

Gesture and language

Cross-linguistic and historical data from signed languages*

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In this paper I explore the role of gesture in the development of signed languages. Using data from American Sign Language, Catalan Sign Language, French Sign Language, and Italian Sign Language, as well as historical sources describing gesture in the Mediterranean region, I demonstrate that gesture enters the linguistic system via two distinct routes. In one, gesture serves as a source of lexical and grammatical morphemes in signed languages. In the second, elements become directly incorporated into signed language morphology, bypassing the lexical stage. Finally, I propose a unifying framework for understanding the gesture-language interface in signed and spoken languages.

Keywords: Gesture, signed language, grammaticization, cognitive linguistics

The search for unity
The British physicist Paul Davies once remarked that “all science is the search for unity” (Davies, 1984, p.6). From the cosmologist’s quest to discover the birth of our universe to the anthropologist’s hunt for our hominid ancestors and the biologist’s search for the origins of species, scientists search for that which unites the known with the unknown, the familiar with the unfamiliar, and the present with the past.

One reason that scientists spend their lives in this pursuit is that unity offers an explanation for phenomena not previously understood. One way to explain phenomena is to search for sources. In an essay on human uniqueness and the quest for the origins of language, Cartmill observes that:

To understand the origin of anything, we must have an overarching body of theory that governs both the thing itself and its precursors. Without such a

body of theory, we have no way of linking the precursor to its successors, and we are left with an ineffable mystery, like the one that Chomsky and Lenneberg have always insisted must lie at the origin of syntax. (Cartmill, 1990, p. 188)

The goal of this article is to explore the links between gesture and language, or what I call the “gesture-language interface”. I begin by offering a discussion of the domain of gesture. I identify two routes that gesture follows as it becomes incorporated into signed languages and offer cross-linguistic and historical data for each route. Finally, I propose a framework for understanding the gesture-language interface in signed languages and spoken languages.

The domain of gesture

As Kendon (2000) notes, whether we regard language and gesture as the same or different depends on how the two are defined. The challenge is to not simply define language and gesture as the same thing, nor to define them as essentially different. The approach I prefer is one which recognizes what unites language, both spoken and signed, with gesture, and which also permits the researcher to acknowledge and understand their fundamental differences. Naturally, any definition that attempts to classify together such disparate phenomena as gesture, spoken words, and signed words, must be formulated at a relatively high level of abstraction. I will use the term ‘Gesture’ to refer to this level. To this end, I start with the definition of Gesture adopted in my earlier work (e.g. Armstrong et al., 1995, p. 43), which itself follows Studdert-Kennedy’s (1987): “a gesture is a functional unit, an equivalence class of coordinated movements that achieve some end.”

This definition is not intended to distinguish gestures from sign or word; rather, it encompasses the articulatory movements that constitute spoken and signed words, as well as other functional bodily actions whether or not they are intentionally produced or communicative. A key aspect of the definition is that it is neutral with regard to the type of function that is performed. Thus, the definition permits me to classify together for purposes of analysis actions that serve quite different functional goals. For example, this approach permits the researcher to explore connections between actions serving a communicative function and those that serve an instrumental but non-communicative function. Likewise, because this approach also does not require that the goal to be *intentionally* achieved, it permits the study of developmental links between non-intentional and intentional functional actions. Finally, the definition does not

include or exclude data on the basis of articulatory apparatus; manual, facial, postural, and other bodily actions are all included.

There are several benefits to adopting this functional definition of Gesture. As Armstrong et al. (1995) point out, a broadly conceived, functional conception allows the theorist to categorize together the articulatory movements of speech (Neisser, 1967; Browman & Goldstein, 1989) with co-speech gestures and the movements comprising the signs of signed languages as part of a dynamic system of bodily action (Kelso, Saltzman, & Tuller, 1986; King, 2004). Under this view, words are regarded as coordinated patterns of articulatory gestures: “words are not simply strings of individual gestures, produced one after the other; rather, each is a particular pattern of gestures, orchestrated appropriately in time and space” (Kelso et al., 1986, p. 31). Signs are also regarded as coordinated patterns of articulatory gestures produced appropriately in time and space. The body actions studied by gesture researchers such as Calbris, Kendon, McNeill, and others are treated the same way: the “Hand Purse” (Kendon, 1995) is a coordinated pattern of articulatory gestures (involving the fingers, wrist, forearm, and upper arm, at the very least) produced appropriately in time and space. Like spoken and signed words, such gestures are also regarded as action complexes composed of coordinated patterns of movements that achieve some end.

The fact that words, signs, and gestures are each treated as manifestations of Gesture does not prevent us from noting significant differences among them. Here too, I prefer to take an approach which does not simply attempt to define clear-cut categories of ‘word’, ‘sign’, and ‘gesture’. Instead, I propose certain dimensions along which these phenomena vary, such as articulatory and perceptual systems, medium of transmission, conventionalization, schematicity, symbolic complexity, and autonomy-dependence.

For example, spoken and signed words are produced by different articulatory systems, are transmitted in different channels (acoustic vs. optic), and are received by different perceptual systems. While words and signs are recognized as conventionally belonging to particular linguistic systems, gestures are not. This is especially important in the case of signs, since they share articulatory and perceptual systems with gestures.

By not requiring including intentionality or communicativeness as part of the definition of Gesture, this approach permits the study of how unintentional, non-communicative movements may come to acquire communicative significance. Such development occurs on an evolutionary scale, such as the development of “intention movements” in animal (Krebs & Davies, 1993), as well as

ontogenetically, both among non-human primates (Plooi, 1984) and humans (Singleton et al., 1993). Researchers such as King (2004) report that such an approach to gesture permits the exploration of how gestural communication emerges in the nonvocal social communication of African great apes.

