Head Nod as a Prosodic Cue in Japanese Sign Language and Its Use by Native Signers and Non-native Interpreters)

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6. Head Nod as a Prosodic Cue in Japanese Sign Language and Its Use by Native Signers and Non-native Interpreters[1)]

Shimotani Natsuko
Kwansei Gakuin University, Japan

Abstract

Head nods are a frequently observed phenomenon by both Japanese users and Japanese Sign Language (JSL) users. However, while head nods used in spoken Japanese are a part of a paralinguistic feature, previous sign language studies show that head nods in JSL function as an important linguistic element. Among several functions of head nods, this study investigates the mechanism of head nods as a prosodic marker, occurring at Intonational Phrase (IP) boundaries. Four native Japanese speakers, four native JSL Deaf signers, and three non-native certified JSL interpreters participated in this study, and their use of prosodic head nods were compared regarding the frequency of occurrence at IP boundaries and the timing of the head nod nucleus (the lowest head nod position). The result shows that while the frequency of head nods at IP boundaries shows individual variation among Japanese speakers, the Deaf JSL signers systematically show prosodic head nods at IP boundaries in a consistently high rate. Also, a different timing of the head nod nucleus is observed between Japanese and JSL. As for the comparative analysis between the Deaf JSL signers and non-native JSL interpreters, the data reveals that the use of prosodic head nods by non-native interpreters is not as inconsistent as that of Deaf native signers, suggesting that Japanese head nod behavior would affect JSL interpretation by non-native JSL interpreters to some degree.

6.1. Introduction

This chapter investigates the dynamic features of prosody in sign languages, particularly head nods in Japanese Sign Language (JSL), and compares their use by Deaf native JSL signers with hearing non-native JSL interpreters. A study on head nods in JSL itself is not completely new; however, previous studies have mainly focused on how head nods contribute to syntactic constructions, instead of how they are produced in a prosodic manner. Following a previous finding of the frequent occurrence of head nods at Intonational Phrase (IP) boundaries (Tang et al. 2010), the present study explores how head nods serve as an edge marker in JSL.

As widely acknowledged, head nods are widespread in natural interaction in Japanese

society; however, head nods in JSL seem to be linguistically more systematic, while Japanese speakers use their head in a relatively free manner. If this is the case, the question is raised: are non-native JSL signers, especially interpreters as bilinguals, sensitive to the different properties of head nods in their JSL production? In fact, some Deaf people have commented that interpretations by non-native JSL signers either overly express or lack rhythm, non-manuals, and flow. Interestingly, most Deaf people have pointed out that these prosodic elements rather than the limitation of interpreter's vocabularies, suggesting that prosody is at least as equally important as, or even more important than, the vocabulary size in signing. With that said, head nods are chosen in the present study, aiming to explore their functions in JSL, as well as whether and to what extent Japanese head nod patterns are carried over to those of the head nods of the non-native JSL interpreter's signing.

6.2. Prosody

6.2.1 Roles of Prosody

Prosody has been widely studied in spoken languages, and its definition covers a broad range of linguistic features. In general terms, prosody is "the metrical features of speech" (Shibata and Hurtig 2008: 177), or "a rich system of rhythm, prominence, and pitch patterns which shapes and interprets the structure and meaning" (Sandler 1999a: 127). These suprasegmental features play an important role to disambiguate two identical sentences. Example sentences in (1) demonstrate how rhythmic chunking serves to distinguish a restrictive relative clause from a nonrestrictive relative clause.

(1) a. Restrictive relative clause
All the interpreters who want to learn more about JSL will sign up for this course.
(Only those who want to learn more about JSL will sign up.)

b. Nonrestrictive relative clause
All the interpreters, who want to learn more about JSL, will sign up for this course.
(All the interpreters in the above discourse context want to learn more about JSL, so they all will sign up.)

The only difference between the above two sentences is whether or not there are commas in the written text. In speech, a pause is usually inserted at the comma, resulting in constructing a minimal pair.

Intonation is another way to differentiate one syntactic structure from the other in some languages. In example (2), the different tone in English determines either a declarative sentence or a yes/no question.

(2) a. Declarative sentence
Speaker A: Do you know who is interpreting today's seminar?
Speaker B: Phillip. (falling tone)

b. Yes/no question
Speaker A: Do you know who is interpreting today's seminar?
Speaker B: Phillip? (rising tone)

As can be seen, examples (1) and (2) show that prosody is closely related to syntactic structure, in which it contributes to a change in the meaning of an utterance.

Prosody also functions to create boundaries. Boundaries are usually recognized by pause, breath, and/or word-internal duration. For example, sentence (3) may be divided into two intonational phrases (shown as $_{IP}$).

(3) Intonational phrase in English
[All the interpreters who take the JSL course]$_{IP}$ [really want to improve their signing skills.]$_{IP}$

In this case, prosodic cues do not serve to contrast meaning. Rather, they provide a signal where the intonational boundary is. Therefore, prosody is not only bonded with syntactic units but also interacts with phonological units.

As prosody in spoken languages is mainly articulated vocally, what elements are analogous to prosody in sign languages? Indeed, prosody in sign languages has been discussed by quite a number of researchers (Boyes-Braem 1999; Sandler 1999a, 1999b, 2010, 2012; Wilbur 2000; Brentari and Crossley 2002; Nicodemus 2009; Tang et al. 2010; Brentari et al. 2012; Puupponen et al. 2015; and others). The consensus among these researchers is that since sign language employs multiple articulators, both manually (i.e. two hands) and nonmanually (i.e. facial expression, head, torso), each one of them has a potential to contribute prosodic markings. For example, phrase-final lengthening, phrase-final reduplication, longer duration of a sign, and H2 spreading have been realized as manual prosodic cues (Nicodemus 2009; Tang et al. 2010; Tyrone et al. 2010; Brentari et al. 2012). As for non-manual prosodic markers, they are more complicated and have more roles than manual prosodic markers, due to the availability of various kinds of articulators. Wilbur (2000) divides non-manual markers of American Sign Language (ASL) into two groups: 1) the lower part of the face, which includes the mouth, tongue, and cheeks, and 2) the upper part of the face, which includes the eyes, eyebrows, and the head. According to her analysis, the lower part of the face provides syntactic information, such as adjectives and adverbs, whereas the upper part of the face provides higher syntactic constituents, such as clauses or sentences. Furthermore, in ASL and Finnish Sign Language (FinSL), non-manuals of the upper part of the face can be either edge markers or domain markers (Wilbur 2000; Puupponen et al. 2015, respectively). According to their analyses, edge markers generally occur at constituent boundaries, whereas domain markers tend to spread across syntactic domains (i.e. questions) and/or prosodic domains (i.e. intonational phrases).

