Against [lateral]: Evidence from Chinese Sign Language and American Sign Language

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1. Introduction

American Sign Language (ASL) signs are claimed to be composed of four parameters: handshape, location, movement (Stokoe 1960) and palm orientation (Battison 1974). This paper focuses solely on handshape, that is, the configuration of the thumb and the fingers in a given sign. Handshape is significant in ASL and Chinese Sign Language (CSL); that is, minimal pairs exist for handshape in each. Thus, the two ASL signs in (1) differ in one parameter: the handshapes are different, but the location, palm orientation and movement are the same.

1. ASL minimal pairs for handshape

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<table>
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<tbody>
<tr>
<td>APPLE</td>
<td>CANDY</td>
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Similarly, the two CSL signs in (2) differ in one parameter: handshape.

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1Thanks are due to many people for help with this research. John D'Andrea, Zhang Da Yin, Zhang Shi and especially Peng Long and Jane Tsay translated the CSL dictionary from Chinese into English. Tom Bourgeois, Colleen Carmean, Megan Crowhurst, Lee Fulmer, Adrienne Lehrer, Husni Muadz, Wendy Wiswall and especially David Corina, Dick Demers, Larry Hagberg, Peng Long, James Myers, Diane Ohala and Wendy Sandler provided comments on earlier drafts or discussed the ideas in this paper with me at length. All pictures are from China Deaf and Blind Association, 1960 and James Myers. This work has benefitted from the observations and constructive criticism of Mike Hammond and Diana Archangeli. Errors are my own.

2Following convention, glosses of ASL signs are written in capital letters.

3Chinese glosses are written in capital letters. English translations are provided in single quotes.
2. CSL minimal pairs for handshape

FEICHANG 'very' MEIYOU HEN DUO 'not much'

A logical next question asks if handshapes are further divisible into parts; more specifically, are handshapes composed of distinctive features? This question is not new; in fact, researchers have made many proposals for ASL handshape features (Lane, Boyes-Braem and Bellugi, 1979; Mandel, 1981; Liddell and Johnson, 1985; Sandler, 1989; Corina and Sagey, 1988 and others). This paper focuses on the proposal of Corina and Sagey (1988). In Section 2, I outline the proposed system for the distinctive handshapes of ASL, of which [lateral] is a part. Then using data from ASL and CSL, I give three arguments in support of the claim that there is not sufficient justification in ASL or CSL for the feature [lateral]. First, I show in Section 3 that the prediction which follows from the claim that [lateral] applies only to the thumb, namely that the thumb behaves differently from the other fingers, is not borne out by CSL data. Second, I argue in Section 4 that since other features (proposed by Corina and Sagey, 1988) can derive the same phonetic effects as [lateral], [lateral] is unnecessary to describe thumb features in either ASL or CSL. Third, in Section 5, I use ASL and CSL data to argue that the notion of fingers as "specified" or "unspecified", although intuitively pleasing, should be discarded. If this notion cannot be used, the feature [lateral] does not uniquely identify a particular set of handshapes. I show that CSL data suggests that two other features, [contact to palm] and [contact to thumb] are independently needed. With these two features, and the exclusion of [lateral], the handshapes of both ASL and CSL can be explained. In Section 6, the arguments against [lateral] are summarized.

2. Corina and Sagey's (1988) Model

In this section I give an overview of what I take to be the essentials of Corina and Sagey's (1988) proposal for ASL handshape features. I briefly describe the features and what they do, and note some restrictions on the way they apply. Finally, I discuss the generalizations that [lateral] was proposed to capture.

2.1 Features and Restrictions

Any feature system must account for the fact that there are four possible configurations of the fingers in ASL. They can be open, closed, bent or curved, as shown in (3).

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4Since all CSL data in this paper were taken from two dictionaries of CSL, the observations based on this data remain tentative and are subject to further research.
3. 

a. open  
b. closed  
c. bent  
d. curved  

To derive these configurations, Corina and Sagey (1988) propose two binary features given in (4).

4. 

[ +bent]= flexed at the knuckle closest to the palm 
[ +curved]= flexed at the knuckle/s closest to the fingertip 

Open hands are neither bent nor curved: [-bent, -curved]. Closed hands are both bent and curved: [+bent, +curved]. Hands which are bent are [+bent, -curved], and curved hands are [-bent, +curved]. Several more features are necessary to describe the handshapes of ASL. These are listed in (5) and pictured in (6).

