *Toronto Working Papers in Linguistics*, 25.
- Wilbur, R. B. 2003. Representations of telicity in ASL. In Cihlar, J., A. Franklin, D. Kaiser, and I. Kimbara (Eds.), *Proceedings of CLS 39*. Chicago, IL: Chicago Linguistic Society, 354-368.
- Wilbur, R. B. 2009. Productive reduplication in a fundamentally monosyllabic language. *Language Sciences* 31: 325-343.

- Wilbur, R. B. 2010. The semantics-phonology interface. In D. Brentari (Ed.), *Sign languages: A Cambridge language survey*. Cambridge: Cambridge University Press: 355-380.
- Zeshan, U. 2004. Hand, head, and face: Negative constructions in sign languages. *Linguistic typology* 8: 1-58
- Zeshan, U. and P. Perniss (Eds.). 2008. *Possessive and existential constructions in sign languages*. (Sign Language Typology Series No. 2). Nijmegen: Ishara Press.
- Zucchi, S. 2009. Along the Time Line: Tense and Time Adverbs in Italian Sign Language. *Natural Language Semantics* 17, 99-139.