

MOUTH MORPHEMES IN ASL: A closer look

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The research presented in this paper attempts to deepen understanding of MOUTH MORPHEMES, by which we mean ‘morphemes which involve the mouth as their primary articulator’.¹ Such morphemes have been mentioned in the literature for decades, but often with only a superficial treatment. We attempt a more thorough coverage than has appeared previously, both of their general role within the grammar of ASL (sections 2 and 3) and of descriptive details of specific morphemes (section 4). We focus especially on combinatorial restrictions of mouth morphemes with manual signs and aspectual modulations.

There are two primary sources of our data, in addition to previous scholarly literature:

- Intuitions of Kathy Fraychineaud (5th generation Deaf from New Orleans, ASL instructor) and recorded videos of her signing
- Videotaped examples by Kevin Struxness (1996; Deaf, ASL instructor, southern California)

1. Distinguishing function from etymology

Different uses of the mouth in signed languages are often categorized diachronically, in terms of their etymological origin: whether or not they are borrowed from a spoken language. For example, the papers in Boyes Braeme and Sutton-Spence 2001 distinguish between MOUTHINGS and MOUTH GESTURES.²

- Mouthings: Borrowed from a spoken language, including both full and partial mouthing.
- Mouth gestures: Not borrowed from a spoken language; may be derived from gestures used in the surrounding community or iconic representations, or they may have no obvious origin.

¹ That is, mouth morphemes do not have a primary manual component, although as we discuss later, they do sometimes involve modified motion on manual signs.

² The term MOUTH GESTURE is unfortunate in light of Sandler’s (2003) distinction between mouth morphemes and true instances of gesturing with the mouth, in that many “mouth gestures” are part of the grammar, not gestures in Sandler’s sense.

For our purposes, however, we prefer to classify them according to their status in the synchronic grammar.

- Use of the mouth which is an inherent part of specific manual signs.
- Use of the mouth as an independent morpheme which combines with a variety of manual signs (MOUTH MORPHEME).

These two ways of classifying them are logically and empirically independent. Most mouthings fall in the first category, and most mouth gestures fall in the second, but the correlation is not 100%.

	Borrowed from English (mouthings)	Not borrowed from English (mouth gestures)
Mouth shapes inherently associated with particular manual signs	[fʃ] with FINISH	[pa] ("pah") with SUCCESS squared lips with TORMENT, (Liddell 2003:13-14)
Mouth shapes independent of particular manual signs ("mouth morphemes")	oo 'to an amazing degree' (from interjection "ooh")	cs 'near' th 'sloppily'

We concentrate on the second row.³

2. THE NATURE OF MOUTH MORPHEMES

In this section, we describe key properties of this group of morphemes. This is important, since they are often described in the literature in a superficial and thus somewhat inaccurate way.

2.1. ARE DYNAMIC AND REQUIRE COORDINATED TIMING WITH MANUAL SIGNS

Some mouth morphemes involve a sequence of mouth shapes. Timing of the transition from one mouth shape to the next is carefully coordinated with motions in associated manual signs.⁴

- In *cha* (section 4.2), the mouth reaches its final open position at the same time as the hands reach their final location.
- In *po* (section 4.11), the gap between manual articulators (hands or fingers) narrows at the same time as the mouth opens.
- *sta-sta* (section 4.16) cooccurs with signs that have cyclic motion. The mouth opens rapidly at the same time as the primary pulse of the manual cycle (i.e. the point at which a moving hand

³ Two other uses of the mouth should also be recognized, and are also not the concern of this paper: full mouthing in contact signing (Lucas and Valli 1990) and gesturing with the mouth (Sandler 2003, cf. McNeil 1992).

⁴ This suggests, of course, that mouth morphemes are associated with the same timing slots as manual components, that is, they share a single timing skeleton.

passes a point of articulation, or the fastest segment of a cycle which varies in speed), then closes more slowly during the rest of the cycle.