5. 

a. [+spread] = two or more fingers spread apart 
b. [+crossed]= index and middle cross over each other 
c. [+lateral]= when the thumb is across the palm, perpendicular to the fingers  

6. 

a.  

index and middle [+spread]  

b.  

index and middle [+crossed] 

c.  

thumb [+lateral]  

The restrictions on the application of the features [bent], [curved], [spread] and [lateral] are stated in (7):

7.  

[bent], [curved], [spread] can apply to the index, middle, ring and pinky  
[lateral] can only apply to the thumb  

The fact that [lateral] can only apply to the thumb predicts that the thumb behaves differently from other fingers in the phonologies of sign languages, a prediction that I argue in Section 3 is incorrect.
2.2 What the feature [lateral] does

In this section, I explain how Corina and Sagey (1988) use the feature [lateral] to delineate two sets: ASL handshapes which are used in signs and participate in monomorphemic handshape change in (8), and ASL handshapes which are used only in fingerspelling and do not participate in monomorphemic handshape change, in (9).

8.

According to Corina and Sagey (1988) the thumbs in the handshapes in (9) are [+lateral]. Although the positions of the thumbs in the handshapes in (9) closely resemble those in (8), they are not considered [+lateral]; all of the thumbs in (9), are unspecified and therefore have no features. This is discussed further in Section 5.

3.0 The Thumb As a Finger

In this section, I give my first argument for discarding the feature [lateral]: that the use of a separate feature for the thumb wrongly predicts that the thumb behaves differently from the other fingers.

The feature [lateral] applies only to the thumb, since only the thumb can be positioned across the palm. Clearly, the other fingers have no such physiological possibility. The thumb feature [lateral] captures this physiological fact. However, physiological facts do not necessarily play a phonological role in languages. For example, in English /p/ and /ph/ are phonetically distinct, but are not phonologically distinctive. Therefore the features controlling aspiration do not play a role in English phonology. Not every phonetic distinction must be reflected in the features.

I now turn to phonological evidence from CSL handshapes which suggests that the thumb behaves in similar ways to the other fingers.

3.1 Features apply to all the fingers similarly

In this section I offer four pieces of evidence for the claim

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5 Monomorphemic handshape change refers to some handshape \( x \) becoming another handshape \( y \) monomorphemically, cf. 13, 20 (CSL) and 18 (ASL).
that the thumb does not act differently from the rest of the fingers. All have to do with the fact that features apply to all the fingers in similar ways. First, in CSL, the thumb patterns with other fingers in the sense that each of the fingers, including the thumb, can be open while the rest are closed. Handshapes that illustrate this are given in (10a)-(10e). The data in (10) reveals a gap; the ring finger does not act independently in CSL.

10.

<table>
<thead>
<tr>
<th>Handshape</th>
<th>Chinese gloss</th>
<th>English</th>
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<tbody>
<tr>
<td>thumb alone</td>
<td>HAO</td>
<td>'good'</td>
</tr>
<tr>
<td>index alone</td>
<td>DONG</td>
<td>'east'</td>
</tr>
<tr>
<td>middle alone</td>
<td>MOSHUI</td>
<td>'ink'</td>
</tr>
<tr>
<td>ring alone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pinky alone</td>
<td>FANDUI</td>
<td>'oppose'</td>
</tr>
</tbody>
</table>

Second, the feature value [+curved] can apply to most of the fingers, including the thumb, in CSL. The data in (11a-b) reveals that the thumb and the index can both participate in a monomorphemic handshape change, in which the second handshape is [+curved]. The data reveals a gap: the middle and ring fingers are

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6 Glosses of CSL signs which use the handshape, followed by an English translation, are provided. Pictures of these CSL signs (and all those discussed henceforth) are provided in the Appendix.

7 The ring finger does act alone in Japanese Sign Language and Taiwan Sign Language signs for "sister" (Smith and Ting 1979, Mandel, 1981).
not attested as participating in such a change. Finally, the pinky is not attested as a handshape change, but it can be [+curved] as shown in (11e).

