Paradigm Leveling in Japanese Sign Language and Related Languages

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10. Paradigm Leveling in Japanese Sign Language and Related Languages

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Abstract

This chapter focuses on cases of apparent paradigm leveling found in varieties of three related sign languages, namely Japanese Sign Language (JSL), Taiwan Sign Language (TSL) and Korean Sign Language (KSL). Paradigm leveling, or the equivalent of it in sign languages, has not been documented, part of the reason being that it is not common for grammatical features of sign languages to be described as paradigms. However, in some semantic domains where the number of the constituent lexical items is limited, such as kinship terms, number expressions and days of the week, it is sometimes found that a phonemic change takes place across multiple members, sometimes in all members. We argue that such changes can be perceived as parallel to morphological changes that occur in paradigms in spoken languages, such as pronouns, in the sense that a change is associated with an abstract notion shared by the members in common.

10.1. Introduction

10.1.1 Overview

In this chapter, we try to capture patterns of identifiable change in some paradigms in historically related languages, namely, Japanese Sign Language (JSL), Taiwan Sign Language (TSL) and Korean Sign Language (KSL). The analysis is based on a comparison between old forms appearing in limited but available sources (Sadobaru 1909 [1902], Matsunaga 1937, and Peng 1976) and the corresponding ones found in modern varieties of JSL, TSL and KSL. Data referred to and presented in this chapter were collected by Sagara from 2014 through 2017, while Kikusawa is responsible for writing the text. Two examples of partial leveling and two of full leveling will be presented, and factors that trigger the changes and the causes for limiting (or non-limiting) the spread of the changes will also be examined.

Paradigm leveling, or the equivalent of it in sign languages, has not been documented to the best of our knowledge. Part of the reason for this can be simply because it is not

common for grammatical features of sign languages to be described as paradigms. For example, "direction" verbs in sign languages have been analyzed as carrying "agreement" features (see Lillo-Martin and Meire 2011). In such analyses, typically, a sequence of descriptions of the relevant forms are provided and not an abstracted list or paradigm of agreement-marking forms. This is partially because the convention of presenting forms of sign languages is not to provide the transcription of phonemic structures of each form, but to describe the components of each morpheme typically with a photo or picture illustrating them. However, we claim that there are equivalents of what is traditionally known as "contamination" found in at least JSL, TSL and KSL. Contamination is defined as "leveling within a semantic paradigm, that is, a set of words or morphemes that belong to a class that is defined by some close semantic relationship" (Jeffers and Lehiste 1979: 175). A classic example is the Modern English word "father", the regular reflex of which would have had intervocalic *d* instead of *ð*, however, it is "generally assumed that a substitution was made (d → ð), because *father* belongs to a semantic set that includes such words as *brother*" (italic by the authors), which has intervocalic *ð* as a regular reflex of Proto-Indo-European *bhrātēr. This process is known to be "particularly common in words that generally occur in lists" (Jeffers and Lehiste 1979: 57–58).

Phonemic changes and replacements are found to have taken place in sign languages in a group of semantically related lexical items where the number of constituents is limited. The change takes place across multiple members, sometimes in all members belonging to the same domains. In this chapter, examples are presented mainly from number expressions, but also days of the week and kinship terms.

10.1.2 Background of the Languages

In this chapter, data from three historically related languages, namely, JSL, TSL and KSL are compared and examined. It is commonly known that deaf schools play important roles in the development of sign languages, for over 90% of hearing-impaired children are born to hearing, non-signing parents. It is therefore one of the characteristics of sign languages that they tend to be transmitted horizontally rather than vertically, which is different from how spoken languages are transmitted, for it is often the case that children learn sign language from their peers at schools (Fischer 2015). It is historically known that a variety of JSL was introduced to Taiwan and Korea during the era of Japanese occupation when deaf schools were founded in these areas (Smith 2005; Su and Tai 2009). The timing and specific locations of the introduction of JSL varieties in the two countries are summarized in Table 10-1. It is also known that, in addition, TSL subsequently has had influence of Signed Chinese in Taiwan, as a result of deaf school teachers from Nantong, China, teaching in Kaohsiung starting in 1949 and then also in Taipei and Tainan (Smith 2005; Ann 2003).