2.2. INVOLVE MORE THAN JUST THE MOUTH

Some mouth morphemes involve other nonmanual articulators, particularly the head and shoulders.⁵

cs 'close': raised shoulder, head turn/tilt *sta-sta* 'with effort': head tilt



NEAR/cs



STUDY/sta-sta

clenchTopic: head/shoulders drawn back from referent, shoulder tilt



THAT-ONE/clench-topic

Some mouth morphemes induce changes in manual motion. For example, *th* 'sloppily', introduces erratic irregularity in path and pacing. Unlike aspectual modulations (Klima and Bellugi 1979:243-271), this change in motion does not have any morphemic status; it only occurs with *th*, and is therefore part of that morpheme. (Cf. unrealized inceptive aspect, Liddell 2003:37-40, which likewise has both nonmanual components and modification of manual motion, and our comments about *mm/mmm* in sections 4.7 and 4.8)



WRITE/th 'write sloppily'

⁵ The term MOUTH MORPHEMES may turn out to be just a convenient phonological classification ("those morphemes that use the mouth but not the hands") rather than a principled category relevant to the grammatical structure of the language. That is, the picture that seems to be emerging is that ASL morphemes vary in what combinations of articulators they use. Many morphemes specify the use of one or both hands, but some do not. Some happen to specify mouth shapes; others do not. Some involve other non-manual articulators; others do not. These different classes of phonological features combine with each other in many different ways and a full description of each morpheme needs to note all articulators that are consistently involved in its production. There is not a clean distinction between mouth morphemes and others, or for that matter, between manual signs and non-manual signals; such distinctions refer only to phonological components, not whole morphemes.

2.3. ARE NOT *JUST* ADVERBIAL

Often mouth morphemes are characterized as “adverbial” or even as “adverbs”. That is, many express degree, manner, and affective evaluation, the prototypical meanings associated with adverbs, and are used to modify verbs, adjectives or other adverbs.



CLEAN/clench 'extremely clean'



WRITE/th 'write sloppily'



STUDY/puffedBlow 'study a lot'



FAR/ahh 'very far'



DIRTY/oo 'amazingly dirty'



WORK/halflip 'work with complaint'

However, some mouth morphemes have uses that are not normally considered “adverbial”, such as size, quantity, distance, relativization, and conversation regulators.



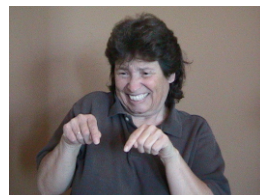
LARGE/cha 'large'



SMALL/po 'tiny'



CL-bentB/CL-B/cha 'a lot (of homework)'



CL-1:“here”/cs
'right next to'



CL-Y:“fat legs walking”/puffed
'(fat person) waddling along'



Relativization⁶ (cf. Baker-Shenk & Cokely 1980:17,
Liddell 1980:21–22, 136ff., 2003:54)

⁶ The brow raise is likely the separate morpheme for topicalization, since relative clauses generally occur only in topics; the relative clause signal itself must consist of the raised upper lip and backward head tilt, and thus is appropriately called a “mouth morpheme”.



m-m-m 'oh really!' (cf. Struxness 1996 40:48)

In some cases, e.g. with LARGE/cha above, the mouth morpheme appears not to add very much to the meaning of the manual sign. However, it is still analyzable as a distinct morpheme because it involves a consistent form-meaning association that can occur with several different manual signs.

2.4. HAVE COOCCURRENCE RESTRICTIONS WITH SIGNS AND ASPECTUAL MODULATIONS

Mouth morphemes are almost always used in combination with individual manual signs. However, there are severe restrictions on which mouth morphemes can be used with which signs.

- *BECOME-SICK/cs '(become recently sick)'
- *DIRTY/ahh '(very dirty)'
- *EMBARRASSED/mm '(normally embarrassed)'

There are also restrictions on combinations of mouth morphemes and aspectual modulations.

- Baker-Shenk and Cokely (1980: 408): *oo* (what they call "pursed lips") cannot be used on WORK with 'over-and-over-again' modulation (presumably iterative aspect, Klima and Bellugi 1979:263).
- *clench* occurs only with a limited set of aspectual modulations (see section 4.3).

The exact nature of these restrictions (the rules that account for them) remains unclear and is one subject of our ongoing research. We document some of them in section 4.

2.5. MAY COMBINE WITH EACH OTHER AND WITH MOUTHINGS

One of the more interesting facets of the use of the mouth as an articulator is that mouth morphemes and mouthings can combine with each other, either simultaneously or sequentially.