Thus, the definition of Gesture adopted here has a methodological motivation. In the early stages of conceptualizing the gesture-language interface, it is important to not make arbitrary distinctions. The functional definition adopted here allows me to categorize together disparate phenomena and understand them as manifestations of a common underlying system — it facilitates the search for an overarching theory of communication by means of bodily action. In the context of the present article, this overarching theory is one which recognizes that language too has its precursors, in several senses. First, unless we accept a discontinuity hypothesis and assume that language began with an unexplainable ‘big bang’, we must search for the evolutionary precursors to language. An increasing number of researchers point to gesture as this precursor (Arbib & Rizzolatti, 1996; Armstrong, 1999; Armstrong, Stokoe, & Wilcox, 1994, 1995; Armstrong & Wilcox, 2002; Corballis, 2002; Hewes, 1992; Kimura, 1993; King, 1999, 2004; Rizzolatti & Arbib, 1998; Stokoe, 2001). Second, evidence points to gesture as an ontogenetic precursor to language (Blake, 2000; Blake & Dolgoy, 1993; Capirci et al., 2002). Although not specifically addressing gesture, Haiman (1998a) suggests that these two courses of development are manifestations of ritualization, whereby instrumental actions are transformed into symbolic actions, and proposes that ritualization can account for the emergence of language from non-language.

The ... evolution of language from originally instrumental action to symbolic is plausible: elsewhere in the animal kingdom, semanticization or emancipation occurred wherever originally instrumental acts were modified and stylized to produce signals. (Haiman, 1998b, p. 128)

There is a third sense in which language has precursors. Linguists have identified a process called grammaticization by which grammatical morphemes gradually develop from lexical morphemes or a combination of lexical morphemes with lexical or grammatical morphemes (Bybee, Perkins, & Pagliuca, 1994, p. 4). This article concerns the gestural precursors of language in this third sense, and suggests that the cognitive and social processes that drive grammaticization also account for the development of language from gesture.

In order to explore the ways by which gesture becomes incorporated into signed languages, and the different paths gesture takes in its development, it is

necessary to adopt a method for describing features of the form and meaning of gesture. For this, I turn to cognitive linguistics, specifically cognitive grammar (Langacker, 1987, 1991). Cognitive grammar claims that all of language, including lexicon, morphology, and grammar, is fully describable as assemblies of symbolic structures, pairings of semantic and phonological structures. These symbolic structures vary along several dimensions, including schematicity, symbolic complexity, and conventionalization. The dimension of schematicity concerns the relative precision of a specification along one or more parameters. A structure is more schematic than another if it is characterized with less specificity and detail; a more schematic structure is coarse-grained, and a less schematic structure is fine-grained in its specification. Visual perception serves as an analogy for the specificity-schematicity relation: objects that we view close-up are more detailed or specific, while those that we view from a distance are more schematic.

Symbolic complexity concerns the property of being analyzable or decomposable into smaller symbolic elements. As McNeill (1992, p. 21) has noted, co-speech gestures typically lack internal complexity. Although the gestures that are the focus of this study also do not initially display internal complexity, as they are incorporated into the linguistic system they do begin to combine with other elements. Two corollaries must be noted. First, although symbolic complexity applies to bipolar structures, pairings of form and meaning, variation in complexity also applies to unipolar structures: either form or meaning may vary from componentially simple to complex. Second, not only can individual symbolic components be combined to form a complex composite structure, but unanalyzed structures can be broken down into components. For example, it is common for signed language linguists to analyze a moving hand into several unipolar, phonological components: handshape, location, orientation (which direction the palm faces), and movement. The movement component can also be broken down into a movement type and a manner of movement. Once movement type (e.g., circle, path) and manner of movement (e.g., fast, slow, sudden onset) are a part of a linguistic system, they may combine to form composite forms. When examining the development of this system, however, we should be aware that movement and manner of movement initially appear as an unanalyzed conceptual unit.

Conventionalization is the measure of how much a structure is shared: conventional structures are widely shared, and known to be shared, among the relevant usage community (Langacker, 1987). Schematicity, complexity, and conventionality each vary along independent continua that apply both to form

and meaning. Linguistic structures such as words, grammatical morphemes, and syntactic structures are defined by their location along these (and other) dimensions.

The symbolic units generally thought of as ‘lexical items’ tend to be morphologically simple and quite specific in both their semantic and their phonological content. ...The units generally thought of as ‘grammatical’ are more schematic semantically and often phonologically. So-called ‘grammatical morphemes’ have specific phonological shapes, and though their meanings tend to be quite abstract, they are not necessarily more so than those of certain lexical items. (Langacker, 1991, p.3)

These dimensions also apply to gesture. Both the form and meaning of gesture can vary along the schematicity dimension. A gesture can have a specific form and (localized) meaning, and thus function lexically, or an abstract form (delayed release, to be discussed below, is an example of schematic form) and a non-specific, generalized meaning. The “Hand Purse” gesture described by Kendon (1995) appears to have the characteristics of a grammatical morpheme, with specific phonological shape but an abstract “semantic theme”.¹

The present article describes two routes from gesture to signed languages. The first route begins with a gesture that is not a conventional unit in the relevant linguistic system. This gesture becomes incorporated into a signed language as a lexical item. Over time, these lexical signs acquire grammatical function (Figure 1).

The second route proceeds along a different path. The source is not a free-standing gesture capable of being incorporated as a lexical item into a signed language. Rather, the source gesture may be one of several types, including a particular manner of movement of a manual gesture or sign, and various facial, mouth, and eye gestures. In this article I present data only for the manner of

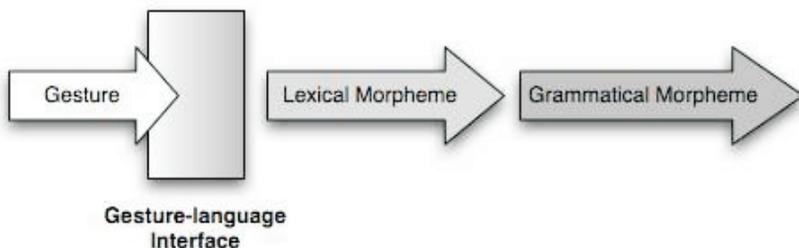


Figure 1. The emergence of grammar from word and gesture.