Table 10-1 Introduction of varieties of JSL to Korea and Taiwan

YEAR	PLACE	INTRODUCED VARIETY
1913	Seoul, Korea	Osaka and Tokyo JSL
1915	Tainan, Taiwan	Osaka JSL
1917	Taipei, Taiwan	Tokyo JSL

It is possible that there had already been signed languages and/or home- or village-signs existing in some areas in these countries. However, there is no documentation of such languages or manner of communication before the introduction of JSL and the details are not known (cf. Sasaki 2007: 131). On the other hand, currently used TSL and KSL are known to show many characteristics commonly shared with JSL or some varieties of JSL (Sagara 2014). By comparing shared and non-shared characteristics of these three languages, we should be able to identify changes that took place independently from one another in the past 100 years.

10.1.3 Notations for Describing Forms Applied in This Chapter

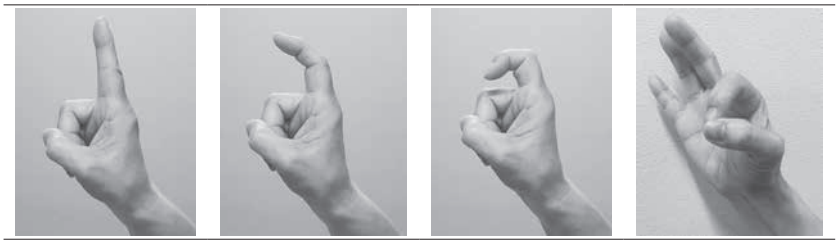
In sign language studies, signed forms are commonly represented with photos (or video clips) with explanatory description. However, a notation system is necessary for analyzing the structure of language. Such a system helps to have a way to transparently represent phonologically significant components in a systematic way, so that the forms can be compared objectively and also the similarities and differences of a set of forms can be generalized. Kikusawa and Sagara 2015 propose a notation system for the comparison and reconstruction of numeral expressions of JSL and related languages. This system partially follows that proposed by Kanda (1986) and Honna *et al.* (1985) but modified to more efficient application for analyses of historical changes. Signed forms are represented in this chapter following that system.

In this system, the four fingers from the index finger to the little finger are referred to as 1 through 4 respectively and the thumb is referred to as 5, as shown in Figure 10-1. When notated, they are represented in the order of 51234 reflecting the physical order of the fingers. This helps to capture changes that are, for example, results of assimilation to the shape, movement or some other aspect of the adjacent finger. Numbering fingers enables us to distinguish and describe the shape of each finger, which is significant when examining historical changes and yet cannot be described in such system as the Stokoe notation where a symbol is assigned to each hand shape as a whole.

Figure 10-1 Finger numbers

Figure 10-2 shows some example notations of the form of fingers. The symbol “S” indicates that the finger is straight, “B” is bent, and “P” is in a pinching position, with the number of the selected finger in the subscript position. The fingers that are not described are in the default (fist) position. The description applies to the dominant hand unless specified otherwise.

Thus S_1 indicates the handshape where the index finger is straight and others are all in the default position as shown in (a) in Figure 10-2, while, B_1 indicates the handshape where the index finger is bent as in (b). The handshape in (c) is also notated as B_1, for the distinctive feature in this context is whether the finger is straight or bent, and the degree of bending is not relevant and therefore, the finger shapes in (b) and (c) are not phonologically distinct. P_{51} in (d) indicates the handshape where the thumb and the index finger are touching each other. Note that the order of the fingers in the subscript position is "51". Assigning a symbol to each feature in this manner helps us to represent derivational relationships such as deriving multiples of decade numbers from one-digit numbers (see (1) in 10.2.1), as well as phonological change, as seen in this chapter.



(a) S_1 (b) B_1 (c) B_1 (d) P_{51}

Figure 10-2 Examples of representing handshapes using a notation

Other aspects of the finger shape are indicated using additional symbols. For example, an optionally selected finger(s) is indicated in parentheses and when adjacent fingers are kept in contact against each other, the numbers of the fingers are boxed together. Thus in Figure 10-3, which is the form for 'nine' in JSL, the notation shows that the thumb is optionally selected ($_{(5)}$), meaning that it can be either straight or in the default position, and the other fingers all are always in contact with each other and cannot be spread ($\boxed{1234}$).

