

Functions of Mouthing in the Interrogatives of Chinese Sign Language

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4. Functions of Mouthing in the Interrogatives of Chinese Sign Language

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Abstract

This chapter looks into the functions of mouthing in Chinese Sign Language (CSL), which is one type of mouth action in sign languages. In particular, we base our discussion on the mouthing that appears in interrogative constructions in naturalistic data. Our findings include that mouthing varies in both morphology and syntactic distribution. Some can be part of sign words and some can function as question markers. In conclusion, we argue that mouthing basically belongs to CSL grammar, rather than that it is a code-mixing phenomenon.

4.1. Introduction

This introduction will cover the following content. In Section 4.1.1, we differentiate between mouth action, mouthing and mouth gesture. Section 4.1.2 provides a literature review of mouthing, and Section 4.1.3 discusses research in mouthing and the significance of the topic.

4.1.1 Mouth Action, Mouthing and Mouth Gesture

Increasing research on non-manual markers in different sign languages (e.g. Schermer 1990; Sutton-Spence and Woll 1999; Pfau and Quer 2007) has shown that apart from the hands, other articulators such as the body and different parts of the face are linguistically important for sign language communication. Mouth actions also have been observed and studied recently. They seem to fulfil certain linguistic functions, many of which have not been clearly determined. However, there is a general distinction between mouthing and mouth gestures in sign languages (Crasborn et al. 2008). Mouth gestures refer to sign language inherent mouth movements, which are part of the signed element, but are irrelevant to the spoken language (Lewin and Schembri 2011). For example, when signing the citation form of THIN in CSL, it is signed with a co-occurring hand movement, one hand touches the sucked cheek. But when THIN is signed in a sentence like “A thin boy and an adult sit together”, the hand movement drops while the mouth movement of sucking cheek is reserved to express the whole meaning of THIN, because both hands are occupied for another expression (Luo 2010). The sucking cheek is used to symbolize the shape of a person, as

an internal accompanying element of the sign. On the other hand, mouthing is a different mouth action that deaf signers use when they are signing. This mouth action is derived from spoken language and is traceable to relevant spoken languages, in contrast with mouth gestures, which cannot be traced back to spoken language.

4.1.2 The Issues of Mouthing in Literature

Mouthing has been increasingly studied recently in sign linguistics, especially since the status of it has provoked much debate. Since mouthing refers to mouth patterns that are supposedly derived from language contact between signed and spoken languages, Sutton-Spence and Woll (1999) classified it as a spoken component of mouth action, and is not part of sign language grammar. Similarly, Ebbinghaus and Hessmann (2001) argues that mouthing is co-incident to sign languages and should be regarded as code-mixing, thus it is not part of sign language. The opposite view has it that mouthing should be incorporated into a sign language system based on following reasons: a) mostly it co-occurs with signs of nouns and verbs; b) it goes with signs of open classes rather than closed classes; c) it is not limited to one sign, rather mouthing may spread over more than one sign, thus functioning at the prosodic level to bind elements within a clause. Bank (2015) draws upon the Sign Language of the Netherlands (NGT) corpus which is based on everyday language use, and finds there are variation among types of mouthing, and concludes that both the use of mouthing and the spreading of mouthing over adjacent signs are ubiquitous among the NGT everyday sign language setting. The ubiquity of mouthing cannot be simply attributed to language contact and the influence of the spoken language. There is an internal evolution in the sign language construction.

The spreading of mouthing has also been studied in different sign languages (Sandler 2009; Mohr 2011). Crasborn *et al.* (2008) and Pfau (2005; 2009) found that mouthing frequently spreads onto adjacent functional signs. Dachkovsky and Sandler (2007) proposed the prosodic word as the outcome of a cliticization process, and found supporting evidence in the spreading of mouthing in Israeli Sign Language. There seems to be cross-linguistic variation as to the behavior of mouthing in sign languages.