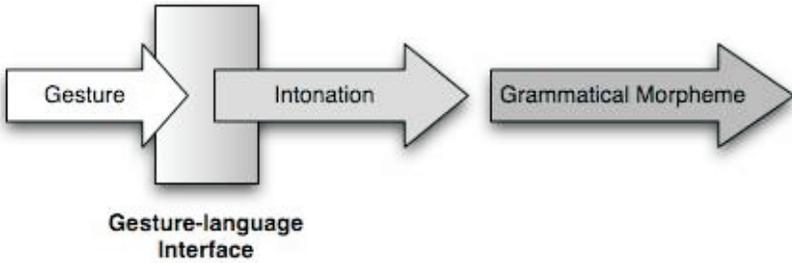


Figure 2. From way to what.

movement type. I will suggest that this second route follows a path of development from gesture to paralinguistic (e.g., intonation) to grammatical morphology (Figure 2).

The first route

In this and the following sections I present cross-linguistic and historical data from American Sign Language (ASL), Catalan Sign Language (LSC), French Sign Language (LSF), and Italian Sign Language (LIS) to document the two routes from gesture to language. The first route develops from gesture to lexical morpheme to grammatical morpheme along two sub-routes. One begins with a quotable gesture (Kendon, 1981) that is in common use in the local hearing community. This gesture is borrowed into the linguistic system as a lexical sign, where the process of grammaticalization moves it along a path to more grammatical function. This sub-route thus consists of the transfer of items from the quotable gesture repertoire into a signed language. The second sub-route begins with an improvised gesture. Again, once the gesture becomes incorporated into the linguistic system as a lexical form, the process of grammaticization drives the form to acquire grammatical meaning.

What unites these two sub-routes is that the source gesture in each has specific form and meaning, qualities that make it (at least potentially) 'quotable'. What distinguishes the two is the degree of conventionalization of the source gesture: quotable gestures are widely shared and, significantly, *known to be shared* among a community. Improvised gestures may differ in their degree of conventionalization, but as a class they occur nearer to the non-conventional end of the continuum than do quotable gestures. Because conventionalization is a matter of degree and shared knowledge, there is not a categorical distinction

between the two sub-routes except where the gestures represent the endpoints of the conventionality continuum, either highly conventional or highly idiosyncratic. One manifestation of this is that while deaf consultants can identify the gestures that appear in the first sub-route as non-native, they often equivocate on whether the gestures in the second sub-route are gestures or signs, native or borrowed. These differences notwithstanding, the two sub-routes begin with a cognitive ability shared by hearing and deaf people alike: the use of bodily actions to express lexical concepts.²

Quotable gesture to lexical sign to grammar

Three sources of evidence for the developmental path leading from gesture to lexical morpheme to grammatical morpheme are presented here: futures, venitives, and markers of obligation.

One example of grammaticization in action is the development of future markers. Data from a cross-section of the world's spoken languages demonstrate that there are three common sources for future markers: desire, obligation, and movement verb constructions (Bybee, Perkins, & Pagliuca, 1994). Lexical morphemes meaning 'come', 'go', and 'desire' are the source of grammatical morphemes used to indicate the future in a remarkable number of spoken languages.

Using a corpus of historical as well as modern conversational data, Shaffer (2000) and Janzen and Shaffer (2002) have demonstrated that the grammatical morpheme used to mark future in ASL (Figure 3a) developed from the lexical morpheme 'go' (Figure 3b).



Figure 3a. ASL 'future'.



Figure 3b. ASL 'go'.

The gestural source of the future morpheme is a gesture described by de Jorio (2000) as produced with the palm of the hand open and held edgewise, and moved upwards several times. Morris and his colleagues (1979) identify this as a gesture still in use among hearing people in the Mediterranean region to signal departure-demand and departure-description (Figure 4, from Wylie, 1977). The gesture appears in LSF as the lexical morpheme *PARTIR* 'depart' (Figure 5, after Brouland, 1855).



Figure 4. Departure-demand/ description gesture.



Figure 5. 1855 LSF lexical sign *PARTIR* 'depart'.

Another set of examples of this sub-route comes from venitives, gestures signaling movement toward speaker. This path begins with a gesture meaning roughly 'come here' identified by de Jorio as *CHIAMARE*, 'to call or summon someone': "Fingers extended and then brought towards the palm several times" (de Jorio, 2000, p. 124).

The 'come here' gesture appears as a lexical item in a number of signed languages, especially those used in the Mediterranean region or historically related to those languages. This form appears in ASL in a variety of senses including requests for physical movement, incitement to action, and requests for metaphorical movement such as the transfer of information or ideas. Thus, a signer might use an ASL lexical sign derived from the 'come here' gesture to request that more information be provided. When a deaf consultant was asked how she became interested in linguistics, she replied, "I took a beginning course and

became fascinated with linguistics — I wanted more” where the phrase translated here as “I wanted more” was the two-handed ASL lexical sign COME-HERE. Higgins (1923) gives the form as NECESSITY (Figure 6), which although still lexical is moving towards a more generalized grammatical meaning.³

In LSC, the ‘come here’ form appears as a lexical sign to request physical movement or, more generally, an invitation to join or affiliate with a group. It also appears in a more specific sense as the lexical sign EMERGÈNCIA ‘emergency’. In LIS, the form also functions to request physical movement; in addition, the ‘come here’ form is used in LIS to encourage action on the part of the interlocutor. For example, in one recorded LIS conversation, a deaf teacher was asked whether hearing students learning LIS could be forced to sign. She responded that students should be encouraged rather than forced to sign in class. The LIS one-handed COME-HERE form was used to mean ‘encourage’.