$S_{(5)}\boxed{1234}$

'nine'

Figure 10-3 An example of optionally selected finger and fingers in contact with each other

Palm orientation and the direction of fingers are also distinctive features that are relevant in this chapter. These are both phonemic parameters in sign language phonology. The palm orientation is either that the palm is facing the signer (P−) or the interlocuter (P+), and the direction of the fingers relevant in this section are whether the fingers are in an upward

position (↑) or a side position (→). When the fingers are in the side position with the palm orientation fixed, because of the physical restriction, whether the fingers point to the left or right is naturally determined. For example, when the palm is facing the signer, the finger direction is possible only toward the other lateral side of the body, opposite the expressing hand.) Therefore, whether they are pointing toward the left or right does not need to be distinguished.

Palm-orientation and finger-direction differences are known to be phonemic in sign languages in certain phonological contexts and need to be documented as such. Specific examples will appear in the following sections. Thus the forms in Figure 10-2, with fingers up and the palm facing toward the interlocutor can be described as (P+, ↑), while the one in Figure 10-3 with fingers sideward and the palm facing toward the signer as (P−, →).

Other details will be explained in the following sections as they occur in the representations of the forms examined.

10.2. Examples of Partial Leveling

In this Section, two cases of partial leveling that can be identified in number expressions of JSL and related languages are presented. The first case involves multiple decade numbers from ten, twenty, thirty, to ninety, which will be referred to here as "x10 (times ten) numbers" (10.2.1). The second case involves numbers from eleven through nineteen (10.2.2). The forms of number expressions from one through ten with notated representations are presented in Figure 10-4, from which the signs for both x10 numbers and the numbers from eleven through nineteen derive.

Form (Visual)					
(Notated)	S_{1} (P+, ↑)	S_{12} (P+, ↑)	S_{123} (P+, ↑)	S_{1234} (P+, ↑)	S_{5} (P+, ↑)
Meaning	'one'	'two'	'three'	'four'	'five'

Form (Visual)				
(Notated)	S_{51} (P−, →)	S_{512} (P−, →)	S_{5123} (P−, →)	$S_{(5)\boxed{1234}}$ (P−, →)
Meaning	'six'	'seven'	'eight'	'nine'

Figure 10-4 Forms for one through nine commonly shared in modern JSL, TSL and KSL

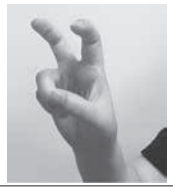
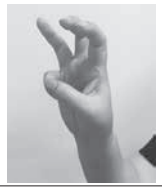
Note that the expressions for numbers 'one' through 'five' have the form where the palm orientation is facing toward the interlocuter (P+) and the selected fingers are directed upward (↑), while those for numbers 'six' through 'nine' have the form where the palm is facing toward the signer (P−) and the fingers are directed sideward (→).

10.2.1 Changes in Palm Orientation and Finger Direction in x10 Numbers in Osaka JSL

The first partial leveling is found in the x10 numbers in Osaka JSL. This leveling involves changes of palm orientation and the direction of fingers and affects some members but not all in the inventory. The change is identified by comparing documented forms of an Old Osaka JSL in Matsunaga (1937) with Modern Osaka JSL, and supported by the fact that the old forms are still used in Tainan TSL today, which is historically known to have developed from old Osaka JSL.

The Old Osaka JSL forms are presented in Figure 10-5, and the corresponding Modern Osaka JSL forms, which are shared with modern JSL and KSL, are presented in Figure 10-6.

Comparing the forms in Figure 10-5 and Figure 10-6, the following is observed. First, the handshape used in each number is commonly shared between the two systems and therefore has not changed. It is consistent that the handshape of a x10 number is derived from the corresponding one-digit numbers (Figure 10-4) by bending the selected finger(s). For example, the handshape of number 'one' is S_1 and that of 'ten' is B_1 as shown in Figure 10-7. The same derivational relationship applies to all the other x10 number derivation and is generalized using the notation in (1).