- *sow* may be a compound of *clench*+*oo* (see section 4.15)
- *mm* 'as expected' + *puffed* 'large' = 'large but as expected' (Baker-Shenk and Cokely 1980:20)
- *th* 'sloppy' + *puffedBlow* 'very' = 'very sloppy' (Struxness 1996 04:24)
- *clench* 'very' can combine with mouthings and with intensive aspectual modulation to express intense or dark shades of color (Struxness 1996 07:54)
 - ♦ RED/[ɹɛ] (with the spread lips of *clench* on the vowel and greater tension throughout) 'very red'

- ♦ TAN/[tæn] (with the spread lips and greater tension of *clench* throughout) ‘dark tan’
- For Struxness (1999 22:50, 50:10), at least, a tongue wag (protruded and trilled vertically), meaning ‘extremely’, can be infixed in mouthings associated with certain aspectual signs.⁷
 - ♦ FINISH/[f]tongueWag[s] ‘finally after a long time’
 - ♦ MUST/[m]tongueWag[s] ‘mandatory’

3. THE ROLE OF MOUTH MORPHEMES IN ASL GRAMMAR

Where, exactly, do mouth morphemes fit in the grammar of ASL and of signed languages generally? Although they may involve a completely different type of grammatical construction than is found in spoken languages, it seems reasonable to attempt to characterize them first using the same general theoretical constructs that are well-documented in languages generally. There are, then, three hypotheses that should be considered about their role in the grammar:

- **derivational (lexical) morphology:** Mouth morphemes are not listed by themselves in the lexicon, but are specified as derivational affixes included in complex lexical items built on manual signs as roots.⁸ Word formation rules exist to create novel combinations of some morphemes with lexical signs and classifier constructions, but these rules vary in productivity.
- **inflectional (syntactic) morphology:** Mouth morphemes are not listed in the lexicon, but combine with manual signs as inflectional affixes according to general morphosyntactic rules.
- **“simultaneous syntax”:** Mouth morphemes are separate “words” that have the special property of being articulated simultaneously with other words (i.e., with manual signs). The rules that control these combinations are essentially syntactic.

Baker-Shenk and Cokely’s (1980:17) and Liddell (1980:42ff) seem to adopt the third hypothesis, since they describe mouth morphemes as “nonmanual adverbs”, and Liddell presents them under ADV nodes in syntactic trees (e.g. 1980:45, 50). Neidle et al. 2000:43ff, however, distinguish mouth morphemes from prosodic nonmanual signals such as the negative head shake or raised eyebrows for topicalization. For prosodic nonmanuals, they give a clearly syntactic account in terms of functional projections and c-command, which suggests that they feel mouth morphemes are not to be characterized in the same syntactic terms. They stop short, however, of actually claiming that mouth morphemes are morphology, describing them simply as “adverbial markings” and “modifiers” (p. 42) without offering any analysis.

⁷ Fraychineaud does not use *tongueWag*, and has never seen anything like the combinations Struxness reports. We have only limited data about *tongueWag*, and so we do not attempt to include it in section 4.

⁸ Liddell 1980:47 acknowledges this possibility for SLEEP+SUNRISE/mmm ‘sleep-in’.

We believe that the available current evidence, though not conclusive, points toward the first hypothesis, that most mouth morphemes combine with manual signs as derivational morphology.⁹ We offer the following considerations in preliminary support of this position:

- Most mouth morphemes are bound, not free; they must cooccur with a manual sign.¹⁰
- Mouth morphemes normally occur only on single signs; they do not spread over syntactic constituents. Though they may occur on several signs in sequence, they don't show the variable spreading behavior characteristic of prosodic nonmanuals (Neidle et al. 2000:43-48). When the same mouth morpheme does occur on more than one sign in sequence, there can often be prosodic breaks between signs (e.g. brief relaxations of the nonmanual signal).¹¹ In addition, Liddell 1980:48 notes that when *cs* 'near' occurs with expressions like YESTERDAY NIGHT, they are signed as compounds, hence consistent with the idea that *cs* is a derivational affix added to single word, rather than superimposed on a whole phrase.
- The meanings of most mouth morphemes are not typical of inflectional morphology. They often have multiple senses, and each sense is semantically complex rather than easily characterized using grammatical categories (see section 4).
- Mouth morphemes do not organize into paradigms like inflectional morphology.
- There are apparently arbitrary gaps in what combinations are possible, of the type that is typical of derivational morphology:
 - ♦ *clench* 'extremely' cannot be used with the standard form of SLOW used in most dialects (strong hand drawn along back of base hand), but can be used with a synonymous sign local to Arizona (Y hand with thumb at corner of mouth, wrist flexes down)