Finally, a one-handed variant of this form appears in a Sicilian dialect of LIS in a more grammaticized sense to indicate epistemic evaluation. In a recorded conversation, a signer from Sicily was asked whether it would be possible to leave for the Rome train station only shortly before the scheduled departure time and still be able to arrive in time to catch the train to Florence. She replied that it was unlikely due to the Rome traffic. But, she added, some people would say that this is possible, using the ‘come-here’ form to signal this judgment.

These extensions are motivated by pragmatic inferences (Traugott & König, 1991) and metaphor (Heine, Claudi, & Hünemeyer, 1991). Pragmatic inferencing is at work in the extension from a request for physical movement to necessity and emergency: one reason I might request that another person come to me is because I need them. The extension from a request for physical movement to a request for information is metaphorically motivated by mapping the movement of physical objects toward the speaker onto metaphorical

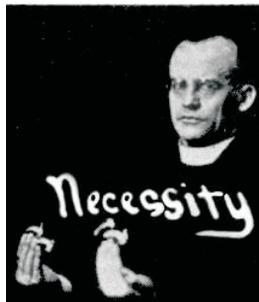


Figure 6. ASL sign ‘necessity’.

objects of communication (Reddy, 1979). An inferential link motivates the extension to encouragement: one reason I might request you to perform an activity (e.g., signing in a language class) is because I want to encourage you.

The extension from movement toward speaker to epistemic possibility involves further pragmatic inferences. Extending the routes just described, encouragement to act implies the ability to act. This indicator of ability can generalize to epistemic possibility. Another inferential link involves future action: both movement towards speaker and epistemic possibility concern future events.

The last set of data comes from the development of obligation verbs. Shaffer (2002) notes that the ASL deontic modal *MUST* (Figure 7) is related to the LSF form *IL FAUT* 'it is necessary' (Figure 8). *IL FAUT* is also attested in mid-nineteenth century LSF (Figure 9). It is likely that these forms derive from a gesture used as early as Roman times to signal obligation. Dodwell (2000, p.36) discusses a gesture (Figure 10) that he calls an imperative: "It consists of directing the extended index finger towards the ground." According to Dodwell, the gesture was described by Quintilian in the first century AD: "when directed towards the ground, this finger insists" (Dodwell, 2000, p.36)

Because the gestural form described by Quintilian already has grammatical function, the data for this last example do not document the complete developmental path from lexical gesture to lexical morpheme to grammatical morpheme. At this time we cannot say whether this is because certain gestural forms begin with more grammatical than lexical function, or whether another gesture with lexical function was the source of the insistence gesture.



Figure 7. ASL sign *MUST* (Humphries, Padden, & O'Rourke, 1980).



Figure 8. Contemporary LFS sign IL FAUT (Girod, 1997).



Figure 9. 1885 LSF sign IL FAUT (Brouland, 1855).



Figure 10. Roman gesture 'insistence' (Dodwell, 2000:plate XVb).

Improvised gesture to sign to grammar

The second sub-route begins with an improvised⁴ gesture, often one enacting some actual or metaphorical object, characteristic, or concept. Wilcox and Wilcox (1995) identified several modal and evidential forms in ASL which have developed from lexical morphemes having improvised gestures as their source. The modal CAN (Figure 11a), used to indicate possibility and ability, had as its source the lexical morpheme STRONG (Figure 11b).

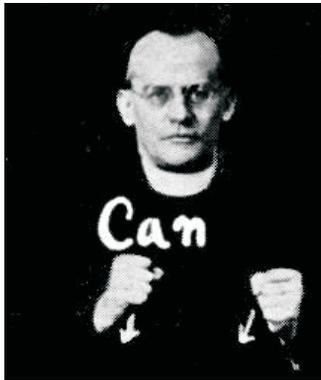


Figure 11a. Old ASL 'can'.



Figure 11b. Old ASL 'strong'.

The ASL evidential forms SEEM, FEEL, and CLEAR/OBVIOUS grammaticized from lexical morphemes MIRROR, FEEL (used in the physical sense), and BRIGHT, respectively. Each of these lexical morphemes can be traced in turn to a gestural source. Thus, the full developmental path for these forms is:

1. [gesture enacting upper body strength] > STRONG > CAN
2. [gesture enacting looking in a mirror] > MIRROR > SEEM
3. [gesture enacting physically sensing with finger] > FEEL (physical) > FEEL (evidential)
4. [metaphorical gesture indicating rays of light] > BRIGHT > CLEAR/OBVIOUS (evidential)

In each case the path is from gesture to lexical morpheme to grammatical (modal or evidential) morpheme.

Traugott (1989) has described three tendencies that occur when items grammaticize:

1. Meanings based in the external situation become meanings based in the internal, evaluative/perceptual/cognitive situation.
2. Meanings based either in the external or internal situation become meanings based in the textual or metalinguistic situation.
3. Meanings tend to become increasingly based on the speaker's subjective belief, state, or attitude towards the proposition expressed.

Data from LSC demonstrates the emergence of grammaticized modal and evidential forms from gestural sources via Traugott's third tendency (Wilcox et al., 2000). The LSC forms *EVIDENT*, *CLAR*, *PRESENTIR*, and *SEMBLAR* (Figure 12a–d) have developed subjective senses which encode the agent's expression of himself or herself in the act of utterance (Lyons, 1996). As we have seen, this tendency for meanings to become based in speaker subjectivity is one indication that a form has become more grammatical.



Figure 12a. LSC *EVIDENT*.



Figure 12b. CLAR.



Figure 12c. LSC PRESENTIR.



Figure 12d. LSC SEMBLAR.

As a lexical morpheme EVIDENT has a range of physical senses denoting visual perception, including intensity of color; prominent or salient, such as a person who stands out because of her height; ‘sharp, well-defined’, such as indicating sharpness of an image; and ‘obvious’, as when looking for an object located in

front of you. As a grammatical morpheme EVIDENT denotes subjective, evidential meanings such as ‘without a doubt’, ‘obviously’, ‘logically implied’.