11.  
a. thumb changes from open to curved  JIEHUN  'marry'
b. index changes from open to curved  CHONG  'worm'
c. middle  
d. ring  
e. pinky in a curved position  SHANGHAI  'Shanghai'

Third, the feature [spread] can apply to the thumb and the index, just as it applies to the index and middle. First, I show in (12a) that the index and middle can be either spread or unspread. Similarly, if the thumb and index are the active fingers, they can be either spread or unspread as in (12b).

12.  
a.  
spread   unspread  
spread JIE SHAO  'introduce'  
unspread FAN ZUI  'commit crimes'  

b.  
spread   unspread  
spread YONG GAN  'brave'  
unspread FEICHANG  'very'

Fourth, I show that when a monomorphemic handshape change involves changing the values for the feature [spread], it applies no differently to the thumb than the other fingers. For example, consider the handshape changes in (13a-c).

13.  [+spread] -----> [-spread]  
a. all fingers  YONG JI  'crowded'
b. index and middle  JIAN DAO  'scissors'
c. thumb  DUI  'right'

In this section I have outlined four ways in which the behavior of the thumb parallels the behavior of other fingers. Thus, it does not seem reasonable to posit a separate feature such as [lateral] for the thumb.

4. Other features will do what [lateral] does  
We saw evidence in Section 3 to say that the thumb behaves no differently from the fingers and therefore does not need to have a separate feature. In this section, I show that other less
controversial features will derive the same phonetic effect as [lateral].

Recall that a [+lateral] thumb crosses the palm perpendicular to the fingers (Corina and Sagey 1988) (cf. (9)). I claim that these thumb shapes, like those in (8), can be derived by the features [bent] and [curved]. The feature [+bent] should be used uniformly to refer to the position of any finger when it is folded forward, closer to the palm. This is illustrated in (14a). Thus when the thumb is in such a position, as in (14b), it should be considered [+bent].

14.

\[\begin{array}{ll}
\text{a.} & \text{fingers [+bent]} \\
\text{b.} & \text{thumb [+bent]}
\end{array}\]

The feature value [+curved] should be used uniformly to refer to the configuration of the fingers when they are flexed at the joint/s closest to the fingertips (cf. (3d)). One effect when the index, middle, ring or pinky are [+bent] and [+curved] is that they are closed to the palm. However, if the thumb is [+bent] and [+curved] it ends up in the same position as [+lateral] as shown in (15).

15.

In this section I have tried to show that combining the features [bent] and [curved], which are independently needed, will derive the same phonetic effect as [lateral].

5.0 [lateral] does not uniquely identify a set of handshapes with shared properties

We saw in Section 4 that thumbs which are [+bent] and [+curved] are phonetically identical to thumbs which are [+lateral]. It seems reasonable that all thumbs in that position should be considered to be the same feature. Returning to the question of the thumbs in (8) and (9), recall that Corina and Sagey's (1988) reason for saying that the thumbs in (8) are not lateral, and in fact have no features at all, is that they are "unspecified". The distinction between "unspecified" and "specified" follows a distinction made by Mandel (1981), originally called "selected" and "unselected". I discuss this distinction below.

5.1 Mandel's selected and unselected fingers

Mandel's (1981:82) Finger Position Constraint states that most
ASL handshapes contain no more than two "groups" of fingers. An example of a handshape with one group of fingers is given in (16); note that all of the fingers are positioned the same way. Compare this with the handshape with two groups in (17). One group is composed of the thumb and index (which are closed to each other). The second group is composed of the middle, ring and pinky (which are completely open, i.e. not flexed at any joint).

16. 

one group handshape

17. 

two group handshape

Mandel (1981) claims that the thumb and index in (18) are the "selected" fingers, since they are "active". For example, in the ASL sign CAT, only the thumb and index change handshape as shown in (18).

18. 

ASL CAT

The middle, ring and pinky are the "unselected" fingers of the handshape in (18), since they are inactive, for example, in ASL CAT. According to Mandel (1981), selected fingers can be in any configuration but closed, as long as they are all in the same configuration. Unselected fingers can be either open or closed, as long as they too are all in the same configuration.

Consider the handshape in (19), in which all of the fingers are closed.

19. 

Since all of the fingers in (19) are closed, they cannot be selected, and are presumably unselected. If this is true, then (19) is wrongly predicted not to undergo any handshape change in

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8I have argued elsewhere (Ann, 1990) that the majority of CSL handshapes also obey the two-group constraint.
monomorphemic signs, since unselected fingers are not allowed to change handshape monomorphemically. However (19) changes handshape monomorphemically in many signs in ASL and CSL such as the CSL signs in (20).

