

1. Signed Languages

Signed languages are natural human languages used by deaf people throughout the world as their native or primary language¹. Although there has been no formal survey of the world's signed languages, linguists generally assume that they number in the hundreds. The 13th edition of the Summer Institute of Linguistics Ethnologue of the world's languages lists 114 signed languages (Grimes, 1996), but we believe that this significantly underestimates the number. The gestural-visual modality of signed languages is reflected in their linguistic structure. Signed languages make extensive use of space, for example by incorporating spatial locations to indicate verbal arguments. In addition to the hands, the face plays a critical role in signed language grammar, expressing a range of information such as questions, topic, adverbials, and so forth.

The modern era of linguistic research on signed language began in the late 1960s with the pioneering work of the American linguist William C. Stokoe. Stokoe was a professor of English at Gallaudet College (now Gallaudet University) in Washington DC, the only liberal arts university for deaf people. Stokoe began to apply linguistic techniques borrowed from the structuralist tradition prevalent at the time to study the language that he saw deaf students using in his classroom — ASL. His research eventually led to a broad interest in the structure of ASL by linguists and initiated research worldwide to analyze the world's signed languages.

Over the past 40 years, linguists have demonstrated that signed languages such as American Sign Language (ASL) may be analyzed and described using the same units as spoken language. While differences in structure attributable to modality (spoken versus signed) have been noted (Klima and Bellugi, 1979), the overwhelming conclusion is that signed languages share important characteristics with spoken languages.

A common misunderstanding is that signed languages are merely representations of spoken languages — that ASL, for example, is a signed representation of spoken English. Signed languages are independent languages with their own lexicons and grammars. Like spoken languages, signed languages have genetic and historical relations with other signed languages. ASL's closest genetic relative, for example, is French Sign Language (LSF).

2. A Brief Sketch of ASL

2.1. Phonology

1. Many authors refer to 'sign languages'. We prefer the term signed language, parallel to spoken language and written language.

One of the pioneering discoveries made by Stokoe was that ASL can be described phonologically. Before this, it was assumed that the signs — that is, the words — of a signed language were unanalyzable. Stokoe showed that a sign consists of analyzable units of structure and coined the term *chereme* for these sublexical units (Stokoe, 1960).

Stokoe analyzed the phonology of signs into three major classes: *handshape* (the configuration that the hand makes when producing the sign), *location* (the place where the sign is produced, for example on the head, or in the neutral space in front of the signer's body), and *movement* (the motion made by the signer's hands in producing the sign, for example upward or towards the signer's body). Stokoe called these the “aspects” of a sign. Later linguists called these aspects the parameters of a sign and added a fourth parameter (Battison, 1978): *orientation* (the direction which the palm of the hand faces when producing the sign). The psychological reality of parameters is demonstrated by the existence of minimal pairs, signs differing only in one parameter which have different meanings (Klima and Bellugi, 1979).

2.2. *Morphology*

ASL, like many signed languages, is highly synthetic with tendencies towards polysynthesis. ASL allows morphemes indicating action, person agreement, aspect, and adverbial information to be combined into a single, multimorphemic ASL word; for example, ‘I very carefully gave [one] to each [person]’ would be expressed with a single sign in ASL.

2.3. *Syntax*

Research on the syntax of signed languages has examined issues of word class; word order; and relations among constituents such as relative clauses; question formation; topic-comment structure and the flow of information in discourse; and the grammatical use of space.

ASL discourse is characterized by a high degree of topic-comment structure (Janzen et al., 1999). Topics are marked grammatically, with the topic phrase accompanied by raised eyebrows, a slightly backward head tilt, often with a pause between the topic and comment phrases, and with the final sign of the topic phrase held slightly longer. Topic-comment structure has been described for ASL as a basic sentence type along with others, such as interrogatives, imperatives, and assertions, but the frequency with which topic-comment structures appear in discourse suggest that it is more basic. Thus, topics can appear as part of any given sentence type.

2.4. *Grammaticization*

Grammaticization is the linguistic process by which grammatical material (for example, grammatical morphemes such as future markers or modal auxiliaries) develops historically out of lexical material (Bybee et al., 1994). Grammaticization operates much the same in signed languages such as ASL as in spoken languages. For example, modals in ASL develop historically out of lexical material with concrete, embodied meanings. Thus, the ASL modal auxiliary meaning can, even when used for mental ability (as in “He can read”), developed historically from the ASL sign STRONG ‘having physical strength’.

A similar example comes from the development of the agentive suffix (similar to the English -er) in ASL. Historically, this suffix originated as a full lexical form meaning body. Over time, the orientation and location parameters changed and the movement became greatly reduced. Semantically, the sign changed from meaning strictly body to become one who does something [as specified by the verb]. It also became a bound form obligatorily attached to a verb. The current sign TEACHER is thus the free lexical form TEACH and the reduced agentive suffix which developed from the sign for body.

2.5. *Fingerspelling*

A common misunderstanding is that signed languages are merely (or largely) comprised of fingerspellings. This is not the case. Fingerspelling makes use of handshape configurations that correspond to the alphabet of the majority written language. Fingerspelling is often used for proper names or technical terms, and is used for loan words in signed languages; for example, *of*, *all*, *sure*, and several other English words have been borrowed into ASL through fingerspelling. A variety of fingerspelling systems exist among the world’s signed languages. ASL and many other signed languages use a one-handed system. British Sign Language (BSL) and other some other signed languages use a two-handed fingerspelling system. The amount of fingerspelling used in a signed language varies greatly. ASL and BSL rely extensively on fingerspelling; the use of fingerspelling in most other signed languages is more restricted.