The lexical morpheme CLAR is used in more concrete meanings to denote ‘bright’ or ‘light’. It may also be used in a more abstract sense to denote clear content, a person’s skill in signing or ability to explain clearly. As a grammatical morpheme CLAR encodes speaker subjectivity and may be used in the same context as the more subjective use of EVIDENT.

Used as a lexical morpheme, PRESENTIR denotes the sense of smell. The grammatical morpheme PRESENTIR is used to express the speaker’s inferences about actions or intentions:

- (1) PRO.3 DIR ANAR HOLANDA NO [pause] PRESENTIR CANVI.IDEA [pause]
MARXAR SEGUR
She said she wouldn’t go to Holland, but I feel she’ll change her mind. I’m sure she’ll go.

When used as a lexical morpheme SEMBLAR denotes physical resemblance. The grammatical sense of SEMBLAR may be used to express the speaker’s subjective belief that an event is or is not likely to occur:

- (2) SEMBLAR PRO.3 AVUI VENIR NO
It seems that she’s not coming today.

As we saw for the ASL data, these LSC forms have sources in metaphorical or enacting gestures indicating the eyes and visual perception (EVIDENT), bright light (CLAR), the nose and the sense of smell (PRESENTIR), and physical, facial appearance (SEMBLAR). Once again, the full developmental path is from gesture to lexical morpheme to grammatical morpheme.

From intonation to morphology

The second route proceeds along a different and quite distinct developmental path than that just described. In addition to differences in degree of schematicity and conventionalization, the source gestures in this second route also differ along the dimension of autonomy-dependence. When components combine, it is often possible to identify one as conceptually autonomous relative to another, dependent component. An autonomous component is one that does not presuppose another for its manifestation; a dependent component does presuppose another for its manifestation. A component is dependent on another, autonomous

component to the extent that the latter constitutes an elaboration of some salient subpart within the former (Langacker, 1987, p.300): the dependent component makes internal reference to the autonomous component. As is the case for the other dimensions, autonomy and dependence apply to both form and meaning.

In the second route, the source gestures are quite schematic, not conventional, and dependent in relation to some other, more autonomous, component. The way in which the autonomy-dependency relation manifests depends on the type of source gesture. For example, when manual and facial gestures combine, the facial gesture often modulates the meaning of the manual gesture in some way, an indication that it is dependent relative to the more autonomous manual gesture. In the data described here, the source gesture is a particular way of making the movement of a gesture or sign. Here again, we see a manifestation of the autonomy-dependency relation. The way a movement is made makes internal reference to the type of movement, and so manner of movement is conceptually dependent relative to movement type.

Manner of movement in Italian Sign Language

The first set of data comes from LIS. In the following dialog, P asks R when she caught the train to come to the research lab. R says she got there around 7 or 8 am. P asks if she could catch a 6 am train. R replies that she wishes she could have left earlier, but the trains are never on time, it would have been impossible to leave earlier. Questioned once again by P whether an earlier departure would have been possible, R repeats that this is simply impossible.⁵

- (3) P: What-time?
 R: Morning, 7, 8 [doubtful], about
 P: Before 6, possible?
 R: *Impossible*
 P: *Impossible*
 R: At-6 before, if only.
 Train never time on-time,
 P: *Impossible*. Before?
 R: Difficult time on-time never
 P: Not-possible.
 R: If only:1hand. *impossible*
 P: {ah, yes}
 R: *Impossible. Impossible* [strong; puff cheek]
Impossible. Impossible. Impossible.

R produces ‘impossible’ five times in this example, each with a distinct pronunciation. By pronunciation, I am referring to modifications to the dynamic movement contour and location of the sign, as well as a distinct set of facial markers. It is the manner of movement that I address here.

The LIS sign IMPOSSIBLE is made with the ‘H’ handshape, index and middle finger extended together. The forearm is upright, extended at a 45-degree angle from the signer’s body, with the ‘H’ handshape pointed upright. The forearm and hand are moved in small circles.

R’s production of IMPOSSIBLE varies several manner of movement features. Two instances of the neutral pronunciation just described are followed by one in which the forearm is further extended from the body and more centrally located in front of the torso. The next production raises the hand higher in the signing space, and the circular movement becomes tighter and faster. This is followed immediately by another production in the same location, but now the forearm and hand move in a much larger circle, and the movement is slower and more deliberate; this is accompanied by a distinct facial marker in which the signer’s dominant side (right for R) cheek is puffed. The final production is a rapid neutral form that is followed by two instances of a different form of IMPOSSIBLE not discussed here.

These five different productions of IMPOSSIBLE do not represent selections from a closed class. Rather, they are better described as different ways of expressively indicating various degrees of impossibility, more analogous to intonational differences than to morphological alternations. Indeed, when a LIS interpreter translated this conversation into spoken Italian, she rendered these instances of IMPOSSIBLE not with different lexical items or phrases, but with the spoken Italian word ‘impossibile’ pronounced with different intonation contours.

The situation, however, is not quite so simple. LIS modal verbs also exhibit these manner of movement distinctions for marking strong and weak forms. Here we see the same articulatory gestures as for IMPOSSIBLE: changes to the manner of movement (larger movements, different rates of movement) and location (proximal/distal) of the signs, accompanied by facial markers. The variations *within* each of these two ways of producing the forms appear to vary along a continuum, with no way to distinguish in principle when a categorical shift between the two is made. Alternation of the end points of the scale, the two distinct ways that the signs are produced, signals strong versus weak modal forms. Thus, in LIS modal verbs the distinctions in manner of movement mark morphological alternation: the weak modal forms are marked by slower, smaller, more proximal, softer motions, while the strong modal forms use faster, larger, more distal, sharper motions.