Form (visual)				
(notated)	B_1 (P+, ↑)	B_{12} (P+, ↑)	B_{123} (P+, ↑)	B_{1234} (P+, ↑)
Meaning	'ten'	'twenty'	'thirty'	'forty'

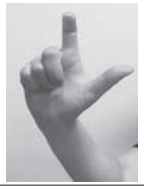
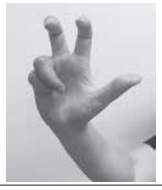
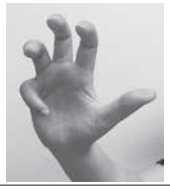
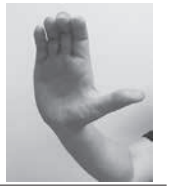
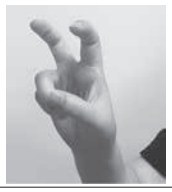
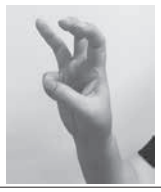
Form (visual)					
(notated)	B_5 (P−, →)	B_{51} (P+, ↑)	B_{512} (P+, ↑)	B_{5123} (P+, ↑)	$B_{(5)\boxed{1234}}$ (P+, ↑)
Meaning	'fifty'	'sixty'	'seventy'	'eighty'	'ninety'

Figure 10-5 Forms for x10 numbers in Old Osaka JSL and modern Tainan TSL

Form (visual)				
(notated)	B_1 (P+, ↑)	B_{12} (P+, ↑)	B_{123} (P+, ↑)	B_{1234} (P+, ↑)
Meaning	'ten'	'twenty'	'thirty'	'forty'

Form (visual)					
(notated)	B_5 (P−, →)	B_{51} (P−, →)	B_{512} (P−, →)	B_{5123} (P−, →)	$B_{(5)\boxed{1234}}$ (P−, →)
Meaning	'fifty'	'sixty'	'seventy'	'eighty'	'ninety'

Figure 10-6 Forms for x10 numbers in Modern Osaka JSL

Form (visual)		
(notated)	S_1	B_1
Meaning	'one'	'ten'

Figure 10-7 Deriving 'ten' from 'one'

(1) Derivational relationship between the handshape of a one-digit number and the corresponding x10 number

one-digit : x10
S : B

Second, in numbers 'ten' through 'fifty,' the palm orientation and the finger direction are also the same, namely, the palm orientation is toward the interlocutor with upward finger direction (P+, ↑). However, differences are found in numbers 'sixty' through 'ninety'. While the palm orientation is toward the interlocutor with upward finger direction in the old Osaka JSL in Figure 10-5, it is toward the signer with sideward finger direction in Modern Osaka JSL in Figure 10-6. This is summarized in Table 10-2 and the changes identified in 'sixty' through 'ninety' are generalized in (2).

Table 10-2 Changes in x10 numbers in Osaka JSL

WORDS	OLD OSAKA JSL	MODERN OSAKA JSL	CHANGE
'ten', 'twenty', 'thirty', 'forty'	(P+, ↑)	(P+, ↑)	no change
'fifty'	(P−, →)	(P−, →)	no change
'sixty', 'seventy', 'eighty', 'ninety'	(P+, ↑)	(P−, →)	(P+, ↑) > (P−, →)

(2) (P+, ↑) > (P−, →)

As can be seen in Table 10-2, the expression for number 'fifty' in Old Osaka system had the features (P−, →), while all the other x10 numbers carried the features (P+, ↑). Thus, among x10 numbers in Osaka JSL, it can be assumed that partial paradigm leveling has occurred, where the palm orientation and the sideward direction of what were seen originally only in 'fifty' fingers have spread to other members.

It is not clear as to why the form for 'fifty' alone had different features from the others, but this form has been documented for Old Osaka JSL of that period. One possibility of the motivation of the levelling is that the features of the numbers 'sixty' through 'ninety' were assimilated to those of 'fifty' to carry also (P−, →). This is not impossible considering the fact that the numbers are counted in a sequence, with the numbers 'sixty' through 'ninety' often counted following 'fifty'. If such is the case, a possible reason as to why only the higher numbers were assimilated to the palm orientation and finger direction of 'fifty' would be that the numbers 'sixty' through 'ninety' consist of B_5 in their forms and thus may have been more susceptible to a change toward features carried by 'fifty' than the lower numbers which do not consists of B_5.

Another possible explanation for the levelling to have taken place would be to attribute the change of the palm orientation and finger direction to assimilation with the corresponding one-digit number. When the palm orientation and finger direction of the numbers 'six' through 'nine' in Figure 10-4 are compared to those of the corresponding x10 numbers in Figure 10-6, it can be seen that the derivation between a one-digit number and the corresponding x10 numberis simply S : B, while that in Old Osaka involves changes in the palm orientation and finger direction, to be represented as S (→, P−) : B (P+, ↑) as presented in Table 10-3. The change from S (→, P−) : B (P+, ↑) to S: B can be interpreted as either a simplifying process or the generalization of what existed in the smaller numbers, or both.