Similarly, non-manual markers, especially articulators on the upper face play a role in syntactic marking in JSL. Compare the two examples in (4). The line over the text indicates the spread of non-manual markers.

(4) a. Declarative sentence in JSL

hd[2)]

TODAY SEMINAR INTERPRETER PHILLIP[3)]

'Phillip is interpreting for the today's seminar.'

b. Yes/no question in JSL

(br, eyes wide open) q

hd

TODAY SEMINAR INTERPRETER PHILLIP?

'Is Phillip interpreting for the today's seminar?'

In (4a), the downward head movement co-occurs with 'INTERPRETER' with a relatively unmarked face until the end of the utterance, constructing a declarative sentence. In contrast, in (4b), the head downward movement co-occurs with 'PHILLIP' with the eyebrow raising and eye wide opening, constituting a yes/no question.

Similar to prosody in spoken languages, prosodic markers can also function as creating boundaries without contrasting the meaning of an utterance in sign languages. The following sentence (5) may be divided into two intonational phrases.

(5) Intonational phrase in JSL

hn

[JSL INTERPERTER COURSE TAKE ALL]$_{IP}$ [SIGN IMPROVE WANT-TO IX_3p]$_{IP}$

'All the interpreters who take the JSL course want to improve their signing skills.'

The pause is inserted between two intonational phrases, and the boundary is realized by a single head nod without changing the meaning. In sum, prosody in sign languages also performs at least two roles, similar to that in spoken languages: 1) to disambiguate two otherwise identical sentences, and 2) to create boundaries between phrases, clauses, and sentences.

6.2.2 Prosodic Hierarchy

The notion of "prosodic hierarchy" has been applied to some sign language prosodic studies (ASL by Brentari and Crossley 2002; Brentari et al. 2012; Hong Kong Sign Language by Tang et al. 2010; Israeli Sign Language by Sandler 2010; German Sign Language by Herrmann 2010). This theory was first proposed by Nespor and Vogel (1986). The key elements of this theory are shown in (6).

(6) Prosodic hierarchy

Utterance (U) > Intonational phrase (IP) > Phonological phrase (PP) >
Prosodic (Phonological) word (PW) > Syllable (σ) > Mora (μ)

Following Wilbur's analysis of the role of heads as creating a syntactic constituent, this chapter mainly focuses on IP and U. Brentari *et al.* (2012: 403) state that the IP is "most

closely aligned with the clause" and the U is "mostly closely aligned with a complete thought." This implies that the prosodic hierarchy is bound with morphosyntactic structures. Meanwhile, prosodic markers are "aligned with timing elements" (Sandler 2010: 302), which fall into a phonological domain. While prosodic units and syntactic units are interfacing with each other, some researchers claim that they are not always isomorphic (Nespor and Vogel 1986; Tang et al. 2010; Sandler 2010). Head nods in JSL may also fall into the same phonology-syntax interface; however, this study does not take either position but approaches head nods from a wider perspective.

This section provided an overview of the basic concepts of prosody and its roles in spoken language and sign language. The next section narrows down our scope to one specific prosodic marker: head nod.

6.3. Head Nod: An Edge Marker

6.3.1. Head Nods in Spoken Japanese and Sign Language

Maynard states that "Japanese speakers and listeners nod almost three times more than their American counterparts" (2011: 255), suggesting that head nods contribute natural interaction in Japanese speech to a considerable degree. However, according to her argument, head nodding is used as a paralinguistic feature which facilitates verbal expressions, such as indicating an emphasis in meaning, the end of an utterance, the end of one's speaking turn, or filling a pause between utterances. Similarly, Munhall *et al.* (2004) reports that speaker's head movements also facilitate listener's perception. Overall, these previous studies acknowledge that head nods in Japanese function as a paralinguistic feature, rather than constituting a core linguistic unit.

In the case of sign languages, Wilbur (2000) and Puupponen *et al.* (2015) illustrate the functions of head movements of ASL and FinSL, respectively. Puupponen *et al.* state that head nod, head nodding, head thrust, and head pull "are said to have several phonological, morphological, syntactic, textual, communicative, and prosodic functions" (2015: 3). As far as head nods are concerned, Wilbur and Puupponen *et al.* divide head nod functions into three categories, based on how the head is articulated.

(7) Head nod functions in ASL and FinSL
   a. Single head nod: boundary marker occurring after clause-final signs
   b. Slow or deliberate single head nod: focus marker co-occurring with lexical signs, indicating emphasis, assertions, or existence
   c. Repetitive head nod: semantic marker, indicating assertion, hedging, or counterfactuals

Puupponen *et al.* (2015) also state an additional function of head nods: copying a manual movement. That is, the motion of the head is synchronized with the manual path movement. According to their spontaneous data, this type of head nod appears to emphasize the manual sign or can be the result of non-deliberate co-articulation.

Previous studies of JSL also show that head nods are acknowledged to have a variety of functions. Ichida (2010) claims that there are total five head movement types in JSL: 1)

Set (head downward), 2) Shake, 3) Nod, 4) Chin up, and 5) Move. Also, while Wilbur and Puupponen *et al*. focus only on the movement of the head, Ichida claims that the timing of head movement differentiates sentence types or/and signer's intentions.[4] Ichida (2014) further claims that head nods in JSL are used to signal topicalized NPs, conditionals, cleft sentences, or complex sentences (i.e. relative clauses, subordinate clauses, or complement clauses). The above descriptions show that head nods in JSL serve as crucial syntactic, semantic, or discourse markers just as in other sign languages.

While Ichida focuses on a single utterance, Ichikawa (2011) examines how adjacent utterances are related to each other by pinpointing the timing of the lowest head nod position at utterance-finals. He notes that the lowest head nod position occurring after an utterance-final sign functions as a conjunction connecting two clauses, or shows topicalization. On the other hand, the lowest head nod position co-occurring with an utterance-final sign indicates either completion of a sentence or functions as a conjunction, depending on the context. He further compares the timing of the lowest head nod position in Japanese with that in JSL based on spontaneous conversation data. According to the result, while the lowest head nod position often appears between utterances in JSL, it rarely happens in spoken Japanese. This comparison uncovers the different timing of the lowest head nod positions between the two languages; however, one limitation of Ichikawa's study is that the frequency of head nods is not clearly stated. In addition, while Ichikawa views head nods from a prosodic point of view, his study does not specify which prosodic unit is most likely interacting with the head nods (i.e. phonological phrase, intonational phrase, etc.). Besides, it should be noted that the distinction of head nods made by Ichikawa is different from that proposed by Wilbur and Puupponen *et al*. Since Wilbur and Puupponen *et al*. view the whole movement of head nods, they treat head nods occurring only after a clause-final sign as a boundary marker. On the other hand, Ichikawa's focus is on the lowest head nod position of head nods, and both head nod patterns are regarded as boundary markers. In this study, Ichikawa's findings are further investigated. Since the lowest head nod position is the most salient part of head nodding, the present study regards this particular position as a *head nod nucleus* for the sake of convenience.