Fingerspelling is more than a sequence of canonical handshape configurations, since the articulatory movements within the fingerspelled word influence each other. Perseverative and anticipatory coarticulation affects the actual shaping of fingerspelled words, creating a fluid transition between letters (Wilcox, 1992).

2.6. *Classes of articulators*

It is possible to divide the articulators used to produce signed languages such as ASL into two broad classes: manual and non-manual. Signs produced with the manual articulators may be lexical or grammatical. Thus, in addition to lexical signs such as GO, STRONG, or MIRROR, the modals discussed in this chapter such as CAN, MUST, and POSSIBLE

are manually produced signs.

Two striking features characterize nonmanual articulators. First, nonmanual articulators, particularly facial gestures, are used predominantly to code grammatical functions such as topic, interrogatives, and imperatives. Nonmanual articulators rarely if ever are used to produce 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 (Zeshan, 2004: 19).

The significance of these facts for the expression of modality relates to the connection between subjectivity and facial markers on the one hand, and between subjectivity and modality on the other. Langacker (1991) describes subjectivity in a way that reveals how this semantic notion can also be used to characterize the difference between manual and nonmanual articulators. Using an example based on visual perception, he says (p. 316):

Consider the glasses I normally wear. If I take my glasses off, hold them in front of me, and examine them, their construal is maximally objective, as I will understand the term: they function solely and prominently as the OBJECT OF PERCEPTION, and not at all as part of the perceptual apparatus itself. By contrast, my construal of the glasses is maximally subjective when I am wearing them and examining another object, so that they fade from my conscious awareness despite their role in determining the nature of my perceptual experience. The glasses then function exclusively as part of the SUBJECT OF PERCEPTION — they are one component of the perceiving apparatus, but are not themselves perceived.

When we consider the hands as articulators of a signed language, they naturally lend themselves to a maximally objective construal because they are available as objects of our perception. The face, on the other hand, invites a subjective construal because our face is not normally available as an object of our own perception.

In addition to these characteristics of hands and faces as articulators, we note that facial

2. Dively (2001) describes a small set of non-manually produced signs. None, however, appear to be strictly lexical. Most are non-manual grammatical signs or discourse markers.

markers in signed languages are used to indicate the speaker's attitude towards the propositional information on the hands, or to otherwise modify the manual meaning; for example, facial markers also function as adverbial and adjectival markers which co-occur with manual signs.

It is worth noting that the face is regarded as a signal of our stance towards what we are saying, such as when we say of a person's statement that "in spite of what he said, *his face gave him away*."

We also use the term subjectivity in its more traditional, pragmatic-semantic sense to describe the asymmetry between an utterance's proposition content, the information that speakers supposedly share when they converse and that is the focus of linguistic analysis, and the speakers' attitudes, evaluations, and opinions (Scheibman, 2002). Subjectivity, as Lyons (1995) notes, is simply the expression of self, of the speaker's viewpoint, in language. Our point is that the asymmetry of facial versus manual articulators in signed languages, where the face is predominantly used to comment on or modify the manual content, mirrors the asymmetry noted by Lyons which is inherent in semantic subjectivity.

A number of linguists have commented on the connection between subjectivity and modality. Palmer (1986: 16) notes that "Modality in language, especially when marked grammatically, seems to be essentially subjective. ... Modality in language is, then, concerned with subjective characteristics of an utterance, and it could even be further argued that subjectivity is an essential criterion for modality. Modality could, that is to say, be defined as the grammaticalization of speakers' (subjective) attitudes and opinions."

We will return to these concepts later when we discuss epistemic modality, and in the final section on modality and intensification.

3. Modality in ASL

The expression of modal notions in signed languages has not been extensively explored. The most extensive work to date on modals comes from ASL, although Ferreira Brito (1990) conducted a pioneering study of modality in Brazilian Sign Language. The classic text *The Sign Language: A Manual of Signs* by J. Schuyler Long (1918) describes ASL auxiliary verbs, including the form and meaning of the following modals: CAN, CAN'T, MAY (MAYBE, PERHAPS), SHOULD (OUGHT), MUST (NEED, HAVE TO), HAVE (FINISHED), WILL (SHALL), WON'T. Fischer and Gough (1978) mention modals in their discussion of ASL verbs but do not discuss their semantics or discourse function. Padden (1988) also discusses the modals CAN, WILL, SHOULD, and MUST but likewise does not discuss in any depth the semantics of these words, instead focusing on

the types of nominals that precede modals. The semantics of modals is typically discussed in only a cursory way in ASL textbooks.

Wilcox and Wilcox (1995) presented a functional analysis of ASL modals. Their study focused on the gestural basis of modal notions, proposing that certain common gestures become lexicalized as ASL modals and examining an iconic relation between strong and weak modal forms. Janzen and Shaffer (2002) further explored the developmental path that leads from gesture to lexical form, and the grammaticization of these lexical forms into modals. Shaffer (2004) provided a detailed analysis of ASL modal notions and the relation between their discourse function and information ordering.

The sections to follow describe the meaning and discourse functions of ASL modals; their grammaticization from lexical sources; and, when appropriate, their hypothesized origins in gestural sources. Regarding the latter, we will suggest that two distinct routes lead from gestural sources to modal forms. One route leads from manual gestural forms to lexical signs, which then grammaticize to modal verbs. The second starts with certain distinct types of manual markers such as manner of movement, as well as non-manual gestural forms. These gestures do not enter the linguistic system as lexical signs; rather, they appear as prosodic markers which then develop directly into grammatical forms such as markers of modal strength.

