

# Mouth-based non-manual coding schema used in the Auslan corpus: explanation, application and preliminary results

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## Abstract

We describe a corpus-based study of one type of non-manual in signed languages (SLs) — mouth actions. Our ultimate aim is to examine the distribution and characteristics of mouth actions in Auslan (Australian Sign Language) to gauge the degree of language-specific conventionalization of these forms. We divide mouth gestures into categories broadly based on Crasborn et al. (2008), but modified to accommodate our experiences with the Auslan data. All signs and all mouth actions are examined and the state of the mouth in each sign is assigned to one of three broad categories: (i) mouthings, (ii) mouth gestures, and (iii) no mouth action. Mouth actions that invariably occur while communicating in SLs have posed a number of questions for linguists: which are ‘merely borrowings’ from the relevant ambient spoken language (SpL)? which are gestural and shared with all of the members of the wider community in which signers find themselves? and which are conventionalized aspects of the grammar of some or all SLs? We believe these schema captures all the relevant information about mouth forms and their use and meaning in context to enable us to describe their function and degree of conventionality.

**Keywords:** sign language, corpus, ELAN, non-manuals, Auslan, Australian Sign Language

## 1. Introduction

The mouth is prominent site of non-manual activity and movements of the mouth are an obvious accompaniment to manual signing. The linguistic status of mouth actions in SLs, like other non-manuals, is a question of debate. There are two major types of mouth actions: those that are transparently complete or partial silent articulations of the spoken words of the ambient SpL (mouthings), and those that are not (mouth gestures). An early issue of interest was the amount of mouth actions, especially mouthings, that various SLs typically manifested. An area of debate concerned the status of mouthings: were they an integral part of a SL or were they marginal, stemming from language contact or borrowing? Addressing both these questions involved describing what mouthing and mouth gestures did and thus categorizing them into types.

## 2. Previous research

Research has shown that mouthings frequently accompany manual signs in many SLs and there is some evidence—though the datasets have never been very large or varied—that the rate varies according to text-type. They occur very frequently with fingerspellings and some signers appear to always mouth when fingerspelling (e.g., Sutton-Spence & Day 2001). Mouthings have been shown to occur more with nouns and plain verbs than with morphologically complex signs such as indicating verbs (also known as agreement and spatial verbs) or with depicting signs (also known as classifier signs). Mouthing has been shown to add meaning to some signs by indicating a more specific reading of a sign, e.g., the Auslan sign spouse with the English mouthings ‘wife’ or ‘husband’ (Johnston & Schembri 2007) which may or may not be considered a specification of the form of the sign (e.g., Schermer 2001). A mouthing can even add independent semantic infor-

mation (e.g., Vogt-Svendsen 2001). Though mouthings are often closely temporally aligned with their co-articulated sign, they may be stretched, reduced, or repeated to maintain an alignment with the duration and rhythm of the manual sign, especially if the sign has itself been modified (Fontana 2008). Finally, the mouthing itself may spread regressively or progressively to adjacent signs (Crasborn, van der Kooij, Waters, Woll, & Mesch 2008).

Mouth gestures are all other communicative mouth actions that are not mouthings and they ‘do not derive from spoken language’ (Boyes-Braem & Sutton-Spence 2001).

For a study of spreading behaviour in mouthings in three SLs, Crasborn et al. (2008) called mouthings M-type mouth actions; adverbials mouth gestures were called A-type, and echoes became part of a slightly broader E-type category (for ‘semantically empty’ following Woll (2001)). Enactions were discriminated into two sub-types—those involving only the mouth in which the mouth represents itself doing the action described by the sign, such as bite or laugh or lick (these were called 4-type for ‘mouth “for” mouth’); and W-type (for ‘whole of face’) in which mouth is simply part of a large whole of face expression, e.g., an open mouth with wide eyes for surprise. Crasborn et al. note that W-type mouth gestures are not specifically part of any mouth-based semiotic system because any mouth action form is linked to the whole face and consequently its interpretation is a function of the enaction and not just a function of (the conventional value of) the mouth form (Figure 1).