6.3.2 Head Nod Production by Non-native Signers

A few articles have focused on prosodic cues produced by non-native JSL signers. Takeuchi *et al.* (1999) analyze head nod errors produced by late learners of JSL. Having seven Deaf JSL native signers and 15 hearing late learners of JSL watch a narrative story by a Deaf JSL signer and retell the story, they discover that while no head nod errors are observed by Deaf native signers, late learners of JSL make head nod errors at a relatively high rate. For instance, they omit head nods or show different patterns of head nods from those of native signers. Although Takeuchi *et al*. illustrate each head nod pattern produced by Deaf signers and late learners of JSL, which head nods produced by late learners of JSL are considered to be an error is not clearly stated. Also, whether the head nod errors involve syntactic errors that change the original meaning, or are more likely prosodic errors, which do not look natural to native-signers' eyes is also unspecified.[5] However, their study reveals that late learners of JSL produce types of non-native 'accent' in their JSL production.

Shirasawa and Saito (2002) investigate six JSL interpreters' productions from four points of views: interpretation rate, duration of signs, the process from the source language (Japanese) to the target language (JSL), and the outcome of the target language. One of the focuses in their study, which is related to the present study, is how clear the interpreters show phrase or sentence boundaries. Their finding is that interpreters tend to omit head nods when their JSL production gets behind the source language and needs to catch up, which makes the boundary ambiguous. However, the omission of head nods is also reported by Takeuchi *et al.* (1999), in which non-natives are not in the interpretation setting. Therefore, it may be reasonable to consider that non-native JSL signers are not as sensitive to the linguistic property of head nods as their native counterparts, which results in omitting head nods or producing a non-native 'accent' of head nodding.

6.4. Research Questions

Based on previous studies, this research aims to investigate the mechanism of prosodic head nods in JSL by addressing the following questions.

(8) Research questions
   a. How do Japanese speakers and JSL Deaf signers produce head nods at IP boundaries?
   b. Do head nod behaviors in spoken Japanese affect interpretation by non-native JSL interpreters?

Here are some hypotheses. Since head nods used by Japanese speakers are paralinguistic, Japanese speakers would use head nods in a relatively free manner, resulting in a wide range of frequency of head nods at IP boundaries. In contrast, as prosodic head nods in JSL have been confirmed to mark the edge of phrases, clauses, and sentences, similar systematic patterns of head nods are expected to be observed from Deaf JSL signers. Also, the high frequency of occurrence of head nods at IP boundaries is expected by their JSL production.

As for non-native JSL interpreters, even though bilingual non-native JSL interpreters should recognize the linguistic nature of head nods in JSL, their first language, Japanese, would affect the production of head nods in the process of interpreting to some degree. In sum, they would produce a non-native 'accent' of prosodic head nods in terms of frequency, consistency, and timing.

6.5. Methodology

6.5.1 Participants

Four Japanese native speakers (H−1 to H−4), four Deaf native signers of JSL (D−1 to D−4), and three non-native JSL interpreters (I−1 to I−3) were recruited for data collection. The Deaf participants were all born to Deaf parents. They have been using JSL since birth and have attended a school for the Deaf. Their ages range between 30 and 49. As for the JSL interpreters, all of them are nationally certified JSL interpreters and have more than five years of experience in interpreting. Before recruiting them, the author consulted some Deaf

native signers to ensure that the interpreters have a high level of ability in natural JSL.[6] Their ages range between 30 and 59. For the Japanese data, four native speakers of Japanese, in their 20's, were recruited. Their data were also used for the JSL interpreters to interpret. All of them were born to hearing parents in Japan and have been exposed to Japanese since birth. None of them had been exposed to any sign language before.

6.5.2 Data Collection

The *Pear Story* film was used for data collection.[7] Since the film contains no spoken words among the characters, it is a suitable resource to collect both signed and spoken language data. For the spoken Japanese data and the JSL data, participants were asked to watch the film and then retell the story to their native interlocutor, who did not know the content of the film. Two video cameras were used to capture the image of participants from two different angles: from the front and from the side. For the JSL interpretation data, the participants were asked to interpret the video-recorded narrative story produced by the Japanese participants. Out of four available spoken Japanese sets of data, two were used for all interpreters: speakers of H−3 and H−4. The task was done twice with two different spoken Japanese data sets with a five-minute-interval. For preparation, they were allowed to watch the film (*Pear Story*), but not the spoken Japanese data. While interpreting, there was a Deaf JSL native signer present at the recording, so that the interpreter could look at the Deaf person and interpret the message naturally. The image of the Japanese speaker was shown on the screen along with the speech, and the interpreter was free to look at the screen. Their interpretations were also video-recorded with two video cameras, just as for other two groups.

6.5.3 Transcription Procedure

ELAN was used for transcription and analyses.[8] For the spoken Japanese data, all utterances and head nods occurring at IP boundaries were annotated. IP boundaries were identified where the speaker showed a clear pause between utterances. For both JSL data produced by the Deaf signers and the interpreters, the following features were annotated: manual signs, IP boundaries, head nods, and the position of the head nod nucleus (the lowest head nod position). To begin with, IP boundaries were identified by morphosyntactic constituents such as clauses, parentheticals, nonrestrictive relative clauses, and other extraposed elements (Sandler 2010; Tang et al. 2010). Then, the prosodic IP boundaries were determined mainly by relying on the following prosodic cues: head nods, hand clasping or dropping, and any torso/head position or eye gaze change co-occurring with phrase-final lengthening. The next task was to categorize head nods. Firstly, linguistic head nods were extracted from all head nods occurring in utterances. The following head nods were regarded as non-linguistic head nods and excluded from the analysis:

(9) Non-linguistic head nods
   a. Gestural head nods: The signers/interpreters mimic the real action of a character in the story.
   b. Self-thinking, confirming, or correcting head nods: The signers/interpreters show head nods while they are thinking, confirming with oneself, or correcting oneself.

Secondly, from these linguistic head nods, prosodic head nods were further extracted. The following head nods shown in (10) were identified as 'non-prosodic head nods.' The utterances from the present data are also provided.