For our discussion we will draw upon the classification scheme proposed by Van der Auwera and Plungian (1998). The key elements of this model are that it describes modality as the semantic domain that involves necessity and possibility. The expression of necessity and possibility plays out in four domains: participant-external, participant-internal, deontic, and epistemic. Participant-external refers to those situations where the source of the condition is external to the participant engaged in the state of affairs, such that the conditions make this state of affairs either necessary or possible (p. 80). Participant-internal refers to those situations where the source of the condition is internal to the participant engaged in the state of affairs (p. 80). Deontic modality is classified as a subdomain of participant-external modality, which “identifies the enabling or compelling circumstances external to the participant as some person(s), often the speaker, and/or as some social or ethical norm(s) permitting or obliging the participant to engage in the state of affairs” (p. 81). Epistemic modality indicates the degree of certainty with which one makes an assertion.

We use this classification scheme because it captures the motivation for the grammaticization paths seen in our data. We also prefer this scheme because in our ASL data, the forms for necessity and possibility are the same across all domains — participant-external, participant-internal, deontic, and epistemic. Finally, we find that this scheme, when applied to signed languages, motivates the search for gestures that likely

served as language-external sources for these modal forms.

3.1. Necessity

The modal notion of necessity in ASL is predominantly expressed with the word **MUST/SHOULD**. Long (1918: 61) describes the ASL word expressing ‘necessity’ (Figure 1):

Must, indicating **Necessity** and **Need**. — Crook the forefinger of “G” hand, then turn it so the end points down; push the hand downward; the downward motion is often repeated several times.

In his section on auxiliary verbs, Long (ibid.: 26) also notes that this sign may be produced “with more or less force,” perhaps indicating weak and strong variants. In this same section Long notes that the form used to express ‘should’ and ‘ought’ also means ‘duty’:

Should, Ought, indicating duty. — Press the crooked forefinger of the right “G” hand against the lips and then move toward side and downward as in “must”



Figure 1: Long MUST

Note that ASL SHOULD/UGHT in 1913 was a two-part sign, the first part corresponding in form to that of MUST. The sign described by Long as SHOULD/

OUGHT is no longer attested in ASL; in modern ASL, SHOULD/OUGHT is the less forceful variant of MUST. We will discuss the relation between these more and less forceful variants in section 4.

3.1.1. Participant-external

A classic **deontic obligation** modal use in ASL is given in Shaffer (2004):

- (1) a. [POSS.1 BAD EXPERIENCE THAT SCHOOL WHAT-gesture]-topic
EVERY MORNING DEAF LINEUP-2h
'My worst experience with that school was that every morning the deaf (kids) lined up.'
- b. [BEFORE CLASS]-TOP MUST LINEUP-2h.
'Before class we had to line up.'
- c. TOILET A-L-L SIT-2h TOILET SIT,
'and then all sit on the toilet in unison.'
- d. [FINISH]-topic, DUTY, WOMAN MUST WIPE CLEAN BEHIND A-L-L
'When we were finished the woman had to wipe all our bottoms.'
- e. PRO.1 DISGUST THAT ORAL SCHOOL DETEST
'I hated that oral school. Hated it.'

In this example, the signer is saying that an external authority (presumably a school official) obligated the woman to perform an action on the children; in turn, the woman obligated the children to perform an action. While the source of obligation in (d) is not stated overtly (the woman on duty likely did not make the rules regarding toileting), it is clear that it is external to the agent (the woman) performing that action.

Participant-external **advisability** refers to those discourse contexts where the speaker offers advice about a current state of affairs but does not include herself in the situation.

- (2) (leaning back) SHOULD COOPERATE, WORK TOGETHER, INTERACT
FORGET (gesture)) PAST PUSH-AWAY NEW LIFE FROM-NOW-ON
[SHOULD]-bf

'They (the deaf community) should cooperate and work together, they should forget about the past and start anew.'

- (3) YOU SHOULD WRITE ORDER [WRITE]-topic
 PRO.1 WANT PLEASE
 eye gaze to addressee PUT-DOWN (on paper) M-E-D MEDIUM CHILE
 PRO.2-SHOULD WRITE
 PRO.3 DON'T KNOW POSS.2 ORDER

‘You should write it out with your order. Write, “I want medium chile.” You should write it, otherwise they don’t know what you want.’

The speakers in (2) and (3) are imposing the condition described by SHOULD, but they are external to the situation being discussed. The speaker in (2) is stating what the deaf community (the participants) should do. The participant in (3) is being told by the speaker how she should order chile in a restaurant.

Participant-external **root necessity** describes those situation where general circumstances compel the action named in the proposition. Root necessity is strongly tied to the lack of an overt or salient obligator. The sense of MUST in (4) is best described as ‘it is necessary’ or ‘the situation makes it necessary’. In this case the absence of a front seat made it necessary for the speaker and his friends to sit in the back seat.

- (4) (looks at watch) MUST LEAVE, HARD FIND EXIT, BIG PARK cl:1 (walk hurriedly) FIND T-A-X-I cl:3 (car pull up) SMALL VW. LOOK-AT, [DRIVER]-topic SIT (left front seat) [PRO.3 CHAIR]-topic, EMPTY. MUST WE-THREE cl;bent-3 (back seat) [PRO.1]-topic (sit behind driver).

‘We had to leave but it was hard to find the exit, it was a big park. We walked quickly and found a taxi. It was a small VW. When I looked closely I saw that the driver was sitting in the front left seat but there was not passenger seat. The three of us had to sit in the back, and I sat right behind the driver.’

Another example of participant-external **root necessity** is seen with the final production of MUST in (4). In (4a and b) the signer is explaining that the only way to catch what the teacher was fingerspelling was to look at the entire sentence, to not look away when the subject of the sentence (the train), was spelled. If one looked away, one would miss important information.