More recently, some researchers have focussed on the question of the gestural nature of some mouth actions in that they have the same kind of relationship to the conventional manual signs of a SL as do manual gestures to

the conventional spoken words of a SpL (Pizzuto 2003). Fontana (2008), drawing on the work of Kendon (2004, 2008) and McNeill (2000), makes the radical suggestion that all mouth actions can be analysed this way. A similar but more conservative observation is made in Dachkovsky and Sandler (2009) and Sandler (2009). They identi-

fy a category of gestural iconic mouth actions to distinguish them from syllabic E-type (or 'lexical') mouth components and from the conventional adverbial and adjectival A-type modifiers already identified by other SL researchers which they also accept (graphically represented in Figure1).

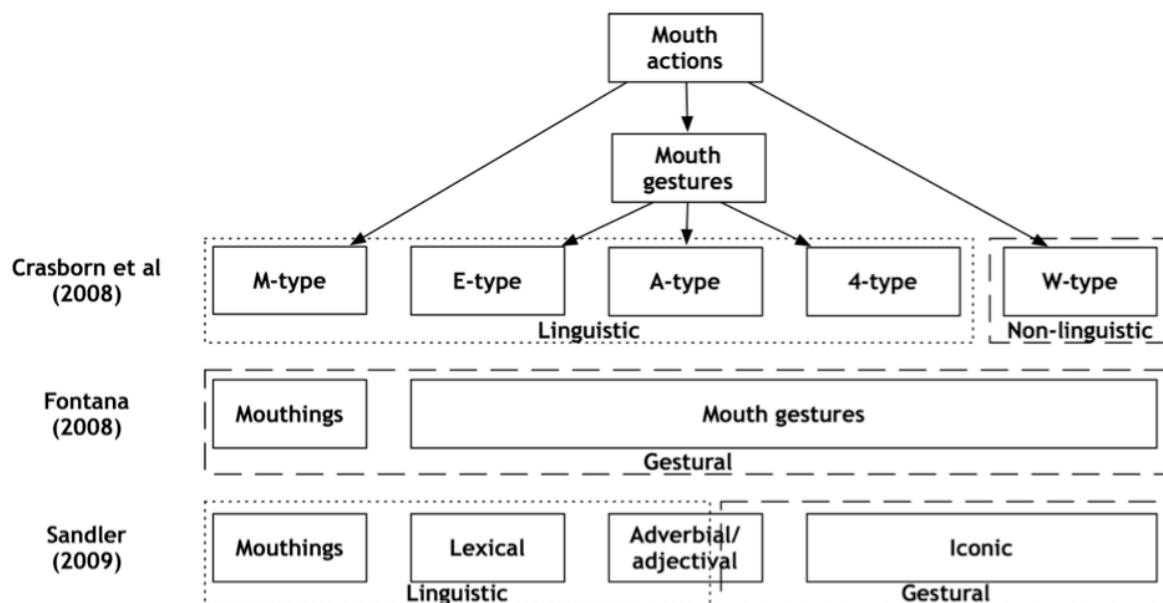


Figure 1 Three potential categorizations of mouth actions

### 3. This study

#### 3.1 Methodology

Fifty video texts were selected from the Auslan corpus for analysis. All signs and all mouth actions were examined and all mouthings and mouth gestures were identified, categorized and annotated.

The data in this study has been drawn from the Auslan corpus of native or near-native signers (for further details see Johnston & Schembri 2006). For this study, 50 video clips were selected from the corpus, representing 38 individuals, 3 text types (monologue, dialogue, and elicited) during 5 hours and 58 minutes of the corpus, representing 16,920 manual sign tokens. The signed texts ranged from 1:32 to 38:30 minutes in duration. The 50 video clips consisted of 25 monologues (narratives of which there were 25 retellings of two Aesop's fables); 10 dialogic texts (free conversation or responses to a series of interview questions); and 15 sessions of 40 elicited picture descriptions.

#### 3.2 Annotation schema

The 50 texts were chosen from a subset of the 459 texts that had previously been given at minimum a basic annotation (i.e., they had been glossed and translated) using ELAN multi-media annotation software according to guidelines detailed in the Auslan Corpus Annotation

Guidelines<sup>1</sup> and Johnston (2010). All signs and all mouth actions were examined and the state of the mouth in each sign was assigned to one of three broad categories: (i) mouthings, (ii) mouth gestures (both of which we have already briefly characterized), and (iii) no mouth action. Mouth gestures were divided into types that were based on Crasborn et al. (2008) but additional sub-groupings were (temporarily) created to accommodate finer distinctions we felt salient in the Auslan data (Figure 2). We are prepared to further adapt or even abandon these categories if needs be after considering the first annotation implementation, aggregation of data, and analysis.