(10) Non-prosodic head nods

a. Pragmatic head nods: introducing or re-introducing a referent into a discourse (produced by one of the Deaf participants)

hn
CL: a-boy-ride-a-bike BOY CHILD BOY CL: a-boy-ride-a-bike-hard
'The boy was riding a bike quickly.'

b. Discourse head nods: marking the beginning of an utterance, or associated with role-shifting (produced by one of the Deaf participants)

hn
BASKET CL: put-pears-into-a-basket LOOK-AT-EACH-OTHER

SAY-NOTHING FEEL-AWKWARD SAY-NOTHING
'They are putting pears into a basket. The boy and three children looked at each other, but the boy felt awkward and didn't say anything.'

c. Lexical head nods: accompanying *mouthing* of spoken words (produced by one of the interpreters)[9)]

hn
CL: a-boy-go-away GO (mouth: *de*)
'The boy went away. Then…

In (10a), a boy in the story is reintroduced, and a single head nod co-occurring with the signs 'BOY CHILD BOY' functions as a focus marker, associating with other non-manuals (i.e. brow raising and eye wide opening). This kind of head nodding is categorized as a pragmatic head nod. In (10b), the signer is playing the role of the boy. By accompanying a single head nod and eye gazing with the sign 'LOOK-AT-EACH-OTHER,' the signer is indicating that the boy's status is lower than other characters of the story. This kind of head nodding is categorized as a discourse marker. In (10c), the spoken Japanese word *de*, which corresponds to 'then' in English, is shown with a single head nod. Therefore, this type of head nodding is categorized as a lexical head nod.

Furthermore, for prosodic head nods at IP boundaries, the positions of the head nod nucleus were annotated. It was marked as 'on a phrase-final sign' when the head nod nucleus was placed on the final sign of the IP, or 'after a phrase-final sign' when the final handshape has disintegrated, and the hands have left their final location. When transcribing the data and categorizing head nods, I consulted three JSL Deaf signers. Lastly, it should be mentioned that there were some head nods involving upward movement before nodding. This may convey some sort of linguistic information; however, its function is left for the further research, and only the head downward movement is targeted in the present chapter.

6.6. Results

The results from the data address several aspects. For the first part, Japanese head nod patterns at IP boundaries are reported. Then, several comparative analyses are made between the two JSL groups: 1) the proportion of linguistic head nods, 2) the proportion of prosodic head nods, and 3) the distributions of prosodic head nods at IP boundaries. For the second part, the timing of the head nod nucleus is focused upon. After comparing the two native groups, production by non-native interpreters is compared with that by native Deaf signers. At the end of this section, some interpreter-specific head nod behaviors are addressed.

6.6.1 Frequency of Head Nods by Japanese Speakers

Table 6-1 provides the data of the Japanese speakers with the following properties: total duration of speech, total IP boundaries, and total IP boundaries where head nods are observed.

Table 6-1 Frequency of head nods at IP boundary by Japanese speakers

PARTICIPANT	TOTAL DURATION OF SPEAKING	TOTAL IP	TOTAL IP BOUNDARY WITH HEAD NODS
H−1	2′37″	33	30 (0.91)
H−2	3′35″	29	29 (1.00)
H−3	4′44″	59	36 (0.61)
H−4	5′45″	64	30 (0.47)

As can be seen, the frequency of head nods shows individual variation across the participants (ranging from 47% to 100%). In addition, there is not only variation regarding the frequency, but also each speaker demonstrates a variety of head movements in their speech. For example, H−2, who shows head nods at all IP boundaries, also shows nodding at other than IP boundaries. In addition, H−2 often produces head bobbing towards the edge of IPs, which is a very common phenomenon in spoken Japanese utterances (Maynard 2011). In contrast, H−4 seldom shows head movements at IP boundaries. As for H−1, the head is likely to move upward first and then downward at the end of an utterance. H−1 also shows head bobbing at some IP boundaries. H−3 usually keeps the head up while speaking, assuming she is trying to recall the content of the video clip she saw. Examples in (11) demonstrate utterances produced by each speaker.

(11) Variety of head behaviors by the Japanese speakers

a. H−1

			hu	x		hu	x
[Sorede	sono	otonokono-ga	jitensha-wo	koi-de-ru		tochu-ni]$_{IP}$	
then	that	boy-NOM	bike-ACC	ride-ASP-NPST		on the way-LOC	

			hb		
[hokano	onnanoko	to	jitensha	de	surechiga-tte]$_{IP}$
another	girl	with	bike	by	pass-CON

'Then while the boy was riding a bike, he passed a girl on a bike.'

b. H−2

		hu	x				hb
[Sono	boshi-wo	hirotte	otokonoko	ni	watashiteage-ta		ra]$_{IP}$
that	hat-ACC	pick up	boy	to	give-PAST		then

	hu	x		hu		x
[sono	otokonoko-ha	orei-ni		sono	otokonokotachi	ni
that	boy-TOP	in return-LOC		that	boys	to

hu		hb	
hitotsu	zutu	ringo-wo	age-te]$_{IP}$
one-CL	each	apple-ACC	give-CON

'The boy gave him a hat. Then he gave an apple to each boy in return.'[10)]

c. H−3

			hu	x		x
[Sono	shojo-no	atama to	butsuka-tte]$_{IP}$		[boshi-ga	ochicha-tte]$_{IP}$
that	girl-GEN	head to	hit-CON		hat-NOM	fall-CON

'The hat hit the girl and fell.'

d. H−4

			hd	hu				
[Kono	epuron-no	naka-ni		yonashi	takusan	tsume-te]$_{IP}$		
this	apron-GEN	inside-LOC		pear	many	put-CON		

		hd	hu		hd	hu		
[de	shita-ni	oi-tearu	kagoni		nagashikondeiku-n		desu	ne
and	down-LOC	put-ASP	basket-LOC		put-NOM		COP	IP[11)]

sono	yonashi-wo]$_{IP}$
that	pear-ACC

'He put a lot of pears into the apron, and poured them into a basket under the tree.'

The data confirm that head nods at IP boundaries are relatively optional in Japanese, and in fact, the head behavior looks less constrained. This may be due to its paralinguistic nature, resulting in a wide variety of head movements in utterances.

6.6.2. Head Nods by JSL Deaf Signers and Non-native JSL Interpreters

6.6.2.1 Comparative Analysis 1: Proportion of Linguistic Head Nods

First of all, the proportion of linguistic head nods and non-linguistic head nods against a total number of manual signs is compared between Deaf signers and interpreters. The result is given in Table 6-2.