Table 10-3 Change in the derivational rules from one-digit to x10 numbers

	OLD OSAKA JSL	MODERN OSAKA JSL
'one' through 'four' : x10	S : B	S : B
'five' : x10	S (↑, P+) : B (P−, →)	S (↑, P+) : B (P−, →)
'six' through 'nine' : x10	S (→, P−) : B (P+, ↑)	S : B

In Tainan TSL today, the same forms as the ones in Old Osaka JSL are used for 'sixty' through 'ninety'. Since Tainan TSL is known to have developed from Old Osaka JSL, it can be safely assumed that these forms are the retentions from the earlier forms, while the ones in Modern Osaka JSL have undergone changes. On the other hand, the development

of Tokyo JSL and KSL is not as clear. Although it is known that handshapes for numbers ‘sixty’ through ‘ninety’ in Old Tokyo JSL were the same as those documented for Osaka JSL (Matsunaga 1937), what kind of palm orientation and finger directions were found in these numbers in Old Tokyo JSL is not clear. Therefore, whether the modern Tokyo JSL and KSL are the results of parallel changes involving palm orientation and finger direction, or they are retentions from the time of introduction of JSL into Korea is not clearly identified.

10.2.2 Fusion in Numbers 11–19 in KSL, Tainan TSL and Gunma JSL

The second example of partial leveling is the fusion in numbers ‘eleven’ through ‘nineteen’ in KSL, Tainan TSL and Gunma JSL. These phonological changes obviously took place separately in each language, however, interestingly, affecting the same or similar parts of the paradigm with one another.

Numbers from ‘eleven’ through ‘nineteen’ in a system with no case of fusion are shown in Figure 10-8. Here, all are expressed as a combination of ‘ten’ and a number indicating their first digit. For example, the sign for ‘eleven’ is a sequence of ‘ten’ (B_1) followed by ‘one’ (S_1), as shown in Figure 10-9. When a word consists of two or more morphemes that are successively expressed, the symbol “^” is used as the linker. Thus, the expression for ‘eleven’ that has been just described is represented as “B_1 ^ S_1”, and/or, “B_1 (↑, P+) ^ S_1 (↑, P+)”, with the palm orientation and finger direction described as in (3).

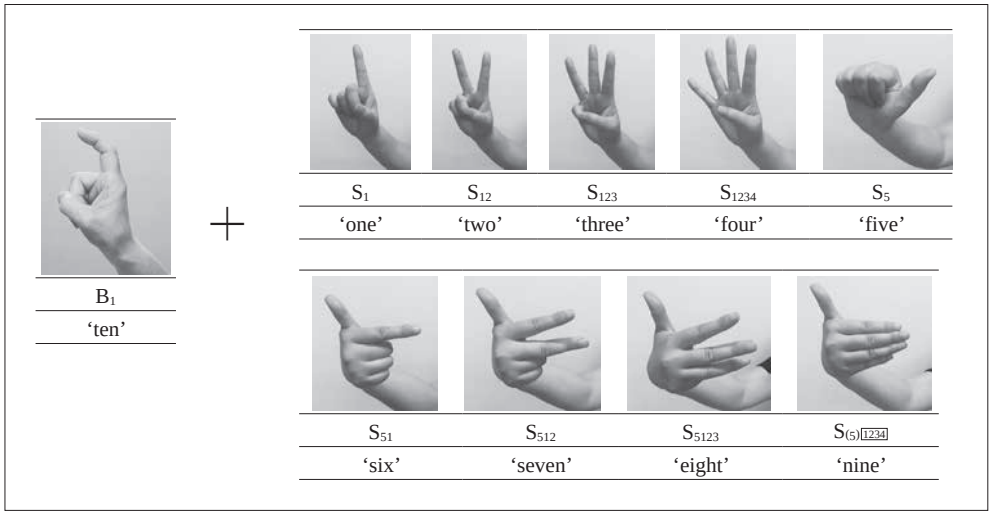


Figure 10-8 Expressions for ‘eleven’ through ‘nineteen’ in modern JSL and TSL

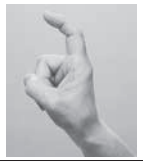
Form (visual)			
(notated)	B_1 (↑, P+)	^	S_1 (↑, P+)
Meaning		'eleven'	

Figure 10-9 Expression of 'eleven' in modern JSL and Taipei TSL with notated representation

(3) Expression of 'eleven' in modern JSL and TSL
B_1 (↑, P+) ^ S_1 (↑, P+)

The forms in KSL, Tainan TSL and Gunma JSL that are different from the ones in Figure 10-8 are considered to be innovative, for all can be shown to have developed with two morphemes merging into one. Because of the unidirectionality of such changes, it can be readily assumed that the forms in Modern JSL and Taipei TSL are the retentions from the earlier system, while those in the other three languages are the innovated ones.