4.1.3 Research of Mouthing in CSL and the Value of the Chapter

As for Chinese Sign Language, Luo (2010) is the first investigation of mouth action, in which mouthing has been analyzed phonetically. This work also argues that some types of mouthing should be viewed as inner elements of the whole sign word that may not be omitted, however she does not discuss the function of mouthing. In a relevant field, Chen (2012) discussed mouthing in Taiwan Sign Language and drew the conclusion that it is idiosyncratic in its frequency, and the choice of mouth action is not obligatory. Currently research into mouthing in CSL is rare, and we are ill-informed of the functions of mouthing in CSL, even less of its role in a particular sentence type. It is important to know the features of mouthing of CSL in everyday language settings. In order to narrow down the scope of discussion, the present study focuses on the discussion of mouthing in a particular sentence type: interrogative, trying to investigate the relation between manual sign question markers and correspondent mouthing within a single sign and beyond. It is expected that: 1) in

closed class question words, mouthing plays a key role; 2) on the syntactic level, some mouthing can be used as a question marker.

4.2. Research Questions and Data Analysis

This section contains a discussion of my research questions and the data collection and annotation, as well as a description and analysis of the data.

4.2.1 Research Questions

According to Lin (2015), CSL manual question markers consists of content-question (Q) signs and polar particles. This chapter tries to see the correlation between mouthing and these question signs. The main Q signs are singled out for the convenience of further investigation, as shown in the Figure 4-1 and Figure 4-2:





WHAT 'Index finger-shaking'		HOW-MANY 'five-finger wiggling'	
WHO 'wiggling of fingers over the face'		HOW 'Wiggling of the L handshape'	

Figure 4-1 Top four WH signs with pictures and simple description





YES 'index and middle finger crossed'		PU 'palm up movement'	
HAVE 'index finger bending inwards'		NOT-HAVE 'Zero hand shape shaking'	

Figure 4-2 Top four particles with pictures and simple description

The questions that this research examines:

- 1) The frequency of mouthing as well as other mouth action that co-occur with Q signs, which can be categorized into WH question signs and particle signs.
- 2) The morphological roles of mouthing in relation with Q signs as well as with other non-manuals.
- 3) The spread of mouthing in interrogative sentences and their syntactic function.
- 4) Whether mouthing is a code-mixing phenomenon in CSL or is part of the sign language itself.

4.2.2 Data and Annotation

The data were collected from 27 deaf people, with ages ranging from 18 to 75, mainly composed of middle-aged subjects, 12 females and 15 males. All of them live in the deaf community and were born deaf or became deaf before the age of 3 years. They were recorded by a Sony 320 DV and sometimes by 2 recorders. Naturalistic methodology was adopted. All data were collected when the deaf subjects were chatting in the park, over tables or in a party. On such occasions, most of the time they were relaxed and at ease when they were video-taped by low-profile DVs at a non-intruding distance.

During the analysis of the data, three conditions of mouth action in interrogatives, around the question signs in particular, are annotated: mouthing, mouth gesture and non-mouth action. As for mouthing, Crasborn *et al.* (2008) offers a working definition, which is adopted in the chapter accordingly: 1) mouthing that is borrowed from a spoken language, and 2) mouthing that is lexically associated with the manual component of the sign. So accordingly, the above principles also applied to the identification of CSL mouthing: mouth action could be traced to some particular spoken Chinese word, whether these sounds could be heard or were visible though not voiced out, judged by the deaf annotators. And if the mouth was in a resting position, for example, closed or in a neutral position, or they were doing something else, chewing or others, they were judged as non-mouth actions. Non-mouth actions were counted when the condition of the mouth over a Q sign could not be classified into either mouth gesture or mouthing. While if the mouth was active but was not relevant to any spoken elements, they were treated as other mouth actions, or mouth gestures. On annotation, 373 instances of mouthing were found, as well as 37 occurrences of mouth gesture and 207 instances of non-mouth action concurrent with question signs. We could find that mouthing instances account for 60% of the total occurrence, and 34% the mouth was resting. Mouth gestures only constituted 6% of all occurrences with signs. The following section deals with details of all the distribution of mouth action in specific question signs.

4.2.3. Description and Analysis of the Data

4.2.3.1 General Description

First, refer to Table 4-1, the 4 top WH signs are listed given, the coding is the following,

WHAT, the first part, symbolizes the code, the second part is one English word to symbolize its basic meaning. Mo=mouthing, MA=other mouth action, NMA=non-mouth action. Chinese pinyin is listed to show the concurrent spoken Chinese. The concurrence of mouthing with all the main question signs is similar. This accounts for about 2/3 of all interrogatives, although there is a slight difference among various WH question signs.