Sharp and soft in ASL

The semantic and phonological distinctions that appear in the LIS examples above also appear in a number of other signed languages. Frishberg describes two classes of alternations in the movement of ASL signs:

The difference between the signs for DEEP-YELLOW and YELLOW is a difference in intensity of movement. The first sign is made with a single, tense, brisk motion of one hand, whereas the second sign has a rocking motion of the same hand configuration. We can also make a distinction between the kinds of motion in the signs for YELLOW and YELLOWISH. YELLOWISH moves in the same general direction as YELLOW but with smaller, gentler, and more soft motion. (Frishberg, 1972)

Frishberg calls these movement alternations “sharp” and “soft” and notes that the semantic distinctions they mark are related to their articulations:

Notice also that the semantic distinctions parallel the articulatory distinctions: the intensity of movement describes intensity of meaning, emphasis, rapid onset of action and total satisfaction of a criterion. We will call this feature sharp. The gentler motion indicates uncertainty, gradual onset of action or partial satisfaction of a criterion. We will call this feature soft. (Frishberg, 1972)

According to Frishberg, sharp and soft movement act like manner or degree markers (Table 1).

Table 1. Alternations marked by sharp and soft movements (++ is used to indicate reduplication)

| Sharp | Standard | Soft |
|---------------|----------|-----------|
| REALLY-YELLOW | YELLOW | YELLOWISH |
| | GOOD | SO-SO++ |
| BAWL | CRY++ | |
| BEAUTIFUL | PRETTY | |
| DOWNPOUR++ | RAIN++ | |
| BLIZZARD | SNOW | |
| PAINFUL | HURT | |

Frishberg notes that a few signs can vary from sharp to soft with almost infinite gradation, including modal forms: “For example, the sign MUST can express any degree of obligation or necessity from ‘must’ through ‘should’, ‘ought to’ and ‘have to’, depending on the manner in which the movement is made.” She

argues, however, that these movement alternations are not impressionistic or expressive variations on an infinite scale, such as loudness in spoken language. As evidence, Frishberg describes another movement alternation between signs in which the standard form has a wiggle and the sharp form becomes what she terms a spritz motion, a sharp opening action of the fingers (Table 2).

Table 2. Alternations marked by spritz motion

| Spritz (sharp) | Wiggle (standard) |
|------------------|-------------------|
| CRAM | STUDY |
| SPELL | FINGERSPELL |
| FILTHY | DIRTY |
| TERRIFIED | AFRAID |
| VERY-EMBARRASSED | EMBARRASSED |
| SHOWER | MIST |
| SWEAT-PROFUSELY | PERSPIRE |
| BURST-INTO-FLAME | FIRE, BURN |
| ERUPTION | BOILING-INSIDE |

Frishberg's claim is that the phonological alternation between wiggle and spritz motion is a morphologically conditioned rule comparable to the situation in spoken languages in which a syllable changes from low tone to high tone in the presence of some morpheme. She suggests that the phonological change from wiggle to spritz movement occurs when the *morpheme* sharp is added to a sign.

The weak-strong modal alternations that Frishberg noted, and that we have already seen exist in LIS, are pervasive throughout ASL modal and evidential forms (Wilcox & Wilcox, 1995). ASL signs such as MUST, OBVIOUS, SEEM, FEEL, and CAN have alternate forms indicating weak or strong obligation, evidentiality, and possibility. Just as in the LIS signs, these semantic distinctions are marked by changes in manner of movement. In all of these cases, the only means of indicating these semantic distinctions are by this phonological alternation; unlike English, for example, ASL has no distinct lexical expressions for weak versus strong obligation ('must' versus 'should').

The same holds true across a range of data for ASL, where we find semantic alternations marked by manner of movement. For example, intensity is regularly marked in ASL by a delayed release of a sign's movement. Examples include the alternations of HOT/VERY-HOT, SMART/VERY-SMART, FAST/VERY-FAST. In an extension of Frishberg's work, Gorbet (2003) identifies spritz as one of at least three allomorphs of the SHARP morpheme, all related to the

general meaning of intensification, such as amplification (DIRTY/FILTHY), spatial or temporal compression (STUDY/CRAM), selection within a domain (YELLOW/REALLY-YELLOW), and, somewhat less prototypical but still in the semantic range of intensification, inceptive (BURN/BURST-INTO-FLAMES).

Finally, Klima and Bellugi (1979) describe morphological alternations in ASL that mark verb aspect (Figure 13) and the derivation of adjectival predicates (Figure 14). These alternations are also marked by the quality or manner of movement.

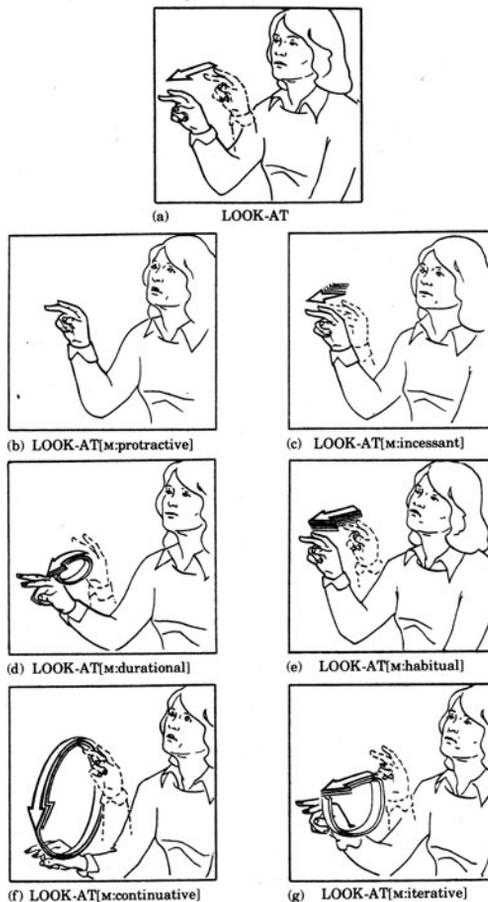


Figure 13. ASL verb aspect marked by movement modulation (Klima & Bellugi, 1979, p. 293).