- (5) a. POSS.1 MOTHER MUST WATCH(2h) FINGERSPELL++
 “T-H-E T-R-A-I-N I-S N-O-T C-O-M-I-N-G”

‘My mother had to watch fingerspelling. “The train is not coming.”’

b. POSS.1 MOTHER WON'T LOOK_a BECAUSE PRO.3 center SAY
 N-O-T ALL LOOK-2h_b PRO.3 SAY NOT COMING
 LOOK(ctr) SENTENCE MUST

'My mother didn't look (to the train) because the teacher had said "not". All (the other kids) looked. But she said "not coming." They needed to watch the whole sentence.'

While it could be argued that this use is deontic necessity, we claim that the sense of **MUST** in this case is one of root necessity: in order for B to occur, A must occur. The source of the condition is understood to be the situation itself, which is a highly abstracted and thus more subjective use of **MUST**.

3.1.2. *Participant-internal*

In contrast to those uses of modals where the condition is imposed by an external source, in participant-internal uses the participant is the source of the condition described by the modal. In (5) the speaker is stating the **physical necessity** for green chile. No external source obligates him to eat chile. His perceived physical need is the source of the condition.

- (6) a. [KNOW SOUTH COUNTRY]-topic (waits for attention) [KNOW SOUTH COUNTRY SPANISH FOOD]-topic STRONG CHILE MUST PRO.1 (leans back)

'You know how it is in the southern part. You know how it is with Spanish food in the southern part, there's a lot of hot chile. I have to have chile.'

b. MUST WITH CHILE MUST PRO.1 (leans back, turns head) FEEL, WITH CHILE

'I have to have chile. I have to.'

In participant-internal **advisability**, the speaker is a participant in the situation being described and is imposing a limiting condition upon himself/herself (as well as others). Participant-internal advisability typically uses 'we' as the semantic agent, while participant-external advisability commonly uses 'you' or 'they' as the semantic agent.

In (6) the speaker is discussing politics and comments on the plight of poor people. He uses 'we' as the agent, suggesting that he sees himself as part of the problem, and proposed solution.

- (7) THAT ONE B-I-G P-R-O-B-L-E-M PRO.1p PROBLEM [gesture WHAT]-
topic ECONOMY PRO.1p SHOULD HELP POOR LOW PEOPLE AREA
SHOULD.

‘One big problem is the economy. We should help poor people.’

3.1.3. *Gestural sources of necessity*

For spoken languages, grammaticization typically leads from lexical morphemes to grammatical morphemes. Such grammaticization has been documented for ASL and other signed languages (Janzen, 1995; Sexton, 1999; Wilbur, 1999; Meir, 2003; Zeshan, 2003). Recent studies of ASL grammaticization (Janzen, 1995; Wilcox and Wilcox, 1995; Janzen and Shaffer, 2002; Shaffer, 2002) have expanded on the notion by claiming that the grammaticization path in many cases can be extended back to include gestural sources of lexical and grammatical morphemes.

When searching for the lexical sources of ASL modal forms, we turn to French Sign Language (LSF) because it is the closest genetic relative of ASL. ASL necessity forms are clearly related to the LSF form IL FAUT ‘it is necessary’ (Figure 3), which is also attested in mid-nineteenth century LSF (Figure 4). Related forms in LSF include DEVOIR ‘duty’ and DEVOIR L’ ARGENT ‘owe’. Wilcox and Wilcox (1995) and Shaffer (2000) speculated that the source of necessity forms may be a pointing gesture indicating monetary debt, citing the modern ASL word OWE and the fact that it is not uncommon cross-linguistically to find verbs indicating monetary debt grammaticize to mean general obligation (Bybee et al., 1994).

In both ASL OWE and LSF DEVOIR de l’ARGENT the forms consist of two components: a finger pointing downward at the palm of a flat, upward-oriented hand. The gestural source of the pointing finger appears to be a gesture described by De Jorio (1832: 308) and used as far back as classical antiquity to indicate ‘in this place’ and ‘insistence’. Dodwell (2000: 36) discusses this gesture (Figure 5), which he calls an imperative: “It consists of directing the extended index finger towards the ground.” According to both de Jorio and Dodwell, the gesture was described by Quintilian in the first century A.D.: “when directed towards the ground, this finger insists” (ibid.).

The upward-oriented hand gesture is also described by de Jorio as indicating “a request for a material object” (p. 128). Thus, the combination of these two gestures seems to indicate an insistence or demand that a material object — in this case money — be placed

in the hand.

Janzen and Shaffer (2002) suggested that the composite gesture of pointing at the upturned palm entered the LSF lexicon as a verb indicating monetary debt and that the form then underwent semantic generalization which resulted in uses where no monetary debt was intended, only a general sense of obligation. We would clarify this analysis slightly. We now believe what likely happened was that the composite gesture of pointing to the upturned palm did enter the old LSF lexicon as a verb meaning ‘to owe money’. It seems likely, however, that the downward-pointing finger, one component of this composite gesture, entered the LSF lexicon as a necessity form.³



Figure 2: ASL sign MUST

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3. Two points need further study. First, we can find no purely lexical predecessor for IL FAUT. This may be because the gesture meaning ‘insist’ already had a grammatical sense to it. Second, we do not here explore the further development of the upward-facing palm gesture, except to note that it occurs in certain classifier forms for flat object, one of which is a component of the ASL word MONEY.