SLOW/clench (Arizona dialect)

- ♦ *clench* may be used with a classifier upright index finger to mean 'walk along/past very fast' if a rapid, tense, up-and-down motion or side-to-side wagging is superimposed on the motion path, but not with a smooth, fast sweep (which is surprising, because this is the most iconic possibility of the three). Instead, the latter motion uses *oo*.
- Since there are cooccurrence restrictions (section 2.4) of mouth morphemes with aspectual modulations, and since Liddell 2003:49-52 argues that aspectual modulations are derivational affixes, it is likely that mouth morphemes are also derivational.

⁹ Of course, they might conceivably be bound roots that participate in compounds with manual signs; tentatively we assume they are affixes since they do not occur alone and generally modify the meaning of the sign they attach to.

¹⁰ The conversational regulator *m-m-m* (section 4.9) can occur by itself, without a manual sign, and therefore cannot be considered to be an affix. However, *m-m-m* does not seem to combine with other material at all to form sentences, only with other conversation regulators such as OH-I-SEE. It thus appears to be in a class by itself, unlike the main body of mouth morphemes discussed in the argument in the text.

¹¹ There are occasional exceptions, such as the use of *mm* (our *mmm*) across an entire clause noted by Liddell 1980:66, note 19. It is not yet clear how to account for such usages.

- The meanings of mouth morphemes in combination with manual signs are not totally predictable, a characteristic typical of derivational morphology:
 - ♦ *th* with an upright CL-1 traversing a horizontal but erratic path typically means ‘walking clumsily due to drunkenness’, not due to some other reason such as cerebral palsy. The same mouth morpheme with WRITE typically means ‘writing sloppily due to inattention’. See Liddell 1980:50–52 for other specific meanings with particular signs.
 - ♦ *clench* ‘extremely’ often has negative connotations of pain, discomfort, danger, or excess. However, when used with an aspectual modulation that involves tense, short, rapid (trilled) movement of the hand(s), it means simply ‘fast’ with no negative connotations.
- Most mouth morphemes are not relevant to the syntax in the sense of Anderson 1982:587; their distribution is not conditioned by the syntactic context in the same way that e.g. agreement and tense are. This, argues for them being derivational rather than inflectional.

If, in fact, most mouth morphemes are derivational affixes, then this has consequences for the conception of the ASL lexicon. Under standard assumptions about derivational morphology, each conventional combination of manual sign plus mouth morpheme needs to be listed in the lexicon. Indeed, in light of Liddell’s (2003:49-52) arguments about aspectual modulation being derivational, one must list each valid combination of manual sign plus mouth morpheme *plus* aspectual modulation.

Learners of ASL need therefore to acquire each combination on its own, in addition to whatever they eventually determine about the abstract characteristics of each mouth morpheme. This means, for example, in ASL language instruction, it is not sufficient to simply teach mouth morphemes or aspectual modulations in the abstract and give a couple examples of each. It is important to teach each combination as a separate vocabulary item in order for students to learn which combinations actually occur and what they mean.

4. Specific MOUTH MORPHEMES


Our ongoing research includes a strong descriptive component, documenting the mouth morphemes that occur in ASL in greater detail than has appeared previously (extending the work in Struxness 1996 and Bridges and Metzger 1996). We aim to provide the following information, as precisely and completely as possible, about each mouth morpheme in ASL that we can find:

citations	sample references, along with any informal names used in the literature other than the ones we use
phonology	prototypical phonological form: descriptions (with photos) of the mouth and any other articulators, modifications of manual motion, and coordinated timing with other articulators—any aspect of form that is associated with this morpheme and not (yet) attributable to other morphemes or general rules

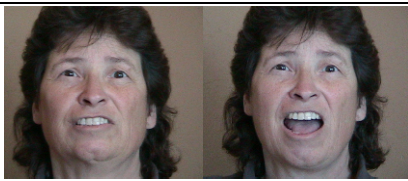
semantics	meaning, including multiple senses, selectional restrictions, lexical relations to other mouth morphemes
grammar	what other elements it combines with, cooccurrence and other restrictions
notes	other relevant information

We include here results so far. Some of these morphemes are mentioned in the literature but not necessarily described well; others are (as far as we know) newly-reported here. Each section head indicates the informal name we use.