Table 4-1 Distribution of mouth action with CSL WH signs

Q SIGNS	TOTAL	Mo	PERC.	MA	NMA	PERC.2	CHINESE PINYIN
WHAT	263	156	59.3%	16	91	34.6%	shenme, shei, nali
HOW-MUCH	86	53	61.6%	5	28	32.6%	duoshao, ji
WHO	32	20	62.5%	1	11	34.4%	shanin, shui
HOW	21	15	71.4%	2	4	19.0%	zenme
Summary	402	244	60.7%	24	134	33.3%	

Secondly, Table 4-2 shows the distribution of mouth action with particles. PU is named after its phonetic features, i.e. palm-up. This is an exception due to its ambiguity in meanings. Lin (2015) has made a preliminary investigation of CSL interrogatives mainly based on naturalistic data and finds that there are many particles that act as supplementary interrogative question markers, which are mainly distributed in polar questions, occurring in one third of polar questions. However, the rich distribution of particles is believed to be influenced by spoken Chinese. And these particles are in the process of grammaticalization or lexicalization, and their grammatical roles are also different. Here, we show their concurrence with instances of mouthing and other actions of the mouth. Tables 4-2 shows that the percentage of mouthing with various particles, ranges from 20% to 100%, however, some occurrence is not statistically significant due to the poverty of the data. When we see the top 4 particles, i.e. PU (69.6%), HAVE (82.6%), YES (55.4%), NO (66.7%), the percentage of mouthing concurrent with particles is above half of the total, and with reference to the total distribution, they also account for 62% of the whole.

Table 4-2 Distribution of mouth action with CSL particles

PARTICLES	TOTAL	Mo	PERC.	MA	NMA	PERC.2	CHINESE PINYIN
PU	46	32	69.6%	0	14	30.4%	
GOOD	10	5	50.0%	1	4	40.0%	hao
HAVE	23	19	82.6%	2	2	8.7%	you
YES	56	31	55.4%	1	24	42.9%	shi, a
CAN	11	4	36.4%	3	4	36.4%	neng, keyi
NOT	5	1	20.0%	2	2	40.0%	bu, vu
NO	21	14	66.7%	0	7	33.3%	mei, me, vu
BAD	6	4	66.7%	0	2	33.3%	bu xing
WHY-NOT	7	5	71.4%	0	2	28.6%	fou, zhu sha
GOOD-NOT-GOOD	8	6	75.0%	0	2	25.0%	hao bu hao
HAVE-NO-HAVE	4	4	100.0%	0	0	0.0%	you mei you
Summary	178	110	61.8%	9	59	33.1%	

To sum up, over two thirds of question signs co-occur with mouthing, and almost 30% of the time, they are signed without obvious mouth action. Other mouth action is not statistically significant.

4.2.3.2 Analysis of Non-Mouthings

As is shown above, one third of the question words are not concurrent with mouthing. So what happened in those cases? We have divided them into two basic types: one is other mouth action, the other is no obvious mouth movement. The former is not in the scope of our discussion. Now let us further look at the case of the latter. We find we could categorize them into three types: Type 1: mouth is at the resting position; Type 2: mouth is not available owing to chewing food, etc. In (1) below, HOW-MUCH is not covered by its mouthing because the signer's mouth was occupied by water when she talked; Type 3: It is occupied by other mouthing, or a spread of an earlier mouth action. In (2) below, WHAT co-occurs with the mouthing of PUT-ON, *chuan* (PUT-ON) rather than its correspondent *shen me*. While in (3) below, the mouthing of *yu* 'fish' in Chinese at the beginning of the sentence spreads to the end of the sentence, because in Mandarin Chinese, 'fish' is a mono vowel, it (including its mouth shape) can hold and last, thus here the question word is not covered by its correspondent mouthing. On counting the frequency, Type 1 accounts for 60%, and Type 3 accounts for 35% in the whole data. Therefore, it appears that deaf signers tend to sign question words with correspondent mouthing, if the correspondent fails to co-occur, more often than not, either the mouth is at rest position or they are affected by the spread of adjacent mouthing, or other non-linguistic action.

duoshao

- (1) TUITION PAY HOW-MUCH
'How much should be paid for the tuition?'

chuan

- (2) PT GIRL PUT-ON WHAT DRESSING GIRL
'What dressing did that girl put on?'

yu

- (3) FISH EAT GOOD WHAT
'What is the good of eating fish?'

