

ROUTES FROM GESTURE TO LANGUAGE

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RESUMO

Neste artigo é explorado o papel dos gestos no desenvolvimento das línguas de sinais. Usando dados da Língua Americana de Sinais (ASL), Língua de Sinais Catalã (CSL), Língua de Sinais Francesa (FSL) e Língua Italiana de Sinais (ISL), assim como fontes históricas que descrevem gestos na região mediterrânea, demonstro que o gesto entra no sistema lingüístico através de, pelo menos, dois caminhos. Pelo primeiro, os gestos servem como fonte de morfemas lexicais e gramaticais em línguas de sinais. Pelo segundo, os gestos entram através da prosódia e entonação, saltando completamente o estágio lexical, e se desenvolvem em formas morfológicas. Portanto, o presente artigo pode contribuir para nossa compreensão dos dois caminhos de entrada de gestos no sistema lingüístico.

ABSTRACT

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 at least two distinct routes. In one, gesture serves as a source of lexical and grammatical morphemes in signed languages. In the second, gesture enters the linguistic system through prosody and intonation, bypassing the lexical stage entirely, and then develop into morphological forms. Finally, I propose further research that could contribute to our understanding of these two routes.

PALAVRAS-CHAVE

língua de sinais, gesto, evolução da língua

KEYWORDS

sign language, gesture, evolution of language

1. Two routes from gesture to language

Haiman (1998: 156-157) 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’s observation suggests that at least two routes may be discovered by which the non-linguistic is codified into the linguistic: one leading to words (and, as we will see, beyond words to grammatical morphemes), the other developing from the paralinguistic to the linguistic.

The present article examines these developmental routes in the context of the natural signed languages of the deaf. I suggest that gestures follow two routes as they codify and grammaticize, and thus that signed languages provide evidence of how material that begins its developmental life external to the conventional linguistic system, as spontaneous or conventional gestures, is codified as language.

The first route, by which signed words develop out of nonwords and further to grammatical morphemes, begins with a gesture that is not a conventional unit in the linguistic system. This gesture becomes incorporated into a signed language as a lexical item. Over time, these lexical signs acquire grammatical function (Figure 1).

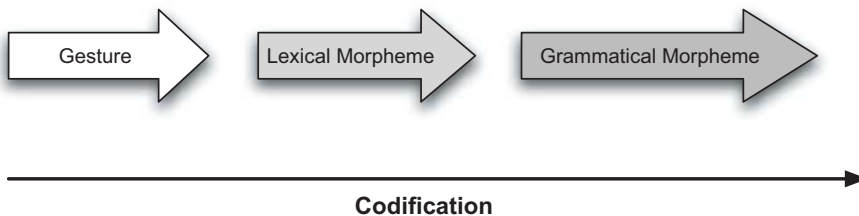


Figure 1: First route

The second route proceeds along quite a different path. In this route, the source gesture is one of several types including the manner of movement of a manual gesture or sign, and various facial, mouth, and eye gestures. I claim that this second route follows a path of development from gesture to prosody/intonation to grammatical morphology (Figure 2). Notably, the second route bypasses any lexical stage.

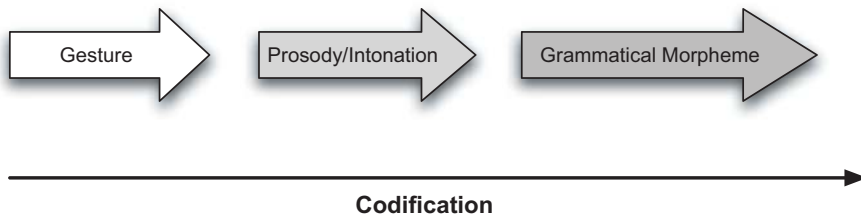


Figure 2: Second route

In 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.

2. The first route: From gesture to word to grammatical morphology

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

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 *et al.*, 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).