Table 6-2 Total number of linguistic head nods and non-linguistic head nods against total manual signs

	TOTAL MANUAL SIGNS	TOTAL LINGUISTIC HN	TOTAL NON-LINGUISTIC HN
Deaf Signer	1098	338	760
Interpreter	929	338	591

The result from a Chi-square statistic test shows that the two groups are significantly different ($X^2 = 7.0997$, $p = 0.00771$). The numbers indicate that the interpreters are using more linguistic head nods than the Deaf signers in utterances. One possible explanation for this may be attributed to the differences in speech styles between Japanese and JSL. The Pear Story involves several characters, and Deaf signers tend to employ role shifting, which is a very common feature in sign language. While playing the role of the characters in the story, the Deaf signers are likely to use more gestural head nods (categorized as non-linguistic head nods) than linguistic head nods, to imitate the real action of the characters. In contrast, the Japanese speakers in the data rarely shift their roles but consistently narrate the scene from the same point of view, which is a common speech style in Japanese.

6.6.2.2 Comparative Analysis 2: Classification of Linguistic Head Nods

In order to see what proportion of linguistic head nods is taken up by prosodic head nods, prosodic head nods are extracted from other linguistic head nods. Table 6-3 presents the proportions of prosodic head nods and non-prosodic head nods.

Table 6-3 Proportion of prosodic head nods and non-prosodic head nods

	TOTAL LINGUISTIC HN	PROSODIC HN	NON-PROSODIC HN
Deaf Signer	338	239	99
Interpreter	338	227	111

The Chi-square test shows that there is no significant difference between the Deaf signers and the interpreters ($X^2 = 0.9947$, $p = 0.31859$). This implies that both groups employ a similar weight of prosodic head nods in their utterances. That is to say, prosodic head nods are not a significant factor to distinguish the linguistic head nod habits between the two groups, but non-prosodic head nods are. Therefore, non-prosodic head nods are then separated into three categories. Each distribution of four head nod functions is compared: prosodic

head nods, pragmatic head nods, discourse head nods, and lexical head nods, as mentioned in the previous section. The result is presented in Table 6-4.

Table 6-4 Distribution of linguistic head nods

	Prosodic HN	Pragmatic HN	Discourse HN	Lexical HN
Deaf Signer	239	25	74	0
Interpreter	227	54	53	4

This time, the Chi-square test shows a significant difference between the two groups (X^2 = 18.3259, p = 0.000377). As can be seen, the Deaf signers use discourse head nods more frequently while the interpreters use more pragmatic head nods. This result shows us that speech styles may affect the proportion of linguistic head nods. Compare the following utterances of the same scene produced in JSL and JSL interpretation. The corresponding Japanese utterance is also provided.

(12) Different style of speech

a. JSL (D−3)

(discourse head nod)
hn
[BASKET CL: put-pears-into-a-basket LOOK-AT-EACH-OTHER
x
SAY-NOTHING FEEL-AWKWARD SAY-NOTHING]$_{IP}$

'They are putting pears into a basket. The boy and the three children looked at each other, but the boy felt awkward and didn't say anything.'

b. JSL Interpretation (I−2)

(pragmatic head nod)
hn
[PEAR TOGETHER PICK-UP $_3$HELP$_1$ CL: pick-up-pears]$_{IP}$ [LATER

(two pragmatic head nods)
hn hn
THREE-PEOPLE IX_1 BE-THERE CONVERSATION NOTHING[12)]

'Three children are helping the boy pick up the pears together. The three children and the boy have no conversation.'

c. Japanese (H−3)

Sono kinomi-wo issho-ni hirottekureta-n desu kedo ma
that nuts-ACC together-LOC pick up-NOM COP but well

karera-ha kotoba-wo kawasa-nai-n desu kedo…
they-TOP word-ACC exchange-NEG-NOM COP but…

'Three boys picked up the nuts with the boy. Well, they do not exchange any words but…[13)]

In (12a), the Deaf signer plays the role of a boy and uses the discourse head nod to show that the boy's position is lower than other three children. In contrast, in (12b), several pragmatic head nods are used to introduce the referents. The production of the interpreter is maintaining the same point of view, just as the source language of the spoken Japanese data.

In spite of a small contribution to the result, it is interesting to note that the interpreters produce lexical head nods in their utterances. It does not necessarily mean that the Deaf signers never produce lexical head nods. In fact, Akahori (1999) found independent head nods occurring between signs by JSL native signers, serving as a conjunction. Also, as head nods can hold several roles at a time (Puupponen et al. 2015), the Deaf signers in the present data seem to unify a prosodic head nod and other head nod functions into one, whereas the interpreters tend to produce one head nod for each function. Compare the following utterances of the same scene, produced by one of the Deaf signers and the interpreters.

(13) Use of head nods by the Deaf signer and the interpreter

a. Deaf signer (D−1)
(prosodic-lexical)

x
[BOY CL: a-boy-riding-a-bike CL: a-boy-approaching RIGHT]$_{IP}$
[UNDERSTAND IN-RETURN…
'A boy approached a boy riding a bike. "Oh, that's right." So in return…'

b. Interpreter (I−1)

(prosodic) (lexical)
x hn
[BOY CL: a-boy-approaching-a-boy HAT $_1$GIVE$_3$]$_{IP}$ [(mouthing: *de*) IN-RETURN…..
'A boy approached the bike boy and gave a hat. So, in return…'

In (13a), there is a single head nod at the IP boundary, taking at least two functions: 1) an edge marker, and 2) adverbial conjunction, corresponding to 'so'. On the other hand, in (13b), the interpreter produces two separate head nods for each function: a prosodic head nod and a lexical head nod. The lexical head nod accompanies mouthing *de*, corresponding to an adverbial conjunction 'so'. This difference can account for the result in Table 6-2 that the interpreters produce more linguistic head nods than the Deaf signers.

6.6.2.3 Comparative Analysis 3: Distribution of Prosodic Head Nods

Table 6-5 provides the distribution of prosodic head nods: at IP boundaries or elsewhere.

Table 6-5 Distribution of prosodic head nods in utterances

	TOTAL PROSODIC HN	AT IP BOUNDARY	ELSEWHERE
Deaf Signer	239	154 (0.64)	85 (0.36)
Interpreter	227	136 (0.60)	91 (0.40)

The Chi-square test shows no significant difference between two groups ($X^2 = 1.0134$, $p = 0.314079$), implicating that the frequency of distribution of prosodic head nods is similar between the Deaf signers and the interpreters. The result confirms Tang *et al.* (2010) that prosodic head nods mark IP boundaries in JSL; however, although more than half of prosodic head nods appear at IP boundaries (64% of Deaf signers and 60% of interpreters), there are still many prosodic head nods occurring at non-IP boundaries. This finding will lead to a hypothesis that prosodic head nods are serving as smaller phrase boundary markers.