4.3. Function of CSL Mouthings

In Section 4.3, instances of mouthing will be dealt with from different perspectives. Section 4.3.1 analyzes mouthing from a phonologically point-of-view. Section 4.3.2 deals with morphological mouthing, and Section 4.3.3 is concerned with syntactic mouthing as well as pragmatically. Section 4.3.4 deals with the problem of free mouthing. Broadly, mouthing will be discussed within the dichotomy of bound types and free types.

4.3.1 Phonological Features of Mouthing

Since basically Chinese words are monosyllabic, it means that each syllable can be symbolized as one whole word. And as an isolating language, there is no inflection within words, its economy and effectiveness is conducive to the adoption of Chinese deaf signers for mouthing in communication. Question words in spoken Chinese are limited. Most of them are intelligible and easy to pronounce. For example, *shen me* WHAT and *sui* WHO. Particles, like *a*, *ma*, and *ba* are discernable and distinct. Thus signers often pronounce question words. Still we find more often than not that there is not complete projection between mouthing instances and their spoken counterparts. The following situations occur in mouthing: a) some parts of the syllables, or even whole syllables are dropped, normally difficult consonants, such as a nasal at the end. Or when a compound sign is too long, part of it is often dropped, as is shown in (4) below, WHEN is a compound with four syllables, the signer only voiced out the first and third syllables; b) some phonemes are mixed together, such as *s* and *z*. even within a question sign like A-NOT-A question word, FINE-NOT-FINE, when it is fully pronounced, should be *mei bu mei*, here in (5) below, the mouthing of two instances of *mei* disappear, and mouthing of the middle NOT remains co-occurring with a head shake, forming a blending of mouthing and signs within one word.

- shesh
- (4) GO GUILIN PLAY GUILIN WHEN
‘When will you go to Guilin (place name) for fun?’

- bu
- (5) WATCH LANTERN-FAIR HOW FINE-NOT-FINE
‘Isn’t it nice to watch the lantern fair?’

Besides, the Chinese dialect seems to affect features in mouthing. The data was collected in Shanghai and most of the signers are Shanghai locals. Inevitably, many of them are mouthing with Shanghai dialect. Typical Shanghai question words are *sha* WHAT, particles are *va*, and *me*. As is shown in (6), WHY-NOT co-occurs with *va*.

- va
- (6) HAVE-LUNCH GO NO?
‘Have you not had lunch?’

This phenomenon occurs among middle-aged (and above) signers. The younger generation, born after the 1990s, tend to exclusively use Mandarin (standardized Chinese) in mouthing.

4.3.2 Morphological Roles of Mouthing

In many cases, mouthing seems to be redundant semantically, however, in some occasions, it is pragmatically significant. In (7a), the first WHAT is a quick movement without mouthing, however. The signer repeated his question by slowing down and signing WHAT with mouthing. So here mouthing helps the signer make himself understood more clearly.

Senme

(7a) DO WHAT-KIND-OF MACHINE BELONG TO WHAT MACHINE?

‘What machine does he do, belong to what machine?’

The status of the spoken element, mouthing in sign language, has been debated intensively. It helps when we combine the question with gesture from the angle of spoken language. Now gesture has been widely believed to be a composite part of language in combination with spoken parts. Since the mouth is part of our body, it can be used in sign language to play the part of gesture in spoken language. Though it is limited in amplitude of movement and hard to identify, its movement is economical and quick and can be used simultaneously with manual signs.

From the other side, sometimes instances of mouthing is the only disambiguators in a sentence. As we can see, the relationship of signs and mouthing are not in a one-to-one projection, rather multiple-to-multiple as shown in the Chinese pinyin of Table 4-1 and Table 4-2. WHAT has various counterparts of mouthing due to its own polysemy, thus *shen me* ‘what’, *sui* ‘who’, *na* ‘where’ are found co-occurring with WHAT. However, it appears that the choice of the different instances of mouthing is not arbitrary. Rather mostly, mouthing is the only element to disambiguate between minimal pairs. Consider (7b):

(7b) HOW GO WHERE (Note that the same manual sign is used for HOW and WHERE.)

‘What and where to go?’