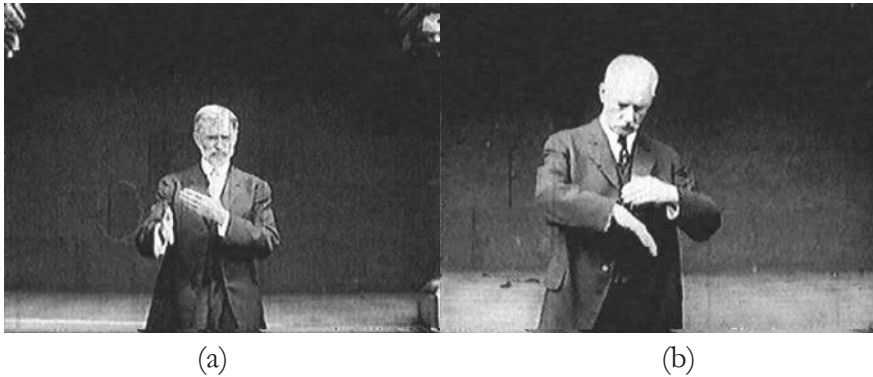


Figure 3: FUTURE and GO in American Sign Language

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 (Morris *et al.*, 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 and Stafford, 1977).



Figure 4: French gesture meaning ‘departure’

The gesture appears in LSF as the lexical morpheme PARTIR ‘depart’ (Figure 5, after Brouland, 1855).



Figure 5: PARTIR in Old French Sign Language

Another set of examples documenting the first 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).

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 grammatical meaning.¹



Figure 6: NECESSITY in American Sign Language (archaic)

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 metonymic semantic extensions are motivated by pragmatic inferences (Traugott and König, 1991; Panther and Thornburg, 2003)

and metaphor (Heine *et al.*, 1991). Pragmatic inferencing motivates 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 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 third set of data comes from the development of obligation verbs. Shaffer (2002) notes that the ASL deontic modal MUST (the forefinger is bent into a ‘hook’ shape, and the hand is oriented so the palm faces down; push the hand downward by bending it at the wrist) is related to the LSF form IL FAUT ‘it is necessary’ (the forefinger is straight, and the hand is oriented to the ipsilateral side; push the hand downward by twisting the forearm). IL FAUT is also attested in mid-nineteenth century LSF (the extended index finger is directed down towards the ground). It is likely that these forms derive from a gesture used as early as Roman times to signal obligation. Dodwell (2000: 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” (*Idem*).

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.

Wilcox and Wilcox (1995) identified epistemic modal forms, which we now prefer to term evidential forms, in ASL that developed from lexical morphemes having gestures as their source. 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 looking in a mirror] > MIRROR > SEEM
2. [gesture enacting physically sensing with finger] > FEEL (physical)
> FEEL (evidential)
3. [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.

Data from LSC (Wilcox *et al.*, 2000) also demonstrates the emergence of grammaticized modal and evidential forms from gestural and lexical sources. 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). This tendency for meanings to become based in speaker subjectivity is one indication that a form has become more grammatical (Traugott, 1989).



7(a): EVIDENT



7(b): CLAR



7(c): PRESENTIR



7(d): SEMBLAR

Figure 7: Evidential forms in Catalan Sign Language

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.

3. Tones, looks, and gestures: The true signs of the passions

The second developmental path from gesture to language follows quite a different route. In order to understand this route and its relation to the first route, it is helpful to examine the relation between words and intonation. We will see that contemporary linguists sometimes mark this distinction as that between *what* we say, the objective content of our words, and the *way* we say it, our tone of voice, facial expressions, and bodily gestures which reveal the intent of why we said what we said.

This relationship has, however, been noted for centuries. One of the most revealing is from the eighteenth century English rhetorician Robert Sheridan in his lectures on elocution (Sheridan, 2001: 883-884):

Words are, by compact, the marks or symbols of our ideas; and this is the utmost extent of their power. Did nothing pass in the mind of man, but ideas; were he a different kind of being from

what he is; were he like the Houyhnhms of Swift, always directed by cool, invariable, and as I may say instinctive reason; to make known the ideas of such a mind, and its internal operations, would not be beyond the power of words only. But as there are other things which pass in the mind of man, beside ideas; as he is not wholly made up of intellect, but on the contrary, the passions, and the fancy, compose a great part of his complicated frame; as the operations of these are attended with an infinite variety of emotions in the mind, (...) it is clear, that unless there be means found, of manifesting those emotions, all that passes in the mind of one man can not be communicated to another. Every one will at once acknowledge that the terms anger, fear, love, hatred, pity, grief, will not excite in him the sensations of those passions, and make him angry or afraid, compassionate or grieved (...) If any one should say in the same tone of voice that he uses in delivering indifferent propositions from a cool understanding, ‘Sure never any mortal was so overwhelmed with grief as I am at this present’(...) no one would feel any pity for the distress of the former. (...) And why is this? But because he makes use of words only, as the signs of emotions, which it is impossible they can represent; and omits the use of the true signs of the passions, which are, tones, looks, and gestures.