Figure 3: Modern LSF sign IL FAUT (Girod, 1997)



Figure 4: Old LSF sign IL FAUT (Brouland, 1855)

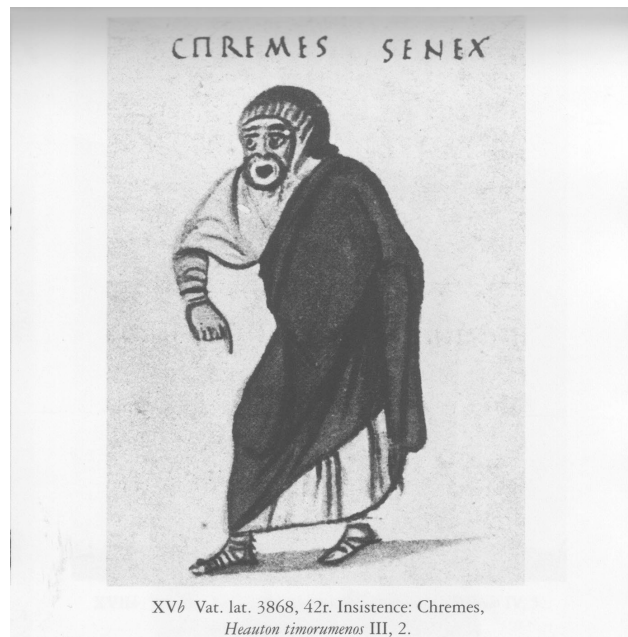


Figure 5: Roman gesture meaning 'insist' (Dodwell 2000, plate XVb).

3.2. Possibility

The semantic domain of possibility includes all notions of physical and mental ability, skills, root possibility, permission and epistemic possibility. We begin with participant-internal possibility and work ‘outward’ because it is assumed that the source of all possibility meanings is ‘physical strength’, an internal attribute.

Long (1918:62) describes the ASL word expressing ‘possibility’ (Figure 6):

Can, indicating **Ability, Power**.—Extend “S” hands forward from the sides, thumb sides up with elbows against sides; bring both hands down with a jerking motion.

Long also describes the difference between CAN and STRONG: “The sign for ‘**strong**’ is very similar. The difference lies in the way the hands are moved. For ‘strength’ they are moved somewhat sidewise with a slight circular motion” (Figure 7).



Figure 6: Long CAN



Figure 7: Long STRONG

3.2.1. Participant-internal

A common meaning of participant-internal possibility is **physical ability**. In (8) the

speaker states his physical ability to lift 100 pounds. In (9) the speaker is discussing his experiences in a school for the deaf that taught speech-reading skills, and to a lesser extent, speech skills. The participant is a hypothetical ‘one’ but it is understood that the speaker is included.

- (8) PRO.1 CAN LIFT-WEIGHT 100 POUNDS.
‘I can lift one hundred pounds.’

- (9) a. [ORAL SCHOOL TEACH HOW SAY WORDS]-topic NOT PRO.3
INTERESTING PRO.3

‘What was interesting about my oral school was that it didn't emphasize speech articulation.’

- b. [CAN LIP-READ R-E-A-D- L-I-P-S EMPHASIZE LIP-READ]-topic
LATER CAN PICK-U-P SPEAK, SOUND

‘If you can read lips (they emphasized lip-reading), then you can learn to talk.’

Root possibility refers to those discourse uses where the enabling condition is present in the situation itself. Often there is no salient agent, and therefore no condition on the agent. The condition is more generalized to the situation being discussed. In (10) the speaker is relating to a friend her experience buying a new house. She tells the friend about a conversation she had with her husband concerning the benefits of the new house, describing what is possible in the new house and its yard.

- (10) PRO.1 TELL HERE BIG Y-A-R-D, G-A-R-D-E-N, POSSIBLE HAVE
PLAY VOLLEYBALL CAN
PEOPLE GATHER CAN
MORE INTERACT, NICE

‘I told (my husband) that (this house) has a big yard, and garden. It has a lot of potential. We could play volleyball, have people over. It would be better for social events.’

3.2.2. *Participant-external*

Permission is often considered to be a type of deontic possibility and a counterpart to deontic obligation. Pragmatically, permission typically is granted to the agent by an external source.

A bit of background information is necessary before we can discuss (11). When schools for the deaf were founded in the United States signed language was the mode of instruction. Later, beginning around the turn of the twentieth century, there was a 50-75 year period when schools banned the use of signs in favor of oral methods of instruction. In (11), the signer is describing her mother's schooling and states that while the teachers were permitted (presumably by an external authority) to use signs, most spelled out each word using the manual alphabet instead.

- (11) POSS.1 MOTHER TIME TEACH, TEACH CAN SIGN BUT ALWAYS
FINGERSPELL+++

'In my mother's time the teachers were allowed to sign, but they always fingerspelled.'

Participant-external **root possibility** describes those modal uses where a condition inherent in a situation that is external to the main clause agent enables the agent to perform the action described by the verb. In (12) the speaker is discussing the use of American TTYs (a type of text telephone) by deaf people in Iceland. He states that while the Icelandic alphabet contains two additional letters, it is still possible for the deaf people there to use American TTYs.

- (12) AMERICAN POSS.3 PRO.3p, AMERICAN C-O-M. LETTER TWO, ADD,
MEAN CAN LIVE WITHOUT. THAT TWO LETTER DON'T-CARE.
[PRO.1p]-topic 26.
(left hand) [PRO.3]-topic 28. BUT CAN LIVE WITHOUT TWO.

'They (people in Iceland) used American (TTYs). They have two more letters, but they can live without the two letters, it doesn't matter. We have 26, they have 28, but they can live without the two.'

3.2.3. *Gestural sources of possibility*

In a discussion of markers of possibility, Bybee et al. (1994) note that while English *can* likely began as a verb meaning 'to know', there are several known cases of words predicating physical ability that come to be used to mark general ability as well. Two cases are cited. English *may* was formerly used to indicate physical ability and later came to express general ability. Latin *potere* 'to be able,' which is related to the adjective *potens* meaning 'strong' or 'powerful', provided the source for French *pouvoir* and Spanish *poder*, both meaning 'can' (1994:190).