These new sub-categories are: **prosodic** = a tensed posture of the mouth that is held for a period of time, even if relatively briefly, without changing dynamically rather than any specific mouth posture as such; **spontaneous** = involuntary or spontaneous expressions (indexes almost) of the state of the mind of the signer (e.g., amused, confused, concerned); **editorial** = expressions as meta-comments about what the signer is signing that do not intentionally modify the manual signs; **constructed actions** = full enactments that involve all of the face; **congruent** = a default expression that match the semantics of the lexical sign, such as smiling while signing happy; **adverbial expressive** = clearly intend to modify and add meaning to the manual sign(s) but they are not limited to the mouth and they are also strongly enacting (Figure 2).

<sup>1</sup> Downloadable from [www.auslan.org.au](http://www.auslan.org.au)

Annotations were added to two ID-glossing and two grammatical class tiers (one for each hand of the signer), and four tiers for information on mouth actions. Annotations for mouth gestures were made on the ‘mouth ges-

ture form’ tier (called MouthGestF), and on the ‘mouth gesture meaning’ tier (called MouthGestM). The annotations for mouthings were made on the ‘mouthing form’ tier (called Mouthing) (Figure 3).

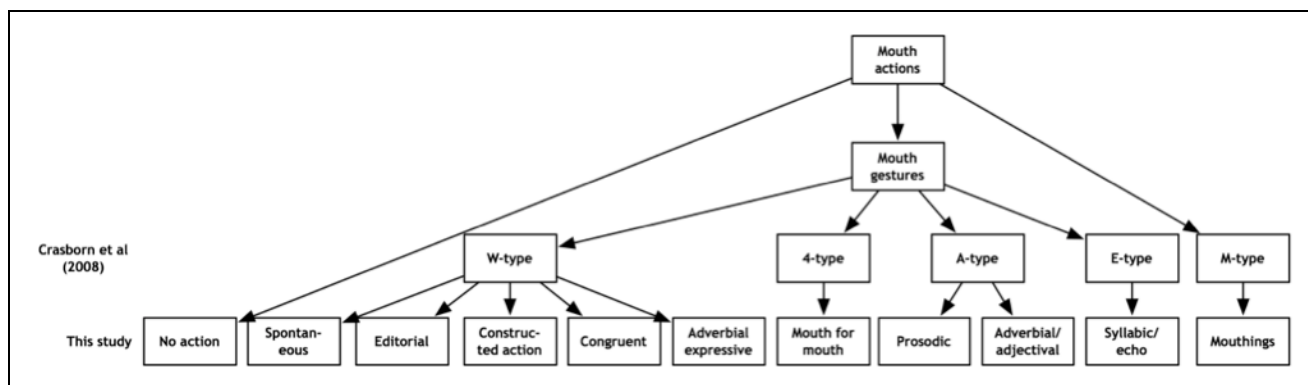


Figure 2 Types of mouth actions annotated in this study

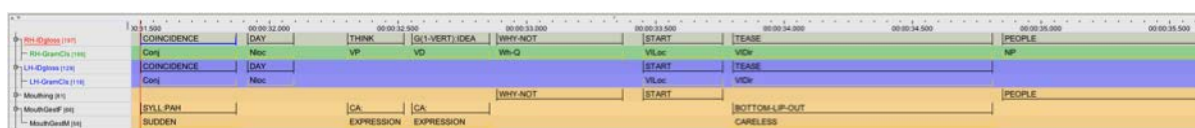


Figure 3 The relevant tiers [file: SSNc2a00:00:29.000]

Mouth action	MouthGestF begins with	MouthGestM tier contains
No mouth action	no annotation	no annotation
M-type (mouthing)	English word (Table 2)	no annotation
<b>Mouth gesture types</b>		
E-type (echo or empty)	syllable:gloss	various meanings as needed
<b>A-type (modifying)</b>		
intonational	gloss (Table 3)	meaning: e.g., <i>activity, emphasis</i>
adverbial	gloss (Table 3)	meaning: e.g., <i>large-amount, careless, unpleasant</i>
4-type (mouth for mouth)	CongruentMouth Only	<i>enactment</i>
<b>W-type (whole-of-face)</b>		
spontaneous	no annotation	no annotation
editorial	comment	no annotation or various meanings as needed
constructed action	ConstructedAction	no annotation or various meanings or descriptions as needed
	ConstructedAction:gloss (Table 3)	the gloss for an A-type mouth gesture
congruent	CongruentWhole Face	<i>expression, enactment, emphasis</i>
adverbial expressive	ConstructedAction:adv	<i>expression</i>