Sheridan clearly distinguishes between words, which he believes are the symbols of our ideas, our reason, and our “indifferent propositions”; and tones, looks, and gestures by which we communicate our emotions, our subjectivity, and thereby the significance of what we say.

As Bolinger (1986) reminds us, it is not uncommon to hear people say, “I don’t mind what she said, but I don’t like the way she said it.” 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: 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. The resulting dichotomy has elevated syntax to 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” (1986: 3-4).

Linguists have long struggled over the question of what is the essential core of language. The contemporary dichotomy of linguistic versus paralinguistic hinders the discovery of a developmental path between two. Further, Bolinger’s view (1986: 74) suggests a way to remove this hindrance: we do not need to choose between the *what* versus *way*; instead, we should realize that in face-to-face communication, the two are intertwined:

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.

In a passage reminiscent of Sheridan, Fónagy (1988: 186) observes that “The vocal expression of anger does not simply denote anger as does the sentence *I am angry*: it is a part of anger, an acting out of aggressive intentions.”

Consequently, the expression of anger by means of a *strangled* voice or that of tenderness by means of caressing softness and an undulating melody is certainly not equivalent with expressions such as ‘I am angry’ or ‘I like you’ (...).

Although Sheridan mentions “tones, looks, and gestures” in the same breath, Fónagy and Bolinger provide the needed link between gesture and intonation. Fónagy (1988: 186), for instance, goes on to suggest that arbitrary linguistic signs such as words, and perhaps even more so grammatical morphology, are demotivated vocal-gestural performances:

Signs are demotivated actions. The demotivation is accomplished in arbitrary linguistic signs, completely deprived of substance. The principle of arbitrariness does not apply (...) to prosodic gesturing. Both are incompletely demotivated vocal performances. They still act in a similar way as performative utterances do.

This view leads Fónagy (1983: 337) to conclude that:

Intonation is inherently dual, Janus-faced, a sign half-way between nonverbal and verbal communication. (...) Thus, intonation could give us an insight into the evolution of verbal signs and mental contents.

Fónagy's observation is key to understanding the second route from gesture to language, that is, that prosody and intonation in signed languages lie along a developmental path leading from gesture to grammatical morphology.

The insight that Fónagy speaks of is undoubtedly into the biological evolution of language, and indeed it has been suggested that data from signed languages also provides critical evidence about the origin and evolution of human language (Armstrong and Wilcox, forthcoming; Armstrong *et al.*, 1995). Here, however, we are concerned only with the developmental evolution leading from nonverbal or nonlinguistic to purely verbal material.

Bolinger also held 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: 195). Both intonation and gesture, according to Bolinger, are biological adaptations that allow us to read the visible and audible signals that are symptomatic of emotion. He 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: 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. He asked, "How far has intonation come on the road to the arbitrary and conventional?" (Bolinger, 1986: 198). The second route described here provides at least a partial answer to this question.

4. The second route: From gesture to intonation to grammatical morphology

It is to discovering the signed language manifestation of Sheridan's "true signs of the passions" that we now turn. First, I will examine how

prosody and intonation are manifest in signed languages. Then I will turn to some data from signed languages. I will claim that previous accounts of data of this sort of data have been incomplete because they omit the developmental aspect, making recourse only to static points on the developmental path. That is, previous accounts have proposed either that the data represent expressive, emotive attitudes of the speaker, or that they represent highly codified, purely grammatical forms in the language. I will suggest that while neither explanation alone is correct, both are true in that they identify the end points of a developmental path: the data document the second route from gesture to language.

4.1. Prosody and intonation in signed languages

Friedman (1977) was one of the first signed language researchers to document the expression of prosody and intonation in signed languages. She observed that signs marked with emphatic stress are larger, tenser, faster, and with longer duration than unstressed signs. Other differences in stressed versus unstressed signs included changes in the manner of production, both in rhythmic characteristics (addition of tension, restraint, or faster movement), and in the movement itself.