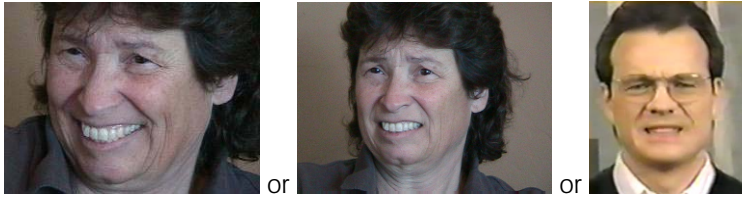
4.1. *Ahh*

citations	Struxness 1996 46:00	
phonology	Mouth open, more so than with <i>halfflip</i> . Often cheeks raised, eyelids narrowed, and head tilted back.	
semantics	1) (with signs indicating extent of space or time) 'long', e.g. with FAR, ALL-DAY, and certain verbs 2) 'astounded', e.g. with SHOCKED	
notes	The two meanings are possibly better analyzed as two distinct morphemes.	


4.2. *cha*

citations	Baker-Shenk and Cokely 1980:24, Bridges and Metzger 1996:38, Struxness 1996 03:00	
phonology	Phase 1) Jaw closed, upper teeth visible. Some signers start with lips thrust forward (squared or with large rounded opening). Phase 2) Mouth opens quickly at same time as manual sign reaches its final hold.	
semantics	'large'	
grammar	Only used with adjectives expressing size or quantity, such as size-and-shape specifiers. Used redundantly with lexical adjectives such as LARGE, TALL.	
notes	Often produces an audible [tʃ̥] or dental/alveolar click, which indicates contact of the tongue with the alveolar ridge during phase 1.	

4.3. *clench*

citations	Baker-Shenk and Cokely 1980:20-21 <i>intense</i> , Bridges and Metzger 1996:37 <i>intense</i> ¹² , Struxness 1996 07:15 <i>clenched teeth</i>
phonology	Jaw fully closed, lips drawn back to reveal teeth. Eyebrows down and drawn together. Mouth corners may be either raised slightly or neutral. Inhale through teeth. Sometimes in an “intense” version: greater muscular tension overall in face, body and hands, exposing more of the teeth, adding squint, raising shoulders. 
semantics	1a) (with state verbs + intensive aspect) ‘very, extremely’, to a greater degree than with <i>puffedBlow</i> (cf. Baker-Shenk and Cokely 1980:20) but a lesser degree than with <i>sow</i> , e.g. with ANGRY, BEAUTIFUL, BIG-HEADED, BORED, CLEAN, DANGEROUS, DEPRESSED, DIRTY. Often has negative connotations of excess; used more often with roots with negative meanings. 1b) (with state verbs + intensive/inchoative aspect) ‘become extremely or rapidly ____’, e.g. with BECOME-SICK 2) (with distance or duration) ‘very (and undesirably) long’, e.g. with FAR, ALL-DAY 3) (with quantities) ‘very many’, e.g. with HORDES 4) (with colors) ‘dark, intense, not pale, fully saturated’ 5) (with actions, using a rapid, tense, trilled motion) ‘fast’, e.g. with COOK, FLASH-LIGHT, RUN, SCRATCH, WALK, WALK-ALONG, WASH 6) (with actions + other modulations) ‘with pain, danger, effort, or discomfort’
grammar	Generally used only with certain aspectual modulations. <ul style="list-style-type: none"> On states, often cooccurs with intensive aspect (Klima and Bellugi 1979:259): slow beginning, accelerate to abrupt stop and hold. In this case the intensified variant (with tension and squint) usually is used. On actions, often cooccurs with a rapid, tense, trilled motion. On a variety of word types, may occur with slow, tense motion, e.g. with ANGRY, DISGUSTED, HORDES Struxness 1996 uses <i>clench</i> overlaid on mouthings for at least some colors (see section 2.5).
notes	The variant with raised mouth corners (first photo above) may be a distinct morpheme without any negative connotations, or may represent the addition of a smile as an emotive signal.