Table 1 The annotation schema for mouth actions

The annotation schema is summarized in Table 1. It is important to note that each type of mouth gesture has a unique MouthGestF annotation or a unique combination of values on both the MouthGestF and MouthGestM tiers. This enables various constraints to be applied with an ELAN search routine to identify and quantify mouth gestures of a certain type or sub-type only. For example, one may perform an ELAN multi-tier conditional search

to extract statistics on, say, intonational mouth gestures because they will be the only ones that have the annotations ‘‘activity’’ or ‘‘emphasis’’ on the MouthGestM tier associated with any of the form glosses listed in Table 2 on the MouthGestF tier. For example, if ‘‘emphasis’’ occurs on a MouthGestM tier which occurs with a ‘‘CongruentWholeFace’’ annotation on the MouthGestF tier, it is an instance of a congruent W-type mouth gesture, not

an intonational one. Each combination of values in Table 1 is unique to a sub-category of mouth gestures.

		
blow	bottom lip out	down
		
lip-curl	lips-out	lips-pressed ('mm')
		
open	puff	slightly-open
		
sucked-in	tongue ('th')	trill ('brrr')
		
wide ('ee')		

Table 2 Examples of glosses for mouth gesture forms

**Annotating the alignment of mouth actions with manual signs** Where a mouth action clearly spreads across two or more signs, it is marked separately on each one and the subsequent annotations are suffixed with -prog (progressive) or -regress (regressive). Only apparently significant spreading is annotated in this dataset—the exact onset and offset time of mouth gestures is not a focus of this study though it has been in other studies (Sandler 1999; Crasborn et al. 2008)

**Annotating mouthings** Mouthings are often incomplete or partial. We found that it was important to annotate which part or parts of the associate English word were mouthed (Table 3). This was partly based on the realization that competent but non-fluent or non-native signers can easily mistaken a partial mouthing for a mouth gesture when annotating the data thus resulting in an overall inflation of mouth gesture counts.

Degree of articulation	Representation	Examples
Complete articulation	complete	race, rabbit, village, far
Initial segment	i(nitial)	v(illage), sa(me), diff(erent), sh(eep)
Medial segment	(me)di(al)	(no)th(ing), (re)mem(ber), (b)e(st)
Final segment	(fi)nal	(success)ful, (fin)ish, (im)prove, (to)day
Initial & final segment only	in(i)tial	f(ini)sh, d(ea)f, s(uc)cesful
Suppressed unreadable	Suppressed unreadable	(lady), (have)

Table 3 The annotation schema for mouthings

In extracting mouthing counts from the data the parentheses may be removed, or left, depending on the type of analysis desired. For example, for a straightforward count of the distribution of English words mouthed in the corpus—and their association with particular sign tokens—the parentheses would be removed. (This can be removed from the entire corpus by a multi-file (domain) search and replace on the appropriate Mouthing tier; alternatively, one may remove them after the exported annotations are opened in a database program.) For pattern comparison of form and meaning with selected mouth gestures, the material enclosed in parentheses would be deleted. The remaining vowels, consonant clusters or syllables can then be compared to the semantics of the source sign and the semantics of similar-looking mouth gestures that occur with other manual signs.

### 3.3 Preliminary results

The results presented here are taken from the first iteration of the implementation of this annotation schema. They are not definitive. They are merely indicative of the type of information that can be easily extracted from the corpus given these annotations. The annotations were partly motivated by the type of functions available in ELAN for searching, filtering and exporting annotations within that program.

The key functions used in ELAN included: multi-file multi-tier searches using explicit values or regular expressions; automatically generated statistical profiles across multiple annotation files (domains); multi-file (domain) processing, in particular, EXPORT MULTIPLE FILES AS > ANNOTATION OVERLAPS INFORMATION. The latter were exported as tab delimited files into Excel for further processing.