Wilbur and Schick (1987) noted that in spoken languages, the primary cues for linguistic stress are increased duration, increased intensity, and changing the fundamental frequency. Fundamental frequency is a feature of spoken languages without any apparent analog in signed languages. Wilbur and Schick proposed that the correlates of linguistic stress in signed languages are increased duration and increased intensity. They identified markers of increased duration, including: larger movement, slower movement, repetition, added movement. The markers of increased intensity included the addition of non-manuals (for example, eye or mouth gestures); sharp boundaries between signs; higher articulation of signs in the signing space; increased tension of articulation; and more forceful articulation.

Another feature of prosody is prominence. Examining data from Israeli Sign Language, Nespor and Sandler (1999) found that the phonetic

correlates of prominence included reduplication, a hold at the end of the prominent sign, and a pause after the last word of the phonological phrase. In discussing how we may extrapolate from spoken to signed language prosody, Kingston (1999) predicted that “individual signs may be made phrasally prominent by increasing the size, speed, and/or acceleration of their inherent movement.” Once again, we find that the phonetic correlates to prosody in signed languages predominantly lie in manner of movement: reduplication, hold (stopping the movement), speed, and acceleration. Increased size is also related to movement, since decreasing/increasing the size of a sign typically results in a slower/faster movement, respectively.

Sandler (1999) maintains a distinction between prosody and intonation in signed languages, suggesting that facial articulations may be best understood as fulfilling the role of intonation. She calls these facial articulations ‘superarticulation’ and proposes that the primitives of superarticulations are different positions of the brows, eyes, cheeks, mouth, and head.

In summary, the phonetic correlates of prosody (e.g., stress and prominence) and intonation in signed languages appear to be changes to a sign’s movement (speed, acceleration, duration, repetition, size, tension, force), which I will henceforth call *manner of movement*, and *facial articulations*.

4.2. Facial articulations

In addition to functioning as phonetic cues of prosody and intonation, two striking features characterize nonmanual or facial articulators. First, facial articulations are used predominantly to code grammatical functions such as topic, interrogatives, and imperatives. Facial articulators rarely if ever are the sole means of expressing lexical morphemes.² Second, the form that these markers take for specific functions are remarkably similar across a wide range of genetically and areally unrelated languages. For example, in a typological study of interrogatives in more than 30 signed languages, Zeshan (2004) found that all used

nonmanual marking for polar questions. In addition, she reported that nonmanual signals marking polar questions tend to be quite similar across signed languages, typically involving a cluster of facial gestures including eyebrow raise, eyes wide open, eye contact with the addressee, head forward position, and forward body posture (2004).

Cagle (2001) describes the interaction of eye and mouth markers in ASL (Figure 8). He identifies 11 mouth markers of intensity (most of the descriptive labels in Figure 3 are intended to indicate the type of mouth gesture; for example, ‘MM’ indicates that the lips are pressed together). Superimposed on these 11 mouth markers is one of three types of polarity marked by eye aperture.

The sign TERRIBLE, for example, can be produced with the mouth gesture IS, marking relatively strong intensity, and wide eye aperture signaling positive polarity. Produced in reaction to something a person just did, this could mean, “You’re crazy, but I kind of like it!” Alternatively, the same sign produced with the same mouth gesture but with squinted eyes would mean, “I don’t approve of that, that’s bad. I don’t agree with what you just did.”

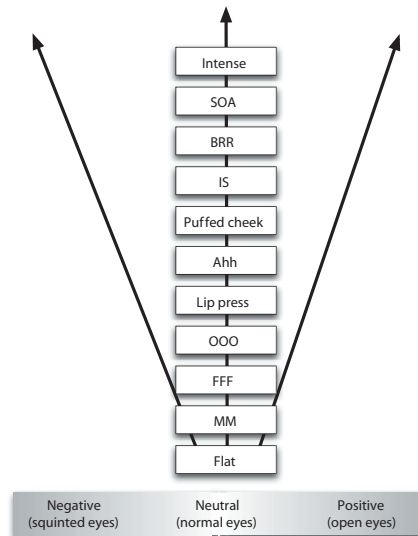


Figure 8: Interaction of eye and mouth gestures in ASL.

Although the description offered by Cagle seems to suggest that the combination of these mouth and eye gestures produces a finite set of 33 distinct combinations, the data do not bear this out. The high level of gradience among the mouth gestures, and even more so between the degree of eye aperture, results in a much more analog system, characteristic of prosody and intonation.