什	么	啊	去	哪
<i>se</i>	<i>me</i>	<i>a</i>		<i>na</i>



We find the same sign WHAT appears both at the beginning and the end of the sentence, however, the instances of mouthing are different. The initial one is *sen me* WHAT, the final mouthing is *na* WHERE. It is the mouthing that makes the difference. Actually, the signer apparently seems to articulate the mouthing emphatically with an exaggerated mouth shape. Furthermore, *a* functioning as a filler is added the end of the initial WHAT.

To sum up, though the mouthing of question words does not fully correspond to spoken words, they are redundant semantically and seem to function pragmatically in many cases. From another perspective, they seem to form part of question words, on some occasions, they are indispensable.

4.3.3 Mouthing Sentences

Normally, as we have seen, mouthing is bound with its correspondent sign form and can

function independently in a sentence. Is there any case in which mouthing can form a whole sentence without being accompanied by a hand movement? The answer is yes. In (8) below, the signer's hands are occupied over the table, she only relied on mouthing of WHY, which is a three-syllable word, i.e. *wei-sen-me*, ended with a filler word *a*, accompanying non-manual movements, i.e. brow movement. I consulted the signer and her friends and was told that they often use mouthing in short interrogatives for convenience. And since they are quite familiar to one another's mouthing signals, it would not cause any misunderstanding. Another reason is that the situation makes it accessible since they sit close together and can see quite clearly one another's mouth action.

(8) WHY?
'Why?'

Manual sign absent			
WEI	SHEN	ME	A
<i>wei</i>	<i>sen</i>	<i>me</i>	<i>a</i>



4.3.4. The Function of Free Mouthings

As is shown above, mouthing instances of Q words are bound morphemes, since they normally co-occur with Q signs, and roughly their scope overlaps with Q signs. However, there are three cases of mouthing that seem to be free morphemes, they can combine with Q words, and also function independently. Different from English and other European languages, spoken Chinese is rich with Q particles. Still more, there are several Chinese modal particles that also find their ways to CSL through the mouthing: 啊 *a*, 吗 *ma*, 吧 *ba* and 伐 *va*. All these words have several things in common: they are monosyllabic, the vowel is *a*, and the consonants of the latter three are all vision-friendly bilabial consonants, which rank at the top of the frequency list (Luo 2010).

First, they can be bound with certain Q manual signs: *a* co-occurs with YES, which has another mouthing *shi* when YES is a conjugator rather than a question marker and according to the data, all 31 occurrences of YES are accompanied by mouthing of *a*; *ma* is a primary polar question marker in spoken Chinese, and the mouthing of *ma* sometimes co-occurs with the sign of the question marker '?. In the following section, we will focus on the typical free mouthing of *a*.

4.3.4.1 The Lexical Role of *a*

The form *a* is widely distributed both in polar questions and content questions. 啊 (pronounced

as long *a*) seems not to have a fixed correspondent sign. Lu (1999) argues that it is an interjection and typically occurs at the end of sentences and functions differently in different types of interrogatives. When it is used in content questions, alternative and negative questions, it functions as an optional buffer word that is to said to relax the manner of speaking, while when it is used in polar questions, it functions as a compulsory question marker, if question intonation is absent. (Lu 1999: 46).

As was also mentioned above, the manual marker YES almost always co-occurs with mouthing of *a* and normally it stays at the end of the interrogative as a question marker. There are two manual signs (YES) that are the same in (10), however, the mouthing of the first YES is *shi*, which also functions here as an auxiliary verb like *be* in English, while the one at the end is concurrent with *a*, functioning as a question marker. In all the data, almost all YES co-occur with *a*. The mouthing of *a* also occurs at the end of content questions as shown in (9) or polar questions, see (10).

(9) ‘Who is that female leader wearing glasses, eh?’

<i>lindao</i>	*	<i>nu</i>	<i>a</i>	<i>a</i>
LEADER	WHO	FEMALE	GLASS	YES



(10) ‘Is the English you are taught (in your school) international, right?’