Figure 14. Derivational morphology marked by movement modulation (Klima & Bellugi, 1979, p. 297).

Paralinguistic or linguistic?

Two analyses could be proposed to account for these data. According to the first, the manner of movement changes that mark these forms are to be regarded as analogous to paralinguistic behaviors, much like intonation in spoken languages. In fact, there is support for such an argument. As we saw in some of the LIS data, and as Frishberg notes for some of the ASL data, these semantic distinctions often do have a gradient quality. In addition, the marking of intensity by delayed release of the sign's movement is remarkably similar to what Bolinger (1986, p. 19) calls a "vocalized gesture" in which a delayed release is used to mark a portion of an utterance for special prominence, a pragmatic intensification as it were: *I'd like to wring your n-n-n-neck!* or *I was a f-f-f-fool to do that!*

The second analysis claims that these semantic distinctions are not signaled paralinguistically but are linguistically marked by adding bound morphology to a root sign. Frishberg suggests this analysis for the spritz motion data. Gorbet's analysis supports and extends the morphological analysis. Klima and Bellugi claim that verb aspect and adjectival predicates are instances of inflectional and derivational morphology in ASL. Further, Wilcox (1996) has demonstrated that the ASL deontic verb *MUST* in certain cases functions epistemically, such as when it occurs in sentence final position and is marked by the 'soft' manner of movement (Shaffer, 2000). This suggests that the weak modal form has acquired grammatical function, arguing for the morphological status of the 'soft' versus 'sharp' forms.

In all of these cases, the phonological shape of these bound morphemes consists of modifications to the manner of movement of the root sign. Klima and Bellugi characterize these modifications as having dynamic qualities superimposed

on lexical movement; using different rates of movement including even or uneven movement; and displaying tenseness or laxness of the muscles.

In describing the phonological shape of these grammatical morphemes, Klima and Bellugi note that the dimensional values (what we might call phonemes) used in the grammatical forms are categorically distinct from those that are seen in lexical forms.

A fundamental issue in the analysis of the organization of ASL is the relationship of the dimensions of patterning used in morphological processes to the dimensions of patterning that appear at the basic lexical level. Are the dimensions of space and movement that characterize inflectional structure distinct from those that characterize lexical structure?

The forms that result from the inflectional processes we have identified are globally different in dimensional values from those that are characterized as uninflected sign forms. Accordingly there might be a distinct separation of patterning at these two levels of structure. Such a separation would make what we have called inflectional processes in ASL fundamentally different from the functionally equivalent processes in English, where segments that are added or changed in morphological processes are of the same kind as those that constitute the basic lexical items themselves. (Klima & Bellugi, 1979, p. 308)

By way of comparison, Klima and Bellugi note that the 's' segment of the plural grammatical morpheme in English is the same 's' segment that appears in a word when it is not a grammatical morpheme (the 's' in 'sit' for example). This is not the case for the movement values used to mark the grammatical distinctions under discussion: these movement values *only* appear in these grammatical morphemes. As Klima and Bellugi note (1979, p. 309): "manner and quality of movement, although a proper part of the structural description of basic lexical signs, appear to bear a lighter functional load in distinguishing signs at this level than they do in building inflections." If Klima and Bellugi are correct, their analysis raises two significant questions: (1) why do signed languages use a distinct set of phonological values in lexical as opposed to grammatical morphology, and (2) why do these values appear across typologically distinct signed languages?

I suggest a third account. These data reflect different stages along the second route from gesture to language. In this account, manner of movement begins as a paralinguistic gestural element analogous to intonation in spoken languages. As these gestural elements enter the linguistic system they become less gradient in their meaning and more restricted in their grammatical function, finally appearing as obligatory inflectional and derivational morphemes, such as

markers of weak versus strong modal verbs, intensity, derivational morphemes, and verb aspect.

According to this account, the heavier functional load that manner of movement has in grammatical morphology over lexical morphology reflects its codification from a gestural and paralinguistic source such as intonation into grammatical morphology.

Gesture and intonation

As Bolinger (1986) notes, it is not uncommon to hear people complain, “I don’t mind what she said, but I don’t like the way she said it.” Although our linguistic analyses often ignore this distinction, Bolinger saw it as critical to understanding how language works. As he noted, the stream of sound that issues from the human voice can be cut up into many different kinds of segments. Well-known remnants of this analytic slicing include sentences, clauses, words, parts of words such as affixes, and distinctive sounds that enable us to tell one word from another.

But running through this fabric of organized sound there is a master thread that holds it all together and by its weavings up and down and in and out shows the design of the whole — the motifs from phrase and sentence to paragraph and discourse, the highlights and shadows, and the relevance of the speaker’s intent. (Bolinger, 1986, p. 3)

This neglected aspect of linguistic analysis, the manner of saying, is intonation, and both intonation and gesture get left by the wayside when linguists, in their search for the purely grammatical, focus attention on the what to the exclusion of the way. One result is that syntax emerges as the quintessentially grammatical: “we regard changes of syntax as a substantial part of the ‘what’: surely it is more than mere ‘way’ that distinguishes *Mary saw John* from *John saw Mary*” (Bolinger, 1986, pp. 3–4).

Part of the problem is deciding what is central to a linguistic message: “is it the vehicle or is it the intent?” (Bolinger, 1986, p. 4). Linguists have long struggled over the question of what to include as part of language proper. Again, Bolinger clearly sees the issue:

Logical people like to view language as primarily the business of exchanging information. This view is reinforced by the importance we attach to writing: most of what we read is written to inform, either the mind or the imagination.

But speech is different. It informs sometimes (as often inadvertently as by intent), but much of the time its aim is to cajole, persuade, entreat, excuse, cow, deceive, or merely to maintain contact — to let the hearer know that ‘channels are open.’