4.3. Manner of movement in Italian Sign Language

An example of the discourse use of linguistic stress marked by dynamic changes to the movement of the sign comes from Italian Sign Language (LIS). In the following dialog, recorded in Rome, Italy, 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.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 prosodic stress 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 intonational and prosodic 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) or 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.

4.4. Intensification in ASL

The semantic and phonological distinctions that appear in the LIS examples above also appear in a number of other signed languages. Frishberg (1972) 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 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.

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

Sharp	Standard	Soft
Really-yellow	Yellow	Yellowish
	Good	So-so ++
Bawl	Cry ++	
Beautiful	Pretty	
Downpour ++	Rain ++	
Blizzard	Snow	
Painful	Hurt	

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

Frishberg observes 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):

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

Table 2: Alternations marked by spritz motion

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 and 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).

4.5. Verb aspect in ASL

Finally, Klima and Bellugi describe alternations in ASL that mark verb aspect (1979). These alternations are also marked by the quality or manner of movement. Klima and Bellugi call these alternations inflectional morphology, implying that they are highly codified, grammatical forms. Indeed, some of the aspectual categories they describe to appear to be quite productive. Recent research by Maroney (2004), however, suggests that the situation is not so simple. She found no evidence that aspectual categories in ASL are inflectional: none of the markers are obligatory to the degree required by inflectional morphology, and productivity is restricted to a small set of specific verb types. In her data, taken from a range of conversational sources, ASL users expressed aspectual meaning primarily by means of lexical and periphrastic expression, reduplication, movement modifications, and non-manual markers. The only category that approached productivity was reduplication used to express iterative, continuative, and habitual meaning. Maroney also reported that a few of the movement modifications described here as manner of movement, and some of the facial markers, were somewhat productive.

Thus, while verb aspect appears to be at the end of the second route, the development is by no means uniform across verb forms, and in very few cases has it reached the regularity and obligatoriness indicative of inflectional morphology.

4.6. Paralinguistic or linguistic?

Two analyses could be proposed to account for these data. According to the first, the manner of movement changes and facial articulations that mark these forms may be regarded as analogous to paralinguistic behaviors, purely expressive, reflecting the signer's internal emotional state. In fact, there is support for such an argument. At most, they are indications of prosody or intonation, used to signal grammatical function but not in the way that grammatical morphemes such as inflectional markers of verb aspect do.

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 (Bolinger, 1986: 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 this weak modal form in ASL 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 (1979: 308) 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.

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 (1979: 309) note: "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 three significant questions: (1) why do signed languages use a distinct set of phonological values in lexical as opposed to grammatical morphology?; (2) why does manner of movement have this higher functional load in grammatical morphology?; and (3) why do these values perform such similar functions across genetically and areally unrelated languages?

The answers lie, I suggest, in a third account: these data document different development points along the second route from gesture to language. According to this account, manner of movement and facial articulations begin as a gestural elements. As these gestural elements enter the linguistic system they first function as markers of prosody and intonation. Although codified, they continue to exhibit a high level of gradience and often serve to marker speaker expressivity. Although they may not be obligatory, when present they do serve grammatical function.

As they further codify, manner of movement and facial articulations become less gradient in their meaning and more restricted in their grammatical function, finally appearing (though perhaps not as often or as regularly as many analyses would make it seem) as question and topic markers; adverbial markers; and derivational and inflectional morphemes indicating various types of grammatical intensity such as weak versus strong modal forms, epistemic versus deontic modals, verb aspect, and so forth.

Returning to the three questions above, I offer the following answers. The distinct set of phonological values seen in grammatical morphology is the result of the codification of prosodic and intonational devices already at play in the language, which, like prosody and intonation in general, often serve grammatical function. We have seen that as for spoken languages, where lexical morphemes grammaticize and take on grammatical function, lexical signs also grammaticize into grammatical forms in signed languages. This is the first route. The difference between

signed and spoken languages is that in signed languages, prosodic and intonational devices are the predominant source of grammatical morphology.

Why does manner of movement have a heavier functional load in signed language grammatical versus lexical morphology? Because manner of movement begins its linguistic developmental life marking prosody and intonation, which moves directly to take on grammatical function. As I have noted, the second route consistently bypasses any lexical stage.