6.6.3. Timing of the Head Nod Nucleus at IP Boundaries

6.6.3.1 Comparative Analysis: Native Japanese Speakers and Native JSL Signers

Focusing on those prosodic head nods at IP boundaries, the timing of the head nod nucleus is examined by referring to the previous findings by Ichikawa (2011). Figure 6-1 provides information on where the head nod nuclei occur in Japanese and JSL: on IP-final words or after IP-final words.

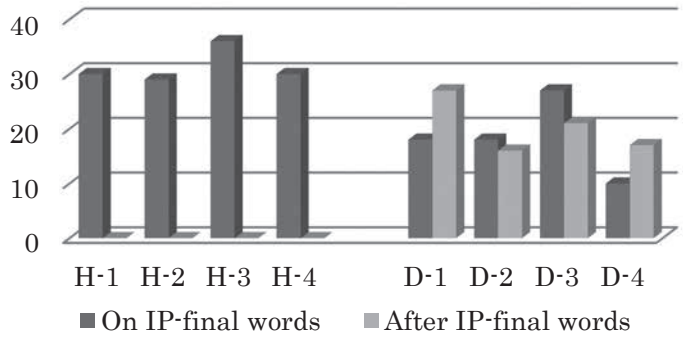

Figure 6-1 Occurrence of head nod nuclei at IP boundaries

As can be seen, the distribution of timing of the head nod nuclei is considerably different between Japanese and JSL. That is, in Japanese, the head nod nucleus is consistently placed on an IP-final word, specifically on the final mora of a word or on a particle.[14] On the other hand, in JSL, the head nod nucleus occurs at both positions. The result supports Ichikawa's finding that the lowest head nod position often appears after an utterance-final sign in JSL, whereas it rarely happens in spoken Japanese. Since the position of the head nod nucleus constitutes a syntactic relationship in JSL (i.e. connecting two IPs or ending a sentence), Deaf signers seem to separate the two patterns of head nods, as the syntactic structure demands. The utterance illustrated in (14) shows both patterns of head nods, produced by one of the Deaf signers.

(14) Different positions of head nod nuclei (Signer D−1)

x

[THREE-PEOPLE CHILDREN BE-THERE IX_3P (hold)]$_{IP}$

x x
[$_3$LOOK$_1$ WHAT]$_{IP}$ [$_3$HELP$_1$ CL: three-children-approaching]$_{IP}$
'Three children were there looking at the boy, then came to the boy to help him.'

There are in total three IPs with a prosodic head nod at each boundary. The first two head nod nuclei occur after the IP-final signs, showing a continuum to the following IP. The third head nod nucleus co-occurs with the IP-final sign, indicating the end of the declarative sentence. As the data shows, the Deaf signer seems to differentiate head nod patterns depending on the syntactic structure of the utterance.

6.6.3.2 Comparative Analysis: Deaf Signers and Interpreters

If Japanese and JSL perform considerably differently in the timing of head nod nuclei, how do non-native interpreters gap these differences? Are they sensitive to the different head nod patterns in their JSL production? Table 6-6 compares the distribution of placement of head nod nuclei produced by Deaf signers and interpreters. Four types of manual behaviors are made: 1) while hands are in the transitional movement between the IP-final sign and the following IP-initial sign, 2) while hands are at rest (i.e. hand clasping or hand dropping to the neutral position, 3) while hands are still articulated, and 4) no prosodic head nods at IP boundaries.

Table 6-6 Distributions of head nod nuclei at IP boundaries

	TRANSITION BETWEEN TWO SIGNS	HAND CLASP/ HAND DROP	ON MANUAL SIGN	NO HEAD NODS
Deaf Signer	77	4	73	32
Interpreter	25	3	108	42

The result of the Chi-square test shows that the distribution is significantly different between the two groups ($X^2 = 34.6129$, $p = 0.00001$). Especially, the figures of 'transition between two signs' and 'on manual sign' contribute to this result. That is, the occurrence of the head nod nucleus during a transitional movement is much more frequent in the Deaf signers' data than the interpreters' data. Also, while the Deaf signers equally distribute the head nod nuclei of these two positions, the interpreters tend to place them on IP-final signs. From the spoken Japanese data, head nod nuclei are usually placed on utterance-final words. This implies that while interpreters are used to nodding along with the word, they may have a difficulty with placing the head nod nucleus after an utterance, or they simply may not be sensitive to the syntactic elements of a head nod nucleus. Although whether or not they are conscious of the difference is another issue, the frequent occurrence of head nod nuclei with manual signs indicates that non-native JSL interpreters are more likely to produce independent sentences rather than connecting two IPs.

6.6.4. Interpreter-specific Behaviors

Besides the different proportion of distributions of head nod nuclei by the two JSL groups, there are some interpreter-specific behaviors observed from the data.

6.6.4.1 Long Hold after a Head Nod

One of the phenomena is a long hold after a prosodic head nod. That is, after a head nod occurs on an IP-final sign, the final handshape of the sign is kept at the final location of the sign for a relatively longer period of time. While hold or phrase-final lengthening is a common prosodic cue in sign languages (Nicodemus 2009; Tang et al. 2010; Tyrone et al. 2010; Brentari et al. 2012), the duration seems too long to be considered a prosodic cue. In contrast, holds made by Deaf signers are much shorter. If a head nod serves as a boundary marker, the manual behavior is contradicting the head nod behavior. This phenomenon is also hypothesized to indicate that non-native interpreters are not sensitive to the prosody-syntactic relationship as are Deaf signers.

6.6.4.2 Different Use of Non-linguistic Head Nods

The use of non-linguistic head nods shows some differences between Deaf signers and interpreters. From the interpreters' data, non-linguistic head nods are frequently observed during a long pause, especially while they are clasping their hands in front of their body. Nicodemus (2009) reports hand clasping as the most frequent prosodic marker among manual behaviors, produced by ASL interpreters of her participants. Also, Brentari *et al.* (2012) accounts for this behavior as a result of "processing demands," that is, the interpreters are in the middle of self-thinking before producing the next utterance. In the I−1 case, those head nods tend to occur while holding the sign in the signing space. The following utterances, (15), are from the interpreters' data. The head nod marked with 'x' is a prosodic head nod and others are non-linguistic head nods.

(15) Non-linguistic head nods by interpreters

a. During hand clasping (I−3)

x hn hb
[CL: three-boys-walking]$_{IP}$ (clasping)
'Three boys started to walk away.'

b. During a long hold (I−1)

x hn hn
[BASKET CL: put-a-basket-on-a-bike (hold)]$_{IP}$
'The boy put a basket on the bike.'

