Grammatical Functions of Mouth Gestures in Japanese Sign Language

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1 Introduction

Japanese Sign Language (JSL, *Nihon Shuwa*) refers to the sign language that deaf children in Japan acquire as their first language, typically in a deaf household or through early exposure to the language. Its linguistic characteristics are very different from those of spoken Japanese, as many research results have revealed (Fischer 1996, Ichida 2005, Ichida 2010, among others.) It has been reported that mouth gestures, a type of non-manual expressions (NM)[1], carry various grammatical or functional roles (Sakata, et al. 2008, Matsuoka, et al. 2010, Kimura 2011, Oka and Akahori 2011). The mixture of communicative and grammatical functions associated with mouth gestures made it challenging for sign language researchers to clearly identify their linguistic characteristics. Nevertheless, one cannot over emphasize the importance of the study of mouth gestures, since influences from spoken Japanese cannot explain the majority of the mouth gesture functions.

In this paper, we provide a summary of mouth gestures described in previous publications (Section 2), report a type of grammatical mouth gestures in sign language, Polarity sensitive mouth gestures, which have not been previously documented (Section 3), and consider their linguistic characteristics (Section 4).

2 Mouth gestures reported in previous literature

Mouth gestures are frequently mentioned in books about JSL written for the general public (Sakata et al, 2008, Kimura 2011, Oka and Akahori 2011). We give a brief introduction of two types of mouth gestures, which are well-known in the JSL community: the 'Aspect, Mood, and Affect' mouth gestures and the 'Degree Adverbial' mouth gestures. Even though those different mouth gestures tend to be introduced as one group of non-manuals, their function types vary and require more sophisticated classification and detailed analysis in future studies.

2.1 Aspect, Mood, and Affect

Sakata, et al. (2008) described various types of mouth gestures. With an intention to create a reference for JSL-Japanese translators, they provided examples of JSL combined with different mouth gestures, coupled with suggested Japanese translation samples. Descriptions of the different mouth gestures covered in their book are supplemented in more detail by example sentences in a series of DVDs (*Shuwa Kokei no Yakuwari* 'Functions of Mouth Shapes in Sign Language'), available from the Shuwa Bunka Mura Corporation. Unfortunately, though, there was no example in which different mouth

[1] Other non-manuals include eyebrow raising/furrow (see Section 5), eye widening/narrowing, head movements, shoulder movements, cheek puff, etc.

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gestures combined with identical signed sentences, which makes it difficult to compare the linguistic functions of these gestures.

For our study, we selected six mouth gestures ('pa', 'po', 'pi', 'pu', 'pe', 'm'), which are widely accepted by native signers, and are among the mouth gestures described by Sakata et al. (2008) and the supplementary DVD materials. We videotaped an identical JSL expression (see the example below) signed by native signers (Yano and Minamida) with the six mouth gestures. We viewed the videotaped materials to confirm or modify the descriptions by Sakata, et al.

The following is a summary of functions of the six mouth gestures:

Mouth gestures	Functions
pa	Perfective
po	Unexpected, interrogative, declaration
pi	Reluctantly accepted, bragging
pu	Critical, unacceptable, discontent
pe	Unstable, uneasy
m	As expected, as scheduled

Table 1: Functions of Aspect/Mood/Affect mouth gestures (cf. Sakata, et al. 2008).

Let's take a look at actual examples. One of the six mouth gestures, produced with the verb *AU* 'meet' in (1) below, influences the meaning (or nuance) of the entire sentence, as indicated in the possible translations in the following chart. (The line with 'mg' indicates a mouth gesture that overlapped with the manual sign.)

			__*mg*
(1)	*pro*	*TOMODACHI*	*AU*
		friend	meet

'(I) met/meet a friend.'[2] [3]

Table 2 below shows how each mouth gesture corresponds to the information communicated to the perceiver:

[2] JSL is a discourse-governed pro-drop language. The grammatical subject or object is frequently dropped in the surface form (as indicated by 'pro'), as long as it can be recovered from the discourse.

[3] JSL does not have an overt tense marker.

Mouth gestures	Possible Translations
pa	I met a friend.
po	I happened to meet a friend (unexpectedly, I wonder why)
pi	I met a friend (which ended up with an unhappy outcome).
pu	I was supposed to meet a friend (but was not happy about that)
pe	I met a friend (but felt uneasy)
m	I met a friend (as scheduled)

Table 2: Sample translations of the example sentence (1) with different mouth gestures.