4.4. *clenchTopic*

phonology	Jaw fully closed, lips drawn back to reveal teeth. Eyebrows raised (due to standard marking for topic). Eyes wide open (no squint). Head drawn back away from referent of pronominal sign. Pronominal sign is articulated higher and closer to the body than normal. 
semantics	‘topic’

¹² We prefer the label *clench* for this morpheme, reserving the term *intense* to describe a gradient modification of this and other mouth morphemes.

Grammar	Occurs only on the final word of a topic. That word must be pronominal, e.g. PRO ₃ or THAT-ONE ₃ . Generally occurs with long, complex topics, where it reiterates and clarifies what the topic is before proceeding to the comment. May also occur at the end of a sequence of directions locating an object on an imagined map. All examples we've seen are on third person pronouns.
Notes	There is a possibility that this may be related to one or more of the nonmanual signals that Liddell (1980:147–151) discusses in connection with relative clauses.

4.5. Cs

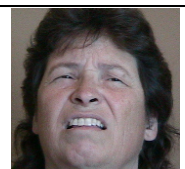
citations	Baker-Shenk and Cokely 1980:18, Bridges and Metzger 1996:36, Liddell 1980:47–50, Struxness 1996 28:40 <i>lips pulled down on one side</i> .
phonology	Jaw closed, lips spread (more so on strong side), head tilt toward strong side, chin and strong shoulder pulled together. Articulation of manual sign is closer to strong shoulder than normal. Eyegaze at hands. Overall: all articulators are drawn towards the space between strong cheek and shoulder, hence the abbreviation <i>cs</i> . (In casual signing, may appear identical to <i>clench</i> , but in careful signing it is distinct: <i>cs</i> is asymmetric, with greater tension and prominence of signals on strong side.)
semantics	'close in space or time' (i.e. to some reference point, usually the place and time of locution). Greater tension and distinctness of the phonetic cues provides a gradient symbolization of greater closeness. (Baker-Shenk and Cokely 1980:177)
grammar	Either with adverbial expressions representing extent in space or time, or an apparently small number of active verbs such as APPROACH and ARRIVE.
notes	Baker-Shenk and Cokely (1980:18, 177-78) limit the reference point of the temporal sense to the present moment, but Fraychineaud can use it with a reference point displaced into the past.



with NEXT-TO

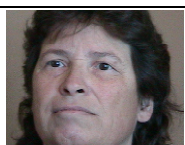
4.6. Halfflip

phonology	Mouth partly open, upper lip raised exposing teeth. Head tilt back, eyes half closed. Brows not raised (unlike the nonmanual signal for relativization).
semantics	Indicates attitude of signer or agent: putting up with a situation but complaining internally about it, e.g. with DIRTY, DON'T-LIKE, EMBARRASSED, FLASH-LIGHT, READ, SICK, WALK
grammar	Occurs with an apparent wide variety of verbs, both states and actions.
notes	Perhaps derived from a sneer.




4.7. mm

citations	Baker-Shenk and Cokely 1980:19, Bridges and Metzger 1996:36, Struxness 1996 14:10 <i>puckered up lips mmm</i> .
phonology	Mouth closed, lower lip pushed slightly upward. Face relaxed.




semantics	<p>'as normally expected'. Translations vary depending on nature of manual sign:</p> <p>On adjectives, this can be translated 'to a moderate degree, not extreme', e.g. on DIRTY, MEDIUM-SIZED, HEARING,</p> <p>On expressions of quantity: 'a moderate amount' (Baker-Shenk and Cokely 1980:377)</p> <p>On verbs: 'going along fine', e.g. on COOK; 'at a moderate speed', e.g. on FLASH-LIGHT; 'as a regular matter of course', e.g. on CONTINUALLY-SICK (Baker-Shenk and Cokely 1980:410), SIGN-UP (Struxness 1996 12:26)</p>
grammar	On adjectives and verbs
notes	See note for <i>mmm</i> .