In (15a), three head nods appear at the IP boundary. The first one is a prosodic head nod occurring on the final location of the CL predicate. The second head nod occurs while clasping the hands in front of the body, identified as a non-linguistic head nod. The third one is a head bobbing, also identified as a non-linguistic head nod, according to a judgement by several Deaf signers. In fact, I−3 shows similar behavior at several IP boundaries (total four IP boundaries). According to the Deaf people I consulted, Deaf people also use head bobbing as a pragmatic marker or a discourse marker; however, the timing of the head bobbing (after a long pause) by the interpreter looks unnatural. Moreover, interestingly, this head bobbing looks similar to the head bobbing produced by H−2 in the spoken Japanese

data. Therefore, a possible account for this behavior is that the style of the interpreter's spoken Japanese is carried over to JSL interpretation. In (15b), there are also three head nods at an IP boundary. The first one is a prosodic head nod, followed by non-linguistic head nods while holding the sign. In both utterances, the non-linguistic head nods can be indicating that the interpreters are in the middle of self-thinking. On the other hand, Deaf signers tend to use gestural head nods for role shifting rather than self-thinking head nods. Recall from Table 2, the statistic test shows a different frequency of non-linguistic head nods between the two JSL groups. However, the type of those non-linguistic head nods seems different between them.

Overall, the data shown in this section have uncovered different properties of head nods in Japanese and JSL with regard to frequency of occurrence of head nods, as well as different timing of head nod nuclei. In addition, while both Deaf signers and interpreters show prosodic head nods frequently as IP boundary markers, the interpreters show some disproportionate weight on the placement of the head nod nuclei. Also, some contradictions between prosodic head nods and manual behaviors are found from the interpreters' data, resulting in unnaturalness of prosodic head nod productions.

6.7. Discussion

This study explores the mechanism of head nods used by Japanese users and JSL users, and then how non-native JSL interpreters deal with head nods while interpreting from spoken Japanese to JSL. The results have yielded some clues to answer the research questions.

6.7.1 How do Japanese Speakers and JSL Deaf Signers Produce Head Nods at IP Boundaries?

Although head nods are a commonly observed phenomenon by Japanese people in general, the present study shows the different status of head nods between Japanese and JSL. In spoken Japanese, due to its paralinguistic feature, head behaviors are found to differ from person to person. As a result, the frequency of head nods at IP boundaries shows individual variation. In sum, while head nods may serve as boundary markers in Japanese, they are used optionally and in a less constrained way.

On the other hand, the current study has revealed the systematically organized head nod patterns in JSL. Also, head nods are used most frequently as a prosodic function among linguistic head nods in JSL utterances. However, one important reminder is that a single head nod has the potential to carry several linguistic functions (Puupponen et al. 2015). For instance, from the present data, some single head nods seem to have a prosodic-lexical function, which marks a boundary as well as functioning as a conjunction. Therefore, the question is how to determine which function receives a higher priority than the other. Although the analyses of this study have consistently prioritized the prosodic function of head nods, overlapping functions need to be also defined for further analyses.

As far as the prosodic function of head nods is concerned, the result has confirmed Tang *et al.* (2010) that prosodic head nods are marking IP boundaries (more than half of all prosodic head nods); however, they are also observed at non-IP boundaries, such as at

the edge of syntactic phrases. This leads to a hypothesis that prosodic head nods in JSL mark small prosodic units, such as PPs (phonological phrases) or even PWs (prosodic words). More research is needed on the property of prosodic head nods in JSL utterances.

6.7.2 What about Non-native JSL Interpreters? Do Head Nod Behaviors in Japanese Affect their Interpretation?

Several comparisons have been made between the Deaf native signers' data and the non-native interpreters' data. The first analysis has revealed that interpreters use more linguistic head nods than Deaf signers, which may be the result of being affected by the style of Japanese speech.

The second analysis has shown that the interpreters use prosodic head nods as frequently as do Deaf signers. Therefore, as far as the frequency of prosodic head nods is concerned, non-native interpreters' head nods production do not show any interpreter-specific habits. However, the distribution of non-prosodic head nods is shown to be significantly different between the two groups. This can be another piece of evidence that the different styles of speech between the two languages have affected the production by the interpreters. Therefore, this comparative analysis has uncovered that non-prosodic head nods are more likely to be affected by the style of the speech than prosodic head nods.

The third analysis has shown the similar frequency of occurrence of prosodic head nods at IP boundaries between the two JSL groups, suggesting that the non-native JSL interpreters recognize the prosodic head nods as an IP boundary marker. Recalling the previous literature, the omission of head nods is reported by non-native JSL signers (Takeuchi et al. 1999; Shirasawa and Saito 2002); however, the Deaf signers in this study also omit head nods at certain IP boundaries, suggesting that prosodic head nods are not always obligatory for marking IP boundaries. Therefore, further research needs to consider whether the omission of head nods are just errors or are appropriately motivated by linguistic structures.

In spite of the similar frequency of prosodic head nods at IP boundaries, the timing analysis of the head nod nucleus has revealed that interpreters show some disproportionate weight on placing it on an IP-final sign, which is a typical nodding pattern in spoken Japanese. Whether or not the interpreters recognize the syntactic property of the head nod nucleus would be another important area to research.

Overall, while head nods used by Deaf signers are relatively systematic and consistent across all participants, non-native interpreters show inconsistent use of prosodic head nods. Therefore, I conclude that head nod behaviors by non-native JSL interpreters are affected by less constrained use of head nods from their first language, Japanese, especially the timing of head nod nuclei.

6.7.3 IP Boundaries without Prosodic Head Nods

Lastly it is important to note the IP boundaries with no prosodic head nods. The data of the Deaf signers show that IP boundaries with no prosodic head nods are marked by head position change, which is acknowledged as another prosodic cue in sign languages (Tang et al. 2010; Brentari et al. 2012; Sandler 2012). In other words, head movement is always

involved at IP boundaries. Interestingly, most IP boundaries without prosodic head nods involve either role shifting from one character to another, or the same role across a boundary, as shown in (16).

(16) IP boundaries with no prosodic head nods

a. Head position change by role shifting (Signer D−1)

Role: (goat) (man)
Head: hf (to sideward) hs
Hands: [APPLE ABOUT-TO-EAT]$_{IP}$ [CL: a-man-pull-a-goat
'When the goat was about to eat apples, the man pulled the goat.'[15)]

b. Head position change with the same role (Signer D−3)

Role: (man)
Head: (to sideward)
Hands: [CL: a-man-taking-out-pears-from-an-apron]$_{IP}$ [WHAT-HAPPEN?
'The man took out pears from the apron and found something strange.'