The functions of those mouth gestures belong to different linguistic categories and hence need to be analyzed separately. For instance, 'pa' (perfective) is a type of Aspect marker[4], 'po' (interrogative) is a Mood marker, and 'pi','pu','pe', and 'm' pertain to the attitude of the signer (Affect).

2.2 Degree Adverbials

According to Kimura (2011), there are also mouth gestures which indicate the degree of the intensity of the action described by the verb. The pattern described by Kimura is summarized in Table 3. Unlike the mouth gesture 'm' in Section 2.1., the Degree Adverbial mouth gesture 'm(+eb)' must be accompanied by an eyebrow furrow.

Mouth gestures	u	m(+eb)
Degrees indicated	Less/Neutral	More

Table 3: Functions of Degree Adverbial mouth gestures (cf. Kimura 2011).

The chart in Table 4 provides examples of JSL verbs combined with the Degree Adverbial mouth gestures presented with their possible translations:

[4] A mouth gesture similar to 'pa' (perfective) has been observed in American Sign Language. Such a mouth gesture seems to be strongly associated with a few specific signs (e.g. 'FINALLY'), which is not necessarily the case in JSL.

	Mouth gestures and possible translations	
	u	m(+eb)
ARUKU 'walk'	easy, short walk	walk for a long time
MIRU 'see'	look (neutral)	stare intensively

Table 4: Examples of Degree Adverbial mouth gestures.

It is important to note that the mouth gestures introduced so far are not required. Aspectual/affective effects of those mouth gestures can also be achieved by using manual signs or other non-manuals. For example, the sign OWARU 'finish', when attached to the predicate, functions as the perfective aspect marker.

(2) *pro* *PAN* *TABERU* *OWARU*
bread eat finish
'(I) have eaten the bread.

Similarly, the Degree Adverbial mouth gestures can be replaced by an intensified or prolonged movement of the verb, as well as various choices of NMMs such as squinted eyes, head/shoulder positions and movement, etc. However, the mouth gestures to be reported in Section 3 demonstrate a very different nature. We classified those mouth gestures as 'Polarity-sensitive'.

3 A New type: Polarity-sensitive mouth gestures

We present here another type of mouth gesture ('ho' and 'hee/ee[5]'), commonly used among native signers of JSL. In an emphatic context, the mouth gesture 'ho' appears with adjectives with positive polarity, while 'hee/ee' is chosen for those with negative polarity. Typical examples are shown in (3) and (4) below:

*__ho/*hee/*ee*
(3) *FUKU* *TAKAI*
clothes expensive
'(The) clothes are awfully expensive.'

*__*ho/hee/ee*
(4) *FUKU* *YASUI*
clothes inexpensive
'(The) clothes are awfully inexpensive.'

The characteristics of 'ho' and 'hee/ee' are strikingly different from the mouth gestures reported in Section 2, in the following ways:

[5] There is a regional variation 'hii'.

(a) They co-occur with adjectives, unlike other mouth gestures which can be used with various types of predicates.
(b) They are observed only in an emphatic context. In a neutral context, neither mouth gesture is used.
(c) Unlike other mouth gestures, they are required in an emphatic context.
(d) The choice of the mouth gesture is sensitive to the lexical polarity of the adjective.

The following is a list of the adjectives which take the mouth gestures 'ho/hee/ee'.

ho		**hee/ee**	
(Positive polarity)		(Negative polarity)	
takai	'expensive'	*yasui*	'inexpensive'
ookii	'large/big'	*chiisai*	'small'
ii	'good'	*warui*	'bad'
omoi	'heavy'	*karui*	'light in weight'
ooi	'in large quantity'	*sukunai*	'in small quantity'
fukai	'deep'	*asai*	'shallow'
hayai	'fast/early'	*osoi*	'slow/late'
se-ga-takai[6]	'tall'	*se-ga-hikui*	'short in height'
reberu-ga-takai	'higher in quality'	*reberu-ga-hikui*	'lower in quality'

Table 5: Adjectives which co-occur with the Polarity-sensitive mouth gestures[7].

The characteristics (a)–(d), listed above, suggest that those mouth gestures are of fundamentally different type of mouth gestures than the ones widely reported ('Aspect, Mood, and Affect' or 'Degree Adverbial' mouth gestures). It is of particular interest that the emphatic context and (lexical) polarity both play a role in the choice of mouth gestures. As we will mention briefly in Section 4, it has been pointed out in the analysis of spoken languages that emphasis and polarity are closely related.