Furthermore, even when we inform we are not above slipping in an extra message *sub rosa*: ‘the information I am giving you is important.’ The importance can be underscored by the words we choose ... or it can be underscored by the tone. (Bolinger, 1986, p.74)

Bolinger’s interest was in vocal intonation — the *way* we say *what* we say. But he also saw that intonation was intimately linked with gesture: “Intonation is part of a gestural complex whose primitive and still surviving function is the signaling of emotion” (Bolinger, 1986, p.195). Both intonation and gesture, according to Bolinger, are biologically built-in adaptations that allow us to read the visible and audible signals that are symptomatic of emotion. Bolinger regarded intonation and gesture as two modes of expression that are inextricably linked psychologically, physically, and evolutionarily, noting that “the whole notion of a gestural complex that includes intonation becomes a mere reflection on man’s antiquity” (Bolinger, 1986, p.197). He also recognized that gesture and intonation develop from expressive origins to more codified linguistic behavior. This led Bolinger to wonder about the routes traced by intonation and gesture as they become part of the linguistic system. Regarding intonation, he asked, “How far has intonation come on the road to the arbitrary and conventional?” (Bolinger, 1986, p.198), and much of his work may be seen as his answer. Bolinger assumed that “physical gesture has conventionalized grammatical uses that have not been hitherto appreciated” (Bolinger, 1986, p.198). I would suggest that the second route described here provides at least a partial appreciation.

Language and gesture: Bridging the gap

I have claimed that an exploration of the gesture-language interface reveals two routes by which gesture is incorporated into signed languages. In the first route, a quotable or improvised gesture becomes a lexical item in a signed language, and then these lexical items acquire grammatical function. In the second route, a gestural element, in this case a particular manner of articulating a sign’s movement, at first functions paralinguistically. As it moves into the linguistic system, manner of movement acquires grammatical function, eventually

becoming highly schematic, bound morphemes. There is no lexical stage in this second route.

We may ask why this striking difference in the way that gestural elements become incorporated into the linguistic system of signed language. According to the framework proposed here, the answer lies in characteristics of the gestural source's form and meaning. In the first route the gestural sources have specific phonological shapes and meanings, dictating their development into lexical morphemes, which also have specific phonological shapes and meanings. Manner of movement, the gestural source in the second route, is phonologically and semantically schematic, precluding its development into lexical morphology. Paralinguistic features such as intonation, as well as grammatical morphemes, are phonologically and semantic schematic. The second route thus follows a course dictated by the characteristics of the gestural source, from paralinguistic to grammatical.

Haiman has noted that:

With insignificant exceptions like 'ouch' and 'boo hoo,' we cannot observe how words developed out of nonwords; however far back we go, it seems that all of our etymologies of words trace to nothing but other older words. But we may be able to observe the genesis of codification in the stereotyping of intonation, which, as it has often been observed, lies at the border between paralinguistic and linguistic behavior. (Haiman, 1998a, pp. 156–157)

When we extend our view to include data from signed languages our vision of language also expands. The data presented here allow us to discover the gestural sources of lexical morphemes and thus to gain an understanding of how words emerge from nonwords. By demonstrating that gestural elements develop from intonation to morphology, this study of the gesture-language interface also reveals how gesture bridges the gap between the paralinguistic and the linguistic.

Morphemes arise in signed languages just as they do in spoken languages. The first route documents a grammaticization process unique only in that it extends beyond lexical items to the gestural sources of signed language grammatical morphology (see also Janzen & Shaffer, 2002). One of the pioneers of the study of grammaticization, André Meillet, claimed that lexical items are the only known source of grammatical morphemes (1912/1948, p. 131). The second route reveals that for signed languages, grammatical morphemes may also arise directly from gestural sources.

A final word on the search for unity

Given the specter of the past when signed languages were denigrated as mere gesture, when powerful forces attempted to wipe them off the face of the earth, and when deaf people were physically punished for using their native signed languages, it is necessary to add a few final words about what the search for the unification of gesture and signed language means, and, more importantly, what it does not mean. Writing of the backlash against teaching evolution in schools, Cartmill says.

[Y]ou might think that by now everyone would have gotten used to the idea that we are blood kin to all other organisms, and closer kin to great apes than to spiders. On the face of it, the idea makes a certain amount of plain common sense. We all know that we share more features with apes than we do with spiders or snails or cypress trees. The theory of evolution simply reads those shared features as family resemblances. It doesn't deny that people are unique in important ways. Our kinship with apes doesn't mean we're only apes under the skin, any more than the kinship of cats with dogs means that your cat is repressing a secret urge to bark and bury bones. (Cartmill, 1998, p. 78)

Positing a gesture-language interface does not deny that signed languages are unique in important ways. Suggesting that signed languages are kin to gestures, or that developmental paths may lead from gesture to language, doesn't mean that signed languages are merely gestures. It simply means that the remarkable family resemblances between signs and gestures, and the tight integration of speech and gesture, point to a common ancestor.

Likewise, adopting a position that seeks to discover the commonality across all forms of gesture does not imply that important differences do not exist. Gesture is widely variable in its manifestation. Indeed, this variation is critical in determining the paths that gesture takes when it becomes conventionalized in a linguistic system. If by adopting a definition of gesture that classifies all of its diversity as akin we risk losing sight of unique differences, we also surely gain insight into the overarching biological, cognitive, and social processes that unite the varieties of gesture with each other and with signed and spoken languages.

Notes

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1. I thank Adam Kendon (p.c.) for pointing out this out to me.
2. Special thanks to Adam Kendon for helping me to distinguish these two sub-routes.
3. This use is no longer attested among ASL users.
4. Although I am calling these 'improvised' gestures, I do not mean to suggest that they do not also become standardized, although apparently not to the extent that they become quotable gestures.
5. In this example, glosses in curly brackets indicate gestures; square brackets indicate facial markers. Two forms of 'impossible' occur; the target form is indicated in *italic*, while the second form, which is not of interest here, is set in non-italic text. The tokens produced by R are set in bold face for clarity.

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