Wilcox and Wilcox (1995) and Janzen and Shaffer (2002) have suggested a similar grammaticization path for markers of possibility in ASL. As we saw in Figures 6 and 7, there is a clear phonological and semantic relation between the ASL forms CAN and STRONG. This connection can be seen in film data from a 1913 lay sermon:

- (13) PRO.3 KNOW EACH OTHER BETTER AND PRO.3 CAN UNDERSTAND EACH OTHER BETTER AND FEEL BROTHER

‘We know each other better and are able to understand each other better and feel like brothers.’

- (14) OUR FATHER STRONG OVER MOON STARS WORLD

‘Our father is strong over the moon, and stars and world.’

- (15) SELF CAN GET-ALONG WITHOUT OUR HELP

‘He can get along without our help.’

In the above examples, STRONG and CAN are signed in an identical manner. In (14) it is unclear whether the signer was intending a strength or ability reading.

The original development from gestural source to lexical sign surely occurred several centuries ago in LSF. The LSF signs FORT (Figure 8) and POUVOIR (Figure 9) are also phonologically related, and we suggest that the source is a gesture indicating upper body strength.



Figure 8: LSF lexical sign FORT



Figure 9: LSF grammatical sign POUVOIR

We further suggest that the old LSF lexical sign FORT ‘to be strong’ grammaticized into POUVOIR ‘can’ which is used in constructions expressing physical ability, mental ability, root possibility, as well as permission and epistemic possibility.

In order to understand the relation between the LSF forms FORT and POUVOIR and their ASL counterparts STRONG and CAN, we must digress a bit and describe the nature of the relation between these two languages. The mechanism by which LSF and ASL came into contact, so-called “methodical signs,” is unique to signed languages. Originally developed at the Paris Institute for the Deaf in the late 18th century, methodical signs were invented sign forms, typically composed of a base lexical sign borrowed from LSF to which various modifications were made to reflect the structure of spoken/written French. For example, Lane (1980: 122) cites Epée’s description of the methodical sign aimable ‘lovable’: “I make the radical sign [for love], then the sign for an adjective, but of one terminating in able formed from a verb: To this I must subjoin the sign for possible or necessary.”

Methodical signs were adapted by Thomas Gallaudet and Laurent Clerc, a former student at the Paris Institute, to reflect English structure and were used in the deaf education classroom at the newly established American Asylum for Deaf-Mutes in Hartford, Connecticut in 1817. Gallaudet soon noted that an existing signed language was already in use, and in fact he came to advocate that teachers of the deaf should know both methodical signs and this natural language.

Thus, it is clear that deaf people in America were communicating with each other, and that the language they used would likely have been related to signed languages from nations which contributed settlers to the colonies at this time, including Britain, France, and Spain. Groce (1985) reports that a population of deaf people on Martha’s Vineyard

around this time used a signed language related to a regional dialect used in Britain. Beyond this, we have very little idea what that language looked like.

Specific to this study and to modal forms, the implication is that the LSF forms FORT and POUVOIR were brought into American education when Gallaudet and Clerc established deaf education in this country. We have virtually no clue as to what existing forms might have been used in the deaf community at that time. We do know that by shortly after the turn of the 20th century, when the films that we cite here were made and when Long wrote his description of ASL, STRONG and CAN were still closely related phonologically. Example (14) suggests that they were also somewhat polysemous.

We also know that these forms in contemporary ASL are clearly distinct phonologically and semantically. While CAN is still made in roughly the same location and with the same handshape as described by Long, the orientation of the hands has changed so that the palms face downward, and the movement often has reduced to a flexing of the wrist rather than a full downward stroke of the forearm. STRONG is now made with the same handshape, but the location has moved up considerably, and the sign moves outward, away from the signer, rather than downward as it did in the earlier form.

3.3. *Epistemic modality*

Epistemic modality in ASL is expressed by a combination of manual signs, and manual and nonmanual markers. The particular combination of manual and non-manual markers indicates the degree of speaker certainty. In addition, the position of a modal in an utterance corresponds to the modal's scope and to its role in the discourse (Shaffer 2004). Modals with scope over only the verb appear near the verb, while modals with clausal scope appear near the end of the clause, in the comment of topic-marked constructions. Position also corresponds to the modal's degree of grammaticization. In deontic obligation, for example, which is a less grammaticized meaning, the modal appears in a position immediately preceding the verb. In epistemic necessity, the most grammaticized meaning, the modal typically appears at the end of the utterance, as in (16).

(16) [LIBRARY HAVE DEAF LIFE]-top [SHOULD]-bf/hn

‘The library should have Deaf Life/I’m sure the library has Deaf Life.’

Because of the weak, reduplicated articulation, non-manual marking (brow furrowing and a head nod), and information ordering, (16) indicates the speaker's positive commitment to the truth of the proposition. The same utterance with the modal produced without nonmanual markers and in preverbal position would be grammatical and felicitous, but it would have a non-epistemic, participant-external advisability meaning.

Epistemic modality also is expressed with possibility, as in (17):

- (17) [SAME SIGN BECAUSE BAD TRANSLATION FALSE
C-O-G-N-A-T-E]-topic [DOUBT]-bf/hs (pause) (gesture “well”)
[POSSIBLE]-hn

‘I doubt the two concepts share the same sign (now) because of a problem with translation, or because of a false cognate, but, well, I suppose it’s possible.’

In describing the expression of epistemic modality in ASL, Wilcox and Wilcox (1995) and Shaffer (2004) discuss a set of words including FEEL, SEEM, and OBVIOUS. We now prefer to classify these words as inferential evidentials. Van der Auwera and Plungian (1998) regard inferential evidentiality, which identifies the evidence as based on reasoning, as an overlap category between epistemic modality and evidentiality. The following examples demonstrate these uses:

- (18) a. [FEEL SOMEONE CL:1 NOTICE GO-INTO SWIPE YOU]-yn

‘Do you suppose someone walked by, noticed it, and just went in and stole it?’