[6] *SE-GA-TAKAI/HIKUI* 'tall/short in height' and *REBERU-GA-TAKAI/HIKUI* 'high/low in quality' are expressed by one JSL sign, though the Japanese translations are clausal.
[7] The adjectives included in this lists are all 'gradable' pairs. As for non-gradable pairs such as *SHINDE-IRU* 'dead' vs. *IKITE-IRU* 'alive', similar mouth gestures may be used, but not required, unlike the gradable adjectives presented here.

4 Polarity and emphasis

It has been pointed out in studies of spoken languages that propositional polarity (positive/negative) and the emphatic elements interact, which can be observed in different word orders or implicatures.

Such an interaction at the syntactic level is reported in the analysis of Basque. Haddican (2004) noted that overt verb raising is observed in Basque in affirmative sentences, but not in negative sentences. In the following examples, the underline indicates the original position of the raised item (the verb with the aspect marker in (5), the negative marker *ez* in (6)).

Affirmative sentence (verb raising)

(5) *Lagun-tzen* *omen* *zintu-en* ____
help-imperfective evidential modal-past
'Apparently she helped.'

Negative sentence (no verb raising)

(6) *Ez* *omen* *zintu-en* ____ *lagun-tzen*
Neg evid. modal-past help-imperf.
'Apparently she didn't help.'

Haddican (2004)

However, as seen in the following, the verb in the affirmative sentence does not raise if the emphatic affix (*ba*) appears.

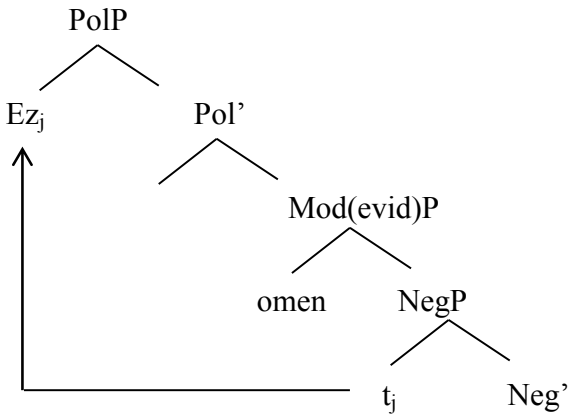
Emphatic sentence (no verb raising)

(7) *Jon* *ba* *da* *etorri*
emphatic perf. arrive
'Jon has so arrived.'

(Laka 1990:101)

To explain the pattern described above, Haddican assumed the functional head (Pol), which projects the PolP. He argued that the Pol head induces verb raising in the affirmative clause, Neg-head (*ez*) raising, and a merging operation of the emphatic affix (*ba*). Example (8) shows the target of the Neg-head raising (i.e. Spec of PolP).

(8)



(Haddican 2004:99)

In Haddican's analysis, polarity and emphasis are closely related in that the same functional head is responsible for the polarity-sensitive raising, as well as hosting the emphatic morpheme.

The interaction of the polarity and the emphasis is discussed in the field of semantics[8]. The verum focus operator (Höhle 1992, Romero and Han 2004, etc.), being an epistemic conversational operator, reflects the speaker's previous assumption, as shown in the following example. In (9), because of the presence of the emphatic stress (which the verum operator is associated with) on the verb *study*, the implicature arises that the speaker B believed or expected that Tom had not studied for the class.

(9) A: Tom got an A in Ling106.
B: Did he STUDY for that class?

(Romero and Han 2004)

The example (9) exemplifies a close connection between the emphasis and polarity: the emphatic stress in B's utterance activates the negative proposition (Tom did not study for Ling 106) even though no negative expression is included in the sentence.

The studies briefly reviewed in this section both discuss the relationship between emphasis and polarity at the propositional-level. The Polarity-sensitive mouth gestures in JSL, reported in the current study, seem to be sensitive to the lexical polarity of the adjectives. Nevertheless, the mouth gestures appear only in the emphatic context. This observation suggests that the polarity can interact with the emphasis at the lexical level, in addition to the propositional level. More cross-linguistic investigation is called for to further investigate this hypothesis.

In Section 5, we will briefly describe how eyebrow movements (another instance of non-manuals) combine with the Polarity-sensitive mouth gestures. Mouth gestures and eyebrow movements each express polarity of a different nature.