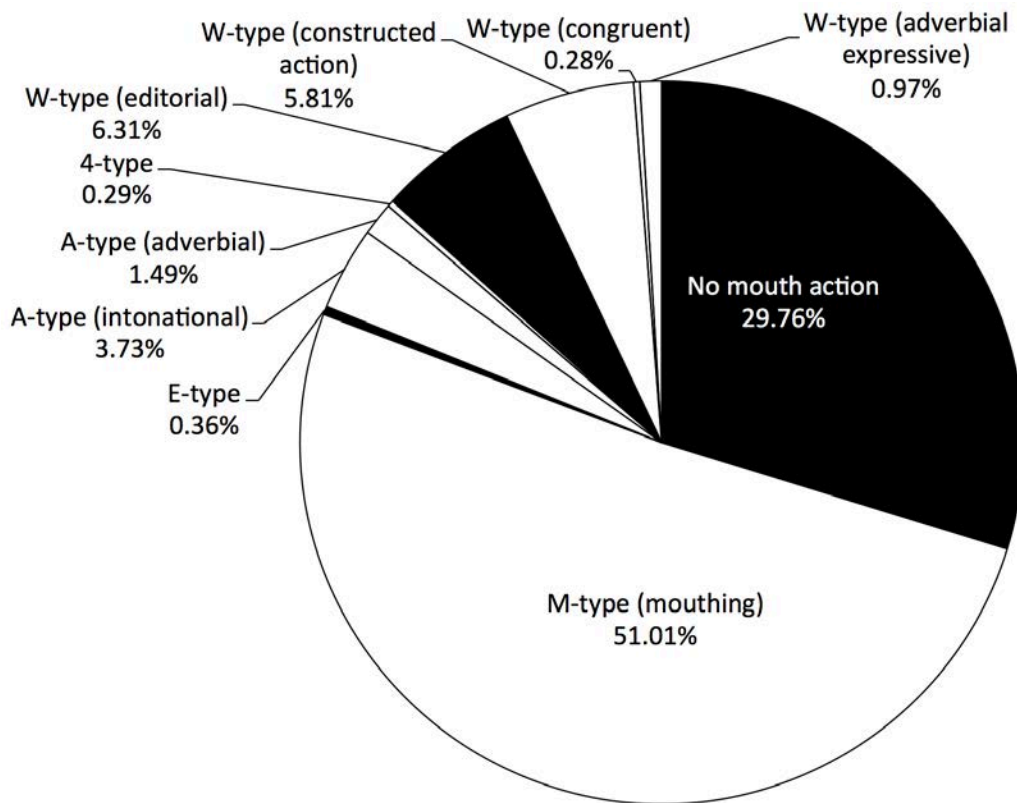


Figure 4 Overall distribution of mouth actions

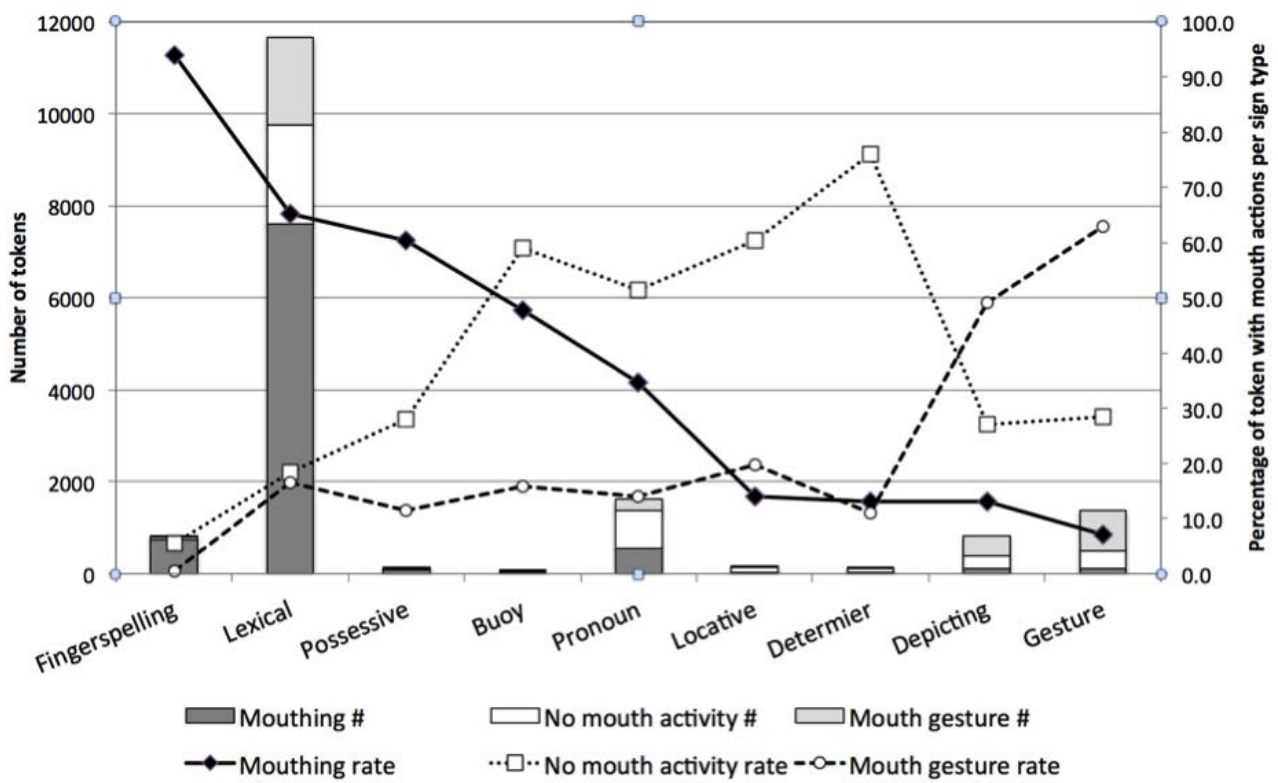


Figure 5 Mouth actions by sign type

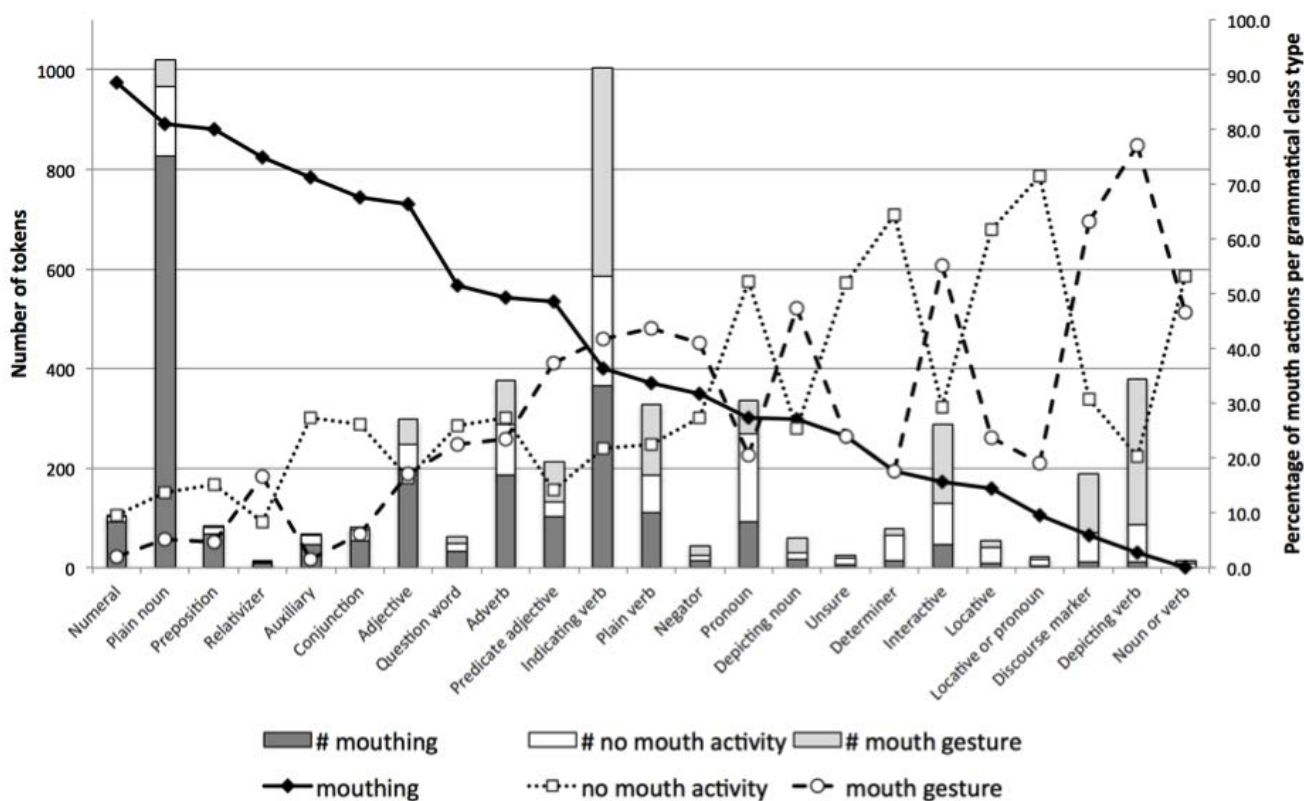


Figure 6 Mouth action by grammatical class

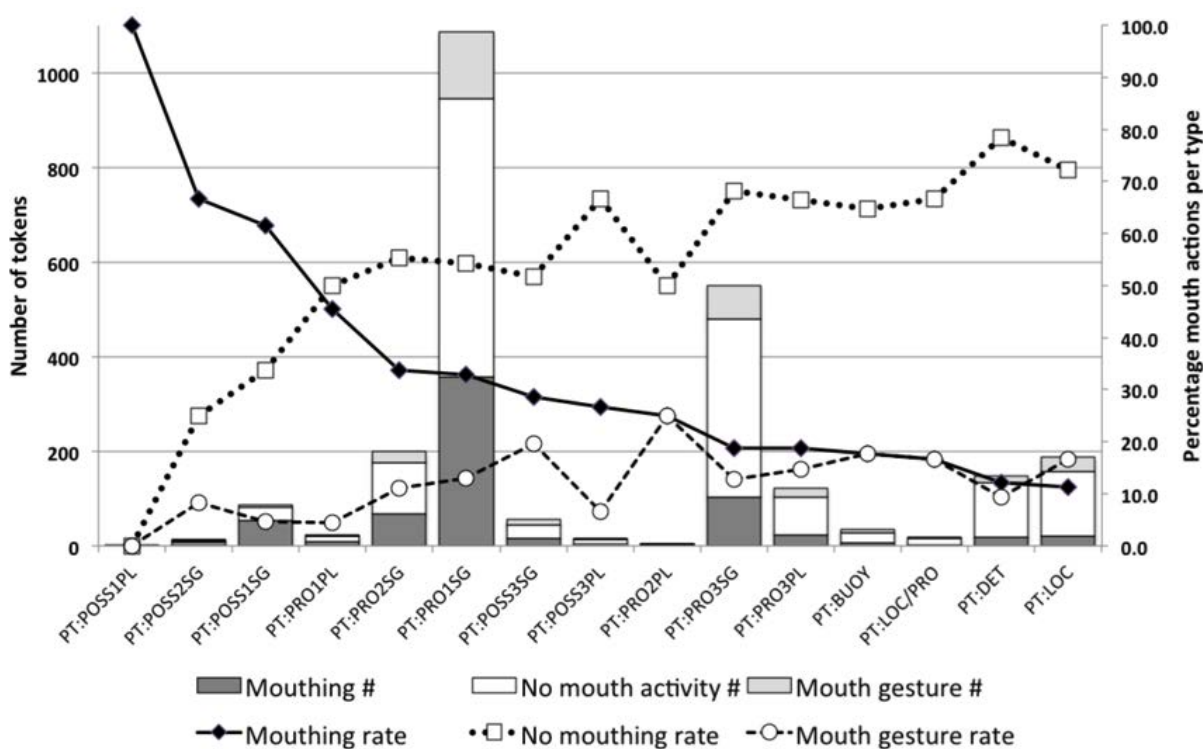


Figure 7 Mouth actions and pointing sign

**Lexical frequency** The rates of mouthing for lexical frequency suggest that lexical frequency, as such, has marginal impact on mouthing rates. However, it did emerge that the highest ranking lexical signs have a smaller the range of English words mouthed with each sign (and this is unsurprisingly often the same word that

has been adopted for the ID-gloss in the corpus).

### 3.3.1 Characteristics of types of mouth actions

**E-type (semantically empty mouth gestures)** Syllabic mouth gestures were very rare in the data. Only 66 signs

and their mouth actions fell into this category. Several signs occurred with different mouth gestures, often with the same effect (Table 4).

The first observation to make is that at 11 potential forms, the number of different syllabic mouth patterns in this dataset is actually quite small. A second important observation is that syllabic mouth gestures in Auslan do have flexible but consistent meanings across a range of signs, they are not exactly semantically empty as such as suggested in the SL literature.