- b. [NOT-KNOW]-hs [SEEM+]-hn

‘I don’t know, apparently that’s what happened.’

- (19) [TIM, JENNIFER]-topic [DIVORCE SEEM]-brow furrow/slow head nod.

‘It looks like Tim and Jennifer are going to get a divorce/I think Tim and Jennifer are going to get a divorce.’

- (20) [MAN PRO.3 RICH]-topic [OBVIOUS]-bf/hn

‘That man is obviously rich.’

One way that epistemic modality is expressed in ASL is with ‘future’. When the sign FUTURE is combined with a constellation of manual and non-manual gestures, the sense is one of future certainty indicating that the speaker is strongly convinced that the event will come about (see (Bybee et al., 1994: 248)).

In example (21), the speaker uses FUTURE twice, first in preverbal position indicating temporal reference, then in clause final position indicating his certainty that the event will take place.

- (21) RT 29 THINK-LIKE PRO.3 R-O-C-K-V-I-L-L-E P-I-K-E PRO.3 BUILD+
PRO.3 [FUTURE]-topic/wg DEVELOP [FUTURE]-bf/hn
S-O WHY MUST _aMOVE_b NEAR COLUMBIA MALL

‘(I live off) route 29, the Rockville Pike area. In the future I’m sure they will develop that area. So why do I have to move all the way up near Columbia

In (22) the speaker indicates his certainty that he will win the lottery.

- (22) [SUPPOSE PRO.1 SEND+++ PCH]-topic
RECEIVE MONEY [FUTURE]-bf/hn

‘If I keep sending in the Publisher’s Clearing House sweepstakes, I’m sure I’ll rake in the money.’

Thus, the constellation of manual and nonmanual markers are what distinguish the epistemic and the temporal readings of FUTURE. Note that in example (21) the brow furrow and head nod only occur on the epistemic FUTURE. In addition, this form of FUTURE is signed with a short, sharp movement. The nonmanual markers that co-occur with the temporal FUTURE indicate topic, and the manual (wiggle) markers, which also result in a longer, softer movement, add a temporally distal meaning to FUTURE.

The same manual and non-manual markers that we have just described for epistemic commitment are also used to indicate the speaker’s degree of certainty with the inferential evidentials SEEM, FEEL, and OBVIOUS. Wilcox and Wilcox (1995) report an example showing both weak and strong inferential evidential senses of SEEM. In a discussion about which of two possible translations would be more appropriate for a particular ASL utterance, one speaker asks “Which do you think she said, this or that?” The second speaker responds:

- (23) SEEM++ index_i
“I think she said this...”⁴
(The two study the videotape of the utterance under discussion some more)
SEEM index_i!

4. We have slightly changed the translation from Wilcox and Wilcox (1995) to better reflect the meaning of this utterance.

“Yes, this has to be what she said.”

In this transcription, the double plus symbols after the first instance of SEEM represent slow reduplication, which contrast with the sharp, short movement of the second instance. The first form indicates weak speaker commitment, the second indicates strong commitment. Wilcox and Wilcox (1995: 156) suggest that an iconicity principle is involved in this contrast: “In epistemics, possibility is expressed with reduced gestural substance; probability or certainty is expressed with strong gestural substance.”

In summary, epistemic commitment is typically indicated by both manual and non-manual means. The manual marking consists of an alternation of the manner in which a sign’s movement is articulated: a sharp, brisk movement and a slower, softer movement indicating strong and weak commitment, respectively. The non-manual marking consists primarily of brow furrow and head nod, indicating strong commitment. These markers as a group function to indicate a special type of intensification, the strength or intensity of epistemic commitment.

4. Modality and Intensification

A number of scholars discuss how modal strength is expressed across a range of semantic domains (Palmer, 1986; Bybee et al., 1994). As we have just seen, modal strength plays an important role in the epistemic domain, where it signals the speaker’s degree of epistemic commitment, from tentative to fully confident. Modal strength also is important across the entire domain of modality; for example, in participant-internal possibility it indicates degrees of ability, and in participant-external necessity it indicates degrees of deontic obligation.

We propose that modal strength is a specialized expression of the more general notion of intensification. We do this for two reasons. First, it seems appropriate to discuss the semantics of modal strength as a matter of degree of intensification — that is, as variation along a scale of intensification of necessity, possibility, and speaker’s epistemic commitment. Modal strength in ASL is formally related to other types of intensification, such as intensity of color. Second, the way that intensification is expressed in ASL is by phonetic variations in gestural strength, that is, by changes in the strength of a sign’s movement. Thus, the expression of modal strength in ASL is iconic: semantically weak modality such as weak deontic obligation is expressed with weak gestural forms, while semantically strong modality such as strong deontic obligation is expressed with a strong gestural form (Wilcox and Wilcox, 1995).

It is well known that languages use different means to express modal strength. In some languages these distinctions are expressed lexically, as English does with ‘must’ and ‘should’ for expressing strong and weak deontic obligation respectively. Similarly,

Spanish has several different forms to express degrees of necessity:

- (24) Ella necesita quedarse en casa para cuidar los niños.
'It is necessary for her to stay home and take care of the children.'
- (25) Ella tiene que quedarse en casa para cuidar los niños.
'She has to stay home and take care of the children.'
- (26) Ella debe quedarse en casa para cuidar los niños.
'She should stay home and take care of the children.'