Finally, why do manner of movement and facial articulations perform such similar functions across genetically and areally unrelated languages? I suggest it is because of their deep link with Bolinger's proposed gestural complex that is the primitive ancestor of intonation used to signal emotion. Although it is certainly true that emotion is not signaled in an absolutely uniform way across cultures, it is nevertheless the case that the gestural inventory for marking emotion, both with manual and facial gestures, is much more restricted than, say, the inventory of words meaning 'angry' across the world's languages. Cultural differences notwithstanding, we all recognize a gesture made in anger, or a face that signals sadness. It is thus not surprising that when gestures of this type make their way into a signed language as prosodic and intonational devices, they are used to indicate the same sorts of general semantic notions.

A final example demonstrates how such a scenario might play out. Looking only at spoken language, Bolinger (1986: 208) points out a relationship between *wh* questions and imperatives mediated by gesture:

Even *wh* questions that appear to be only for eliciting information are affected by gesture to the extent of being more question-like or more command-like. *Wh* questions straddle the line between interrogative and imperative: they use interrogative inversion but freely use an intonation that is more typical of commands – continuous downmotion plus a terminal fall. So if a speaker asks,

“Where did you put it?” with nothing arched up (“with a solemn expression”) and with lips tightly close at the end of the utterance, the assumption of authority is manifest. But if the usual question cues are added – smile, raised eyebrows, and mouth open at end of utterance – the authority is softened.

Wh questions straddle the line between interrogative and imperative in ASL as well. The way wh questions and imperatives are marked in ASL may reveal their close connection, as well as the connection with Bolinger’s gestural complex: both are marked with brow furrow (“with a solemn expression”) and tightly closed lips (Humphries *et al.*, 1980: 76, 88). Polar questions, on the other hand, are marked as Bolinger notes with “the usual question cues” – raised eyebrows (Humphries *et al.*, 1980: 43). But this is not just the case for ASL alone. As we saw in section 3.2, Zeshan (2004) reports that interrogatives of this sort are marked in remarkably the same way across 30 different signed languages.

5. Gesture and signed languages

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 it means to say that there are developmental routes leading from gesture to signed language, and, more importantly, what it does not mean.

The account offered here is a developmental one. It suggests neither that signs are merely gestures nor that signs are categorically unrelated to gesture. Rather, I claim that the only way to understand the relation between gesture and signed languages, and to understand the emergence of grammatical morphemes from erstwhile lexical morphemes

or of grammatical morphemes from prosodic and intonation devices, is to adopt a developmental perspective.

This account thus has a great deal in common with other developmental stories, such as the evolution of species. In order to understand what is and is not implied by my developmental account of routes from gesture to language, we can learn by looking at what is and is not claimed by evolutionary theory. Writing of the backlash against teaching evolution in schools, Cartmill (1998: 78) 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.

Positing developmental routes from gesture to language 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 points to a common ancestor.

6. Conclusion

In conclusion, I have suggested that gesture follows certain developmental routes as it becomes codified into a signed language. Two routes were proposed. The first route traces a path from manual gestures to

lexical signs to grammatical signs. The second route leads from expressive gestures to prosody/intonation and in some cases to grammatical morphology. Two types of gestures were identified in the second route: facial articulations, and manner of movement.

Clearly, further research is needed to work out the details of the developmental journey that specific forms take as they move along these routes. In particular, we need many more studies that examine the path and extent of codification along the second route. Do forms move at different rates as they develop from gesture to prosody-intonation and on to grammatical morphology? If so, what determines these different rates? Is it some quality of the form itself, is it determined by frequency of use, or is it some combination of the two? Finally, the suggestion that the second route grows out of a biologically-based gestural complex raises intriguing questions concerning the ‘natural’ or inherent conceptual meanings of these prosodic/intonational patterns, i.e., eyebrow raising, tense muscular articulation, etc. Future studies will need to cross disciplinary boundaries, examining data and integrating findings from linguistics, gesture studies, phonetics and speech science, neuroscience, and comparative and evolutionary studies of animal communication.

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Notas

- 1 This use is no longer attested among ASL users.
- 2 Dively (2001) describes a very small set of non-manually produced signs. None, however, appear to be strictly lexical. Most are non-manual grammatical signs or discourse markers
- 3 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 discussed, is set in non-italic text. The tokens produced by R are set in bold face for clarity