4.8. *mmm*

citations	Often called <i>mm</i> , following Liddell 1980:42ff., Liddell 2003:270. Struxness 1996 14:10 <i>puckered up lips mmm</i> .
phonology	<p>Lips thrust prominently forward and upward, more so than with <i>mm</i>. Chin thrust forward (i.e., head tilt back). Often head tilt to one side. Manual motion relaxed and slower than normal, with no sudden changes in speed or direction.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p>or</p> <p>(Liddell 2003:13)</p> </div> </div>
semantics	'with pleasure, enjoyable'
grammar	Seems limited to dynamic verbs.
notes	<p>The morpheme <i>mmm</i> is not distinguished from <i>mm</i> in the literature, and not all signers make the distinction (e.g. Struxness 1996 14:00 does not). But, for some signers (e.g. Fraychineaud), the <i>mm</i> and <i>mmm</i> are phonetically distinct, at least in careful signing. For example, <i>mm</i> can be used with COOK when the strong hand is held above the base hand, palm contra, with trilled forearm rotation (unlike the normal gentle motion used with <i>mmm</i>); this combination means 'cook routinely'. In contrast, <i>mmm</i> used on COOK, meaning 'cook with pleasure', requires 180° rotation of forearm and contact with the base hand on each turn. Similarly, Baker-Shenk and Cokely 1980:410 report CONTINUALLY-SICK/mm 'be continually sick as a regular matter of course', a meaning that is inconsistent with <i>mmm</i> 'with pleasure' but expected for <i>mm</i>. Liddell 1980:45 notes both meanings but stops short of positing two distinct morphemes, attempting rather to give a single abstract meaning that encompasses both usages.</p>


4.9. *m-m-m*

citations	Struxness 1996 40:40
phonology	Mouth closed, corners down, lower lip thrust upward/outward trills open-and-shut repeatedly. Eyes wide open, eyebrows raised. Often accompanied with repeated head nodding at a slower rate than the lip trill. (See photo sequence in section 2.3.)
semantics	'Oh really!, You don't say!' (i.e. backchannel response to moderately surprising new information)
grammar	Usually occurs alone, without any manual sign, but can also be simultaneous with manual backchannel signals like OH-I-SEE (Y hand, palm down, moving up and down in neutral space).
notes	<p>With the lips closed (no trill), seems to be usable with manual signs as a possibly distinct mouth morpheme with closely-related meaning.</p> 


4.10. oo

citations	Baker-Shenk and Cokely 1980:22 <i>pursed lips</i> , Bridges and Metzger 2006:37 <i>pursed lips</i> ¹³ , Bridges and Metzger 1996:43 <i>ooo</i> , Struxness 1996 04:50.
phonology	Mouth open slightly in center, corners narrowed. Some signers: lips rounded. Often with head turn to one side, eyes wide, eyebrows up.  or
semantics	1) 'to an amazing degree', but a lesser degree than with <i>clench</i> , e.g. with BEAUTIFUL, DIRTY, WOW, HORDES, OVERWHELMING, WALK-PAST/fast, WORK/continuous 2) 'to a small degree', e.g. on SHORT, SMALL, THIN (Baker-Shenk and Cokely 1980:376–7) 3) (with colors) 'light, pastel' (in this usage, manual motion is slow and relaxed)
grammar	Generally does not combine with what Klima and Bellugi 1979:259 call intensive aspect.
notes	The distinct senses suggest that there may be distinct morphemes (cf. Baker-Shenk and Cokely 1980:21), but we haven't been able to find any consistent difference in form.

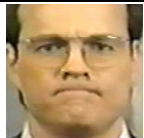
4.11. po

citations	Bridges and Metzger 1996:44.
phonology	Mouth closed, opens to small slit in center. At the same time, eyebrows are pressed together, and the distance represented in the manual sign (between hands or fingers) becomes slightly smaller. (Illustrated with one of several possible manual signs.)  with SMALL
semantics	'very small'
grammar	Only with adjectives or classifier constructions denoting small size.



4.12. *pressed*

phonology	Lips pressed together and forward, eyebrows together and/or down, overall tense face. Head pulled down and/or shoulders up.  with WRITE
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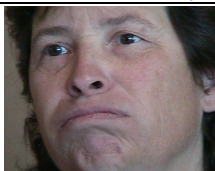

¹³ The term “pursed lips” is used for different mouth shapes by different people, so we suggest avoiding it. Struxness 1996, for example, uses it to describe a morpheme that appears to be same as our *pressed*.

semantics	'with concentrated attention' (antonym to one sense of <i>th</i>), e.g. with BUY, CONTINUE, DRIVE, PLAN, READ, SUSPECT, STEP-CAREFULLY, WRITE, WORK
grammar	with active verbs involving agentive control
notes	Some examples of what Struxness (1996 11:46) calls <i>pursed lips</i> appear to be the same morpheme as what we call <i>pressed</i> . The meaning and most of the nonmanuals are the same, but Struxness has lips folded inward. 