	*		<i>shi</i>	<i>guoji</i>	<i>a</i>
NOW	READ	TEACH	YES	INTERNATIONAL	YES




4.3.4.2 Free *a* and Its Spread Beyond Words

In the data we find that *a* is more than a bound phoneme. It seems to play various roles in CSL interrogatives. In (11), there are three occurrences of *a* in the sentence. The first *a* is followed by WORK, which seems not to co-occur with any sign, rather it followed SPRING to the initial movement of WORK. The second instance of *a* spreads between HAVE (over SAME) and the initial movement of REPORT, which seems not to belong to any sign word, because the correspondent mouthing of SAME should be *yi yang* SAME in Chinese). Finally, the third instance of *a*, is a sentence final mouthing. It does not correspond to any sign, and follows the last manual sign HAVE and holds for a while in the end. All these three *a*


can be seen as independent mouthing. When we measure the duration, the final *a* is much longer. Functionally, the first *a* functions as a topic marker and the second *a* can be regarded as a prosodic marker while at the same time, the final *a* functions as an independent question marker that co-works with manual marker HAVE and other non-manuals. It seems that mouthing *a* is interwoven with manual signs of CSL interrogatives.

(11) ‘Did Zhu Dechun, who has worked similarly, also registered for (the match)?’

MORAL	SPRING		WORK	HAVE
<i>Zhu de</i>	<i>chun</i>	<i>a</i>	<i>s-ban</i>	<i>you</i>
				
<i>a</i>	<i>bao</i>	<i>ming</i>	<i>you</i>	<i>a</i>
SAME	REPORT	NAME	HAVE	

The frequency of *a* spreading at the end of the interrogatives seems rather high, which often spreads progressively over more than two signs. As can be seen in (12), *a* spreads from the end of NO to the end, crossing DRUG-TAKING.

(12) ‘Wouldn’t the Canadian cops catch those drug takers?’

CANADIAN		COP	CATCH
			
NOT	<i>a</i>	DRUG-TAKER	<i>a</i>

4.3.4.3 Other Free Mouthings

Besides the typical *a*, there are other sentence-final particles that function similarly in CSL interrogatives. The mouthing of *ma* mainly appears in polar questions, mainly functioning

independently at the end of sentences as a supplementary question marker. On a few occasions, it sometimes co-occurs with Q signs, like YES, as in (13).

- (13) TIME DIFFERENT YOU BE THREATEN ME $\overline{\text{YES}}$
 ‘Now since Time is different, are you threatening me?’

The mouthing of *ba* also appears in polar questions and occasionally co-occurs with HAVE, HAO, etc., while *va* seems to be a mouthing originating from the Shanghai dialect, as we saw in (12). See (14).

- (14) PAST YOU-PT READ TIME SING $\overline{\text{HAVE}}$
 ‘Did you sing songs at the high school in the past?’

However, *a* is distributed most widely in each of the several free occurrences of mouthing.

4.4. Findings and Conclusion

4.4.1 Findings

Mouthing is widely distributed in CSL interrogatives. Over two thirds of Q words are signed with correspondent mouthing. Phonologically, mouthing which occurs over Q signs are characterized by Chinese Q words, which are mainly monosyllabic and quite visible. Morphologically, the spread of instances of mouthing is bound with the signs. Still, there are a few occurrences originating from spoken Chinese, including *a*, *ma*, *ba* and *va*, which beside their concurrence with Q signs, also function independently, appearing in between signs, or spread over several signs. Therefore, they can be classified into two types: bound morphemes or independent morphemes. The former mainly function as pragmatic markers or as disambiguation within a Q sign, and in some extreme cases, can function as a whole sentence with non-manuals. The latter can also function as discourse markers, or optional clause-final or sentence-final question markers.

4.4.2 Conclusion

The wide distribution of mouthing interwoven in CSL interrogatives has shown their significance. They function at all levels of CSL interrogative constructions, at the morphological level as a part of the sign, and at the syntactic level, some of them function as independent question markers or even on some special occasions constitute the whole sentence in combination with other non-manuals.

This chapter has documented and described the forms and functions of mouthing that occur with question signs in CSL interrogatives. The influence of spoken Chinese as well as Chinese dialects on CSL interrogative constructions is not only reflected on manual parts of CSL, but also on occurrences of mouthing, which form an important part of interrogative

constructions in CSL. Interestingly, mouthing in CSL interrogative constructions like *a* tends to be in a process of grammaticalization in CSL. However, as this chapter focuses on the research of mouthing with respect to interrogatives, for further research, we need to study CSL mouthing in a wider perspective. A large-scale CSL corpus is needed to make a wider and more in-depth research on the functions of mouthing in CSL.

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