Other languages use morphological means to express modal strength. For example, Palmer (1986: 65) cites data from Hixkaryana (Derbyshire, 1979) in which the intensifier *ha* is used to mark degree of epistemic certainty:

- | | | |
|------|--------------------------|-----|
| (27) | nomokyaha | ha |
| | he come+NONPAST | INT |
| | 'He must certainly come' | |
| | nomokyan | ha |
| | he come+NONPAST UNCERT | INT |
| | 'He may come' | |

ASL indicates modal strength with the addition of markers such as those described above. In the next section, we describe the way in which intensification is expressed in ASL. We then move to a discussion of intensification across a range of modal uses. Finally, we explore the question of the nature of the marker of modal intensification in ASL.

4.1. Intensification in ASL

Intensification is indicated by a change in the manner of movement of the sign: the weak forms exhibit a soft, reduplicated movement, while the strong forms are produced with a single, forceful stroke. Weak and strong forms also are accompanied by a set of non-manual, facial markers including brow furrow and head nod. The manual intensification devices were first described by Frishberg (1972):

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 called these movement alternations “sharp” and “soft,” respectively, and argued that they were morphological forms bound to lexical roots. In addition to the color examples just given, examples include the alternations of HOT/VERY-HOT, SMART/VERY-SMART, FAST/VERY-FAST. Frishberg also described sharp and soft 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.” In an extension of Frishberg’s work, Gorbet (2003) identified allomorphs of the SHARP morpheme 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).

These markers of intensity in ASL thus show great semantic range, from lexical uses such as the distinction between ‘hot’ and ‘very hot’ to more grammatical uses such as inceptive and the expression of epistemic commitment. Whether a grammaticization path from the more lexical to the more grammatical meanings can be identified remains for now an open question. As for the other modal forms, however, we might ask whether a gestural source can be identified, and here an answer suggests itself.

4.2. *The second route*

Wilcox (2004) has proposed that the facial and manner of movement markers such as those that signal intensification constitute a second route by which gesture becomes incorporated into signed languages. According to this proposal, these markers are prosodic or intonational components of signed languages derived from gestural sources which ultimately have their source in the expression of emotion or the speaker’s personal, subjective response to some state of affairs. Their link to the expression of modal strength should come as no surprise, since prosody is one of the resources languages have available for the expression of subjectivity. Discussing epistemic modality, (Lyons, 1995: 331) ties subjectivity and modality to prosody, remarking that “All natural languages provide their users with prosodic resources — stress and intonation — with which to express the several distinguishable kinds of qualified epistemic commitment.”

Manner of movement is analogous to prosody and intonation in yet another way. Writing of intonation, Bolinger (1986) noted that people often remark, “I don’t mind what she said, but I don’t like the way she said it.” This distinction between the propositional *what* and the subjective *way*, which, as Bolinger points out, is often dismissed “as a mere manner of saying, an accompaniment to the message rather than an inseparable part of it”

(Bolinger, 1986: 3), mirrors the distinction between the *what* of a sign's movement and the *way* it is produced, its manner of movement.

Bolinger (1986: 195) regarded intonation as part of a “gestural complex whose primitive and still surviving function is the signaling of emotion” and asked, “How far has intonation come on the road to the arbitrary and conventional?” (ibid.: 198). Our claim is that manner of movement in the expression of intensification provides a glimpse at how we might answer this question. For signed languages, gesture seems to have entered the language system, the realm of the arbitrary and conventional, and in the case of epistemic modal forms has travelled some distance towards becoming fully grammatical. Interestingly, this also seems to be the conclusion reached by Fónagy (1983: 341) for spoken languages, who notes that “modal intonation patterns represent undoubtedly the highest level of semantic organization which can be reached by tonal means. ... Intonation had to cover nonetheless a long distance in semantic space to become, from a mere reflection of emotional states, a denotation of modal categories.”

When we turn to the non-manual markers associated with intensification and modal strength, the situation is much the same. In this case, however, the evidence is much clearer in support of the gestural source of these markers. Wilcox and Wilcox (1995: 146-148) point out that head nod and brow furrow are not only used to mark modal forms, especially epistemic modals, but also *wh* questions and imperatives. Looking only at intonation in spoken language, Bolinger (1986: 208) also 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.

Once again, when these gestures enter the signed language system they do so first as prosodic devices that accompany and modulate the more propositional portion of the linguistic message. Like manner of movement, however, they too travel along the route from gesture to grammar, eventually functioning to distinguish between a statement and an interrogative, or, as we saw in (21), between temporal future and future certainty meanings. In some cases, such as when they serve to indicate degree of obligation or ability, these forms exhibit almost continuous variation and thus appear more prosodic. In

other cases, they seem to have moved much farther along the path to fully grammatical and obligatory. This is the case for the expression of epistemic commitment. The ASL necessity form can only be used in an epistemic sense when it appears in the soft, reduplicated form, glossed as SHOULD. For example:

- (28) [PRO.3 SEND LETTER ASK TRANSLATE SPANISH]-topic, [RECEIVE THIS WEEK SHOULD]-bf/hn.
“I sent a letter to the Spanish translator and asked them to translate it. I should receive it this week.”

We suggest that the soft marking in this case has achieved morphological status.

5. Conclusions

We have described a range of modal forms in ASL and suggested that their semantics are best described, following Van der Auwera and Plugian (1998), by using the semantic domains of necessity and obligation, participant external and participant internal, and epistemic modality. We have also documented that, as for spoken languages, modal forms often develop from lexical sources.

Unlike spoken languages, for signed languages such as ASL we can often trace the ultimate source of these lexical forms to gestures outside the language system. Here, we have provided evidence of two routes leading from gesture to grammar: one in which manual gestures go through a lexical stage before developing into more grammatical forms, and a second which leads from gesture to prosodic device and then directly to grammar.

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