4.13. *puffed*

citations	Bridges and Metzger 1996:37, Struxness 1996 06:15
phonology	Mouth closed, cheeks and often lips inflated, no leakage of air.  or 
semantics	'fat, large and round'
grammar	With certain adjectives of size, e.g. FAT, and certain classifier constructions, e.g. WADDLE-ALONG (using the inverted Y classifier 'fat person walking', see photo in section 2.3).
notes	See note on puffedBlow below.


4.14. *puffedBlow*

citations	Baker-Shenk and Cokely 1980:20 <i>puff.cheeks</i> , Struxness 1996 06:15 <i>puffed</i> .
phonology	Mouth closed, cheeks inflated (but not as much as with <i>puffed</i>), air leaks out through small opening.  or 
semantics/grammar	'to a medium high degree' (more than <i>mm</i> but less than <i>clenched</i>). Appropriate translations vary depending on type of predicate: (with extent of distance or time) 'far, long' e.g. with BACK-THEN (with states) 'very' e.g. with BECOME-SICK, AWKWARD/th (with quantities) 'many' e.g. with HORDES, CL-4: "many people enter" (with some verbs) 'exhausted' e.g. WALK
notes	For some signers, <i>puffedBlow</i> seems to be distinct in meaning and form from <i>puffed</i> , even if in casual signing (or in published sources) they are difficult to distinguish. Struxness does not describe them as different morphemes though his actual productions are visually distinct.


4.15. *sow*

citations	Bridges and Metzger 1996:40, Struxness 1996 20:30
phonology	<p>Phase 1) Jaw closed, lips spread wide exposing teeth.</p> <p>Phase 2) Lips open only a slit, corners of lips tight, sometimes rounded.</p> <p>Overall: squint, tense.</p> 
semantics	'to an extremely high degree' (greater than <i>clench</i>)
grammar	Only with states (or inchoative states). Not with reduplicated signs.
notes	Perhaps analyzable as a compound of <i>clench</i> + <i>oo</i> .

4.16. *STA~STA*

citations	Baker-Shenk and Cokely 1980:23; Bridges and Metzger 1996:38, Struxness 1996 10:30.
phonology	<p>Phase 1) Jaw closed, upper lip raised and lax, showing upper teeth.</p> <p>Phase 2) Jaw opens slightly, revealing lower teeth. Opening coincides with the pulse of the (cyclic) manual sign (i.e. at the most prominent part of the cycle: the fastest motion or place where the hand passes closest to a location)</p> <p>Throughout: head tilt to one side.</p> 
semantics	'with effort'
grammar	Only seems to occur with signs that have cyclic (reduplicated) movement.
notes	<p>Produces an audible dental click, indicating contact of the tongue with the gum line during phase 1.</p> <p>A single <i>sta</i> is occasionally possible, though we don't have enough examples to describe it; <i>sta-sta</i> may therefore simply be an aspectual reduplication of <i>sta</i>.</p>

4.17. *th*

citations	Baker-Shenk and Cokely 1980:19, Liddell 1980:50–52, 2003:263, Bridges and Metzger 1996:36, Struxness 1996 04:10.
phonology	<p>Mouth slightly open, tongue tip or blade visible between upper and lower teeth. Liddell (1980:50) claims the lips must be pushed forward and the upper lip slightly curled, but this does not seem to be true for Fraychineaud, who also just barely shows the tongue. Often with puffed cheeks (Neidle et al. 2000:42) and airflow through teeth. In action verbs, motion in the manual sign is more erratic than normal, and there is erratic swaying of head and torso. Relaxed muscles in all articulators.</p> 

semantics	1) sloppily due to inattention (antonym of <i>pressed</i>), e.g. with CARELESS, SLOPPY, WRITE, classifier constructions employing BE-LOCATED[redup] 2) clumsily due to temporarily impaired ability (esp. drunkenness), e.g. with DRUNK, STEP, WALK-ALONG Liddell 1980:50 characterizes the range of meaning as centering “around lack of control, inattention, unintention, and unawareness”.
grammar	Adjectives of manner, verbs.

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