No prosodic head nods at these boundaries can account for the function of head nods as indicating the end of an action. In (16a), a morphological aspect marker, 'unrealized inceptive,' is affixed to the last verbal phrase 'EAT'. That is, the manual movement stops during the process of articulation due to the incompletion of the action (i.e. the goat tried to eat an apple but was interrupted by the man). Instead of head nodding, changing the head position indicates the role shifting from goat to man. Similarly, in (16b), the signer imitates the real action of the man, who finds something wrong while taking out pears. Therefore, in both cases, no prosodic head nods seem to be motivated by morphological or semantic properties.

In addition, the utterance, (17), involves a head upward movement at the IP boundary while the signer is simply narrating the story.

(17) Head upward movement (Signer D−1)

hn hu hn hu
[THREE-PEOPLE LEAVE]$_{IP}$ [BOY CL: a-boy-ride-a-bike LEAVE]$_{IP}$
'Three children left. The boy rode a bike and left.'

The upward head movement co-occurs with the last sign of the first IP 'LEAVE,' instead of a head nod. According to several Deaf signers I consulted, the upward head movement, at least in JSL, indicates a signer's intention of showing a syntactic clause. Although upward head movements have not been focused on in this study, this type of head movement seems to serve as a conjunction to connect two IPs.

6.8. Conclusion

This study has investigated prosodic head nods in JSL. The different properties of prosodic head nods in Japanese and JSL have led to the conclusion that non-native JSL interpreters would be affected by the Japanese use of head nods in their JSL interpretation. The results have uncovered exactly what factors of Japanese head nod behaviors affect their interpretation: 1) Japanese speakers are most likely to nod along with an IP-final word, and 2) Head nod behaviors in Japanese are much less constrained than JSL. Factor 1) indicates that non-native interpreters place the head nod nucleus after the IP-final sign less frequently than do Deaf signers. Factor 2) indicates that non-native interpreters produce a non-native 'accent' in their JSL production. In addition, an unexpected discovery was that the style of speech could be another factor affecting the proportion of linguistic head nod use in JSL interpretation.

There are some limitations and concerns in this study. First of all, the results might have been different if the interpreters had simply retold the story instead of interpreting. However, as just mentioned, the design of this study could have revealed that the different style of speech between Japanese and JSL could affect JSL interpretation. If this were the case, the finding would help non-native interpreters to design their style of interpreting. Yet, the use of head nods in a regular JSL production by non-native JSL signers would be another interesting area to investigate. The second concern is that the transcriptions and categorizations of head nods have been mainly led by the author, who is also a non-native user of JSL. While previous literature has contributed to categorize head nods, collaboration with native JSL signers is necessary to gain more reliability.

Last but not least, this chapter only investigates prosodic head nods at IP boundaries in JSL, especially the timing of the head nod nucleus. However, there is a lot more to be examined: velocity, amplitude, temporal duration, the scope over a manual sign, different types of movement path, and more. For instance, the amplitude of head nods by non-native JSL interpreters in this study looks much smaller compared to that by Deaf signers. Also, the present study has focused on higher prosodic domains: IPs and Us. By observing prosodic head nods at non-IP boundaries, smaller prosodic domains (i.e. PPs and/or PWs) also need to be investigated in future studies. Furthermore, as Brentari and Crossley (2002) claim, sentence-final position is prosodically 'heavy,' which can attract a wide variety of prosodic cues in sign language. Therefore, head nods cannot fully explain the whole scope of prosody in JSL. Other features may be more primary prosodic cues than head nods, or other cues are more IP-boundary-specific than head nods. Since widely acknowledged prosodic cues, especially eye blinks, H2 spreading, and phrase-final lengthening are an unexplored field of research in JSL, further investigations on other prosodic cues would uncover the full scope of prosody in JSL. Recognizing those limitations though, the data in this study may provide some interesting properties of head nods in Japanese and JSL, as well as non-native signers' head nod behaviors while interpreting. On top of all that, the discovery of the systematic use of prosodic head nods in JSL has provided the evidence that sign languages do have a modality-specific prosodic system, just as spoken languages do.

The demand of JSL interpreters is rapidly increasing as Deaf people are gaining more access to the public, in spite of the fact that formal instruction of prosodic features of JSL

is rarely available in JSL classes and interpreting trainings. I hope these findings would shed a light on JSL studies for non-native JSL signers, as well as contribute further to JSL teaching and JSL interpreting training for educators.

Appendix: List of Abbreviations

ACC	Accusative case
ASP	Aspect
br	Brow raise
CL	Classifier
CON	Connective
COP	Copula
GEN	Genitive
hb	Head bobbing
hd	Head downward
hf	Head forward
hn	Head nod
hs	Head shaking
hu	Head upward
IP	Interactional particle
I/IP	Intonational phrase
IX_1	Index pointing: a first person singular
IX_2	Index pointing: a second person singular
IX_3	Index pointing: a third person singular
IX_3P	Index pointing: a third person plural
IX_loc	Index pointing: a locative
LOC	Locative
NOM	Nominative case
NPST	Nonpast
PAST	Past
P/PP	Phonological phrase
q	Question
TOP	Topic
x	head-nod nucleus (the timing when the lowest head-nod position occurs)

Notes

1) This article is based on a master's thesis by the author at The Chinese University of Hong Kong, 2015.
2) See Appendix for the list of abbreviations.
3) Sign glosses are shown in capital letters.
4) See Ichida (2010: 17).
5) Although the illustration of each head nod pattern is provided, the researchers I contacted have given no further instructions, such as duration, timing or error types of head nods.
6) In Japan, the certification system does not differentiate natural JSL interpreters from 'Signed Japanese' interpreters.
7) This is a six-minute video designed by Professor Wallace Chafe in the 1970's with his research team, and has been widely applied in the field of linguistic studies in the elicitation of narrative speech data in many languages.
8) ELAN is a transcription device developed by Max Planck Institute for Psycholinguistics, Nijmegen, and is widely used for language transcriptions.

9) *Mouthing* is defined as "the full or partial articulation during a sign's production of the corresponding spoken word (usually voiceless)" (Lewin and Schembri 2011: 95).
10) H−2 perceives the fruit as apples instead of pears.
11) Only this 'IP' stands for 'interactional particle' in the entire chapter.
12) '$_3$HELP$_1$' indicates that this is an agreement verb. The numbers indicate corresponding pronouns.
13) H−3 perceives the fruit as nuts instead of pears.
14) Japanese is classified as a mora-counting language (Shibata and Hurtig 2008).
15) Signer D−1 perceives the fruit as apples instead of pears.

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