Mouth gesture form	Mouth gesture meaning	Tokens
PAH	SUDDEN	31
AP	EMPHASIS	12
(L/B)AM	DISAPPEAR	8
WOOF	EMPHASIS	4
PAH-PAH	EMPHASIS	2
POOH	REMOVE	2
(L/B)AM	EMPHASIS	2
POW	EMPHASIS	2
BOOM	EMPHASIS	1
AM	EMPHASIS	1
ALARM	EMPHASIS	1
<b>Total</b>		<b>66</b>

Table 4 E-types by meaning and token count

MG form (tokens)	MG meaning gloss	Meanings in more detail
TONGUE (111)	CARELESS	carelessly, easily, without regard, petulantly, with deliberate carelessness, reckless, slipshod, insouciant
LIPS-OUT (16)	EASE	easily, without regard, petulantly, with enjoyment
TRILL (13)	LARGE AMOUNT	large amount, a lot of, unimpeded, energetic, powerful, engine/machine-powered
BLOW (10)	SMOOTH	smooth, unimpeded, quickly, ongoing
TONGUE (7)	UNPLEASANT	unpleasant, distasteful, bad
TRILL (3)	EASE	easily, unimpeded, with enjoyment
LIPS-PRESSED (2)	EASE	easily but deliberately, enjoyable
BOT-TOM-LIP-OUT (2)	CARELESS	careless, easily, without regard, petulantly, with deliberate carelessness, reckless, slipshod, insouciant
<b>Total (165)</b>		

Table 5 Form/meaning pairings for A-type

**A-type (adverbials)** the majority are actually intonational in character, according to our definitions. In effect, only a very small number of the total number of signs in the dataset represent putative dedicated conventional A-type adverbial mouth gestures. Only a very small set of recurring semantic descriptors needed to capture the apparent contribution of these mouth gestures. The data suggests that the semantic component of the mouth gesture is quite broad (Table 5).

Only two broad meaning labels appeared necessary to capture the effect of **intonational mouth gestures: emphasis and activity**. Emphasis was the broader default reading (71%), and wide was the most preferred mouth gesture with this force (21%); activity accounted for the force of the remaining 29%, of which 48% were achieved with wide. Overall, wide accounted for almost a third of all intonational mouth gestures.

W-type (whole of face) 82% are of the **constructed action** sub-type. There are very few of the other types. Indeed, constructed actions represent 45% of all mouth gesture types (i.e., mouth actions excluding mouthings).

**4-type (mouth for mouth)** Token count was extremely low (N = 68). The token frequencies are unremarkably linked to the narratives chosen for the re-tells or the elicitation materials, e.g., GRAZE, YELL, CAPTURE, EAT, AMERICAN, SPEECH, LAUGH, SHOUT, CHEW, ANGRY, etc.

**Time alignment of mouth actions with manual signs (spreading and ‘holding’)** Only mouthings have been thus far annotated and processed for spreading activity. There are approximately 305 spreading mouthings (245 progressive and 60 regressive). Importantly, they are strongly associated with pointing signs (PT) with approximately 50% spread to PTs (both progressively and regressively). There are >100 cases in which mouthing articulation proper spans only one sign but the mouth shape is held progressively (for the duration of the following sign). Once again, approximately 50% involves a following PT sign.

**M-type (mouthings)** Most, but not all, mouthings were completely and clearly articulated (over 95%). A small number of mouthing tokens (approximately >30) were not accompanied by any manual sign yet they were clearly not redundant. They provided essential disambiguating or logico-cohesive information to the utterance. They were conjunctions, prepositions or adverbial like but, or, for, just, maybe; sentence modifiers like *I-don't-know*, *I-think*; or other interactives like *no*, *yes*, *not-true*.

Degree of articulation	Tokens
Complete articulation	8911
Initial segment	262
Medial segment	13
Final segment	26
Initial & final segment only	23
Suppressed articulation	6
Unreadable	64

Table 6 Type of mouthing

### 3.3.2. Variation

Individual variation in mouth action rates, text type variation, and sociolinguistic variation are all also very important for understanding the role of mouth actions in SLs. However, these results are not reported here as these deal with wider questions on the function and interpretation of the role of mouth actions in SLs rather than the annotation and classification of mouth actions and other non-manuals.

## 4. Acknowledgments

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