20.  

FANG QI 'give up'  
FANG SONG 'disperse'

The paradox is that the fingers in (19) must at once be both selected and unselected. Mandel's (1981) solution was to call (19) an exception, undesirable since (19) is very common in ASL and CSL and undergoes monomorphemic handshape change.9

5.2 The Problem with "specified" and "unspecified"

In this section, I outline the problem with the notion of "selected" and "unselected" (hence "specified" and "unspecified") fingers. Corina and Sagey (1988) claim that the index, middle, ring and pinky in ASL (19) are specified, with the thumb unspecified. Why should all of the fingers in (19) except the thumb be specified? The ASL and CSL facts of (19) are that all of the fingers are in the same configuration, and that when (19) changes handshape, becoming (21), all of the fingers change shape, not all but the thumb.

21.  

In light of these observations, it would seem that the notion of "specified" vs. "unspecified" is not fully clarified and should be discarded. If these notions are discarded, then all thumbs positioned across the palm perpendicular to the fingers (i.e. all of the handshapes in (8) and (9)) should be [+bent] and [+curved] (by the original Corina and Sagey (1988) proposal [+lateral]). However, if the handshapes in (8) and (9) are not distinguished, then significant generalizations about each set are lost. (Recall that the handshapes in (9) are used in ASL only in fingerspelling, and they resist monomorphemic handshape change. The handshapes in

9Sandler (1989) considers handshapes which undergo handshape change as "primary".

10Corina and Sagey (1988) do not treat (19) as an exception.
A possible solution to this problem lies in the observation that the CSL data demands that contact features be introduced. If we assume that the handshapes in the dictionary are all distinctive, and therefore not interchangeable, two independently needed contact features ([contact to thumb] and [contact to palm]) for CSL are needed. There are signs (cf. (22a-b)) in which fingers are [+bent] and [+curved] but do not contact the palm.

22. a. ![Image](BAO_HU_protect.png) b. ![Image](BU_QIANG_rifle.png)

Similarly, there are CSL signs in which fingers which are bent and curved but not contacting the thumb, i.e. (23a), and signs in which fingers are [+bent] and [+curved] and are contacting the thumb (23b).

23. a. ![Image](DAI_BU_arrest.png) b. ![Image](O.png)

If these CSL facts obtain in ASL, the addition of these two contact features can be used to explain why the handshapes in (9) don't participate in handshape change. The handshapes in (9) resist monomorphic handshape change because they violate the "two-group constraint". For example, fingerspelled N has two groups: the first group is composed of the index and middle, which are [+bent], [+curved] and [+contact to thumb], the second group is composed of the ring and the pinky which are [+bent], [+curved] and [+contact to palm]. The third group is composed of the thumb which is [+bent] and [+curved]. All of the handshapes in (9) would be composed of the same features but with different fingers having these features. For example, the groups in fingerspelled M would have the same features as the groups in fingerspelled N, but the first group would be composed of the index, middle and ring, the second group composed of the pinky alone and the third group would be composed of the thumb alone. The handshape in fingerspelled E is a counterexample, since by my feature assignments it will have at most two groups of fingers. It ought to participate in
monomorphemic handshape change, since it doesn't violate the two-group constraint, but it does not.

6. Conclusion
I have argued that the feature [lateral] is not necessary for three reasons. First, the thumb should not have a separate feature, because it does not behave in ways different from the rest of the fingers. Second, other features are independently needed and can capture the same phonetic facts about CSL handshapes. Third, the generalizations that were captured with [lateral] can be captured with two independently needed devices: contact features and the two-group constraint.

APPENDIX

10a. HAO  'good'

10b. DONG 'east'

10c. MOSHUI 'ink'

10d. FANDUI 'oppose'

11a. JIEHUN 'marry'

11b. CHONG 'worm'
11e. SHANGHAI
'Shanghai'

12a. JIE SHAO
'introduce'

FAN ZUI
'commit crimes'

12b. YONG GAN
'brave'

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13. YONG JI
'crowded'

JIANDAO
'scissors'

DUI
'right'
BIBLIOGRAPHY