[8] We thank Kathryn Davidson for pointing this out.

5 Two types of polarity

As described in Section 3, the Polarity-sensitive mouth gesture is sensitive to the lexical polarity of the adjective it overlaps with. In the example (3), repeated below, the mouth gesture 'hee' or 'ee' appears with the adjective of negative polarity (*YASUI* 'inexpensive'):

(3)
		__*ho/hee/ee
	FUKU	*YASUI*
	clothes	inexpensive

'(The) clothes are awfully inexpensive.'

Interestingly, the mouth gesture can be combined with either raised eyebrows or furrowed eyebrows. The former combination yields the connotation that the signer has a positive attitude about the content s/he is communicating, while the later indicates the opposite (negative) attitude of the signer.

In examples (10) and (11), below, the different attitude of the signer is indicated in the parenthesized part of the English translation. (*ebr* refers to the eyebrow raise, and *ebf* refers to eyebrow furrow.)

(10)
		____*ebr*
		____*hee*
	FUKU	*YASUI*
	clothes	inexpensive

'(The) clothes were awfully inexpensive (and it was a good deal.)'

(11)
		___*ebf*
		___*hee*
	FUKU	*YASUI*
	clothes	inexpensive

'The clothes were inexpensive (and it was junk.)

In those examples, different non-manuals are responsible for different types of polarity: the mouth gesture reflects linguistic polarity (a part of the lexical information of the adjective), while the eyebrow movement conveys the positive or negative attitude of the signer.

Distinguishing those two types of polarity and their effect on linguistic expressions have been proposed in the analysis of morphemic choice in Swedish. Saury (1984) conducted a corpus analysis of spoken Swedish to find that two derivational morphemes of the same meaning systematically alternate according to the attitude of the speaker. Based on that observation, he argued that there are two different types/levels of polarity: cognitive and attitudinal.

For example, the noun *skuld* 'debt' can be followed by a derivational suffix *–fri* or *–lös*, which derives two words of the same meaning, 'without debt'. The choice of the two morphemes, though, is determined by the context, as shown in the following:

Expressions 'being without debt'	Appropriate contexts
skuld-fri	(You are free when you pay off the debt.)
skuld-lös	(No one can live without debt in this society.)

Table 6: Attitudinal polarity expressed by different suffixes in Swedish (cf. Saury 1984).

The morpheme *–fri* is selected when *skuld* is meant (by the speaker) to be something negative (i.e., a debt one does not want to have). On the other hand, the other morpheme *–lös* is used when *skuld* refers to something desirable (a debt, i.e., kindness or consideration that one receives from people around her/him). The positive/negative polarity discussed here is not a part of the lexical information of the noun *skuld.* Rather, the 'polarity' is a reflection of the attitude of the speaker.

The JSL examples in (10) and (11) clearly show that the two types of polarity in Saury's analysis are expressed with different non-manuals. The linguistic/cognitive polarity appears in the form of the mouth gesture, and the attitudinal polarity is indicated by the form of eyebrow movements. Our data provide empirical support for the distinction of cognitive/attitudinal polarity discussed in Saury (1984). It is also interesting to consider how non-manual items in a sign language divide the labor of expressing different types of semantic/pragmatic information.

6 Conclusions

In this paper, we presented the data of Polarity-sensitive mouth gestures, a new addition to the collection of mouth gestures attested in Japanese Sign Language. The linguistic characteristics of those mouth gestures suggest an interesting possibility that the association of the polarity and emphasis is established at the lexical level, as well as at the propositional level. Furthermore, the fact that the mouth gestures can co-occur with eyebrow raise/furrow suggests the possibility that different types of polarity are expressed by different non-manual expressions. There are no facial gestures used by hearing Japanese speakers which are comparable to the mouth or eyebrow movements reported in the current study[9]. A further analysis of the Polarity-sensitive expressions would lead us to a deeper understanding of non-manuals in sign languages, as well as to provide insights into the nature of the polarity realized in a variety of linguistic expressions in signed and spoken languages.

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[9] There are interjections in spoken Japanese such as *hoo* (more typical in masculine speech) and *hee* (gender-neutral). They indicate that the speaker became interested in what they perceived verbally or non-verbally, whether it is positive or negative (i.e. the use of those interjections is not influenced by any sort of polarity.)

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