In KSL, fusion of two morphemes took place in 6 numbers including 'twelve'. In an earlier system, this number was expressed by a sequence of 'ten' and 'two', which is the same as the expression in Modern JSL and Taipei TSL as shown in the left of Figure 10-10. In Modern KSL, however, the same number is expressed by a single expression with the index finger bent (B_1, expressing 'ten') and the middle finger straight (S_2) as in the right of Figure 10-10. This change can be described as in (4), where it can be seen that the two forms merged retaining B_1 and the S_2 part of S_{12}. The palm orientation and finger direction did not change and are not included, but if they are to be represented, it would be (↑, P+) > (↑, P+).

Form (visual)				>	
(notated)	B_1	^	S_{12}		B_1S_2

Figure 10-10 Change from lineal expression 'twelve' to a merged from 'twelve'

(4) B_1 ^ S_{12} > B_1S_2

What is interesting here is the fact that this change affected some of the members in the group but not all. Forms for 'eleven' through 'nineteen' in modern KSL are shown in Figure 10-11. It can be seen that the numbers 'twelve', 'thirteen', 'fourteen', 'seventeen', 'eighteen' and 'nineteen' underwent the same change as 'twelve', while forms for 'eleven', 'fifteen' and 'sixteen' retain the earlier lineal expression. These are summarized with notational

representation in Table 10-4. From the table, it can be generalized that where there was S_2 in the earlier expression, this fusion took place, while where there was not, the original expression was retained. Clarifying the phonological reason as to why this is so is an interesting question for further research.

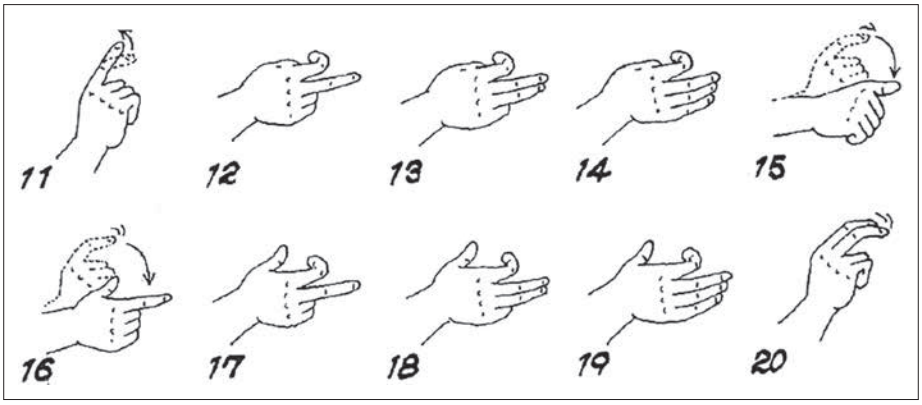


Figure 10-11 Expressions for 'eleven' through 'nineteen' in KSL (cited from Chang 1988: 11)

Table 10-4 Notational represenation of the change from an earlier system to KSL

'eleven'	$B_1 \wedge S_1$		(no change)
'twelve'	$B_1 \wedge S_{12}$	>	B_1S_2
'thirteen'	$B_1 \wedge S_{123}$	>	B_1S_{23}
'fourteen'	$B_1 \wedge S_{1234}$	>	B_1S_{234}
'fifteen'	$B_1 \wedge S_5$		(no change)
'sixteen'	$B_1 \wedge S_{51}$		(no change)
'seventeen'	$B_1 \wedge S_{512}$	>	B_1S_{52}
'eighteen'	$B_1 \wedge S_{5123}$	>	B_1S_{523}
'nineteen'	$B_1 \wedge S_{51234}$	>	B_1S_{5234}

Parallel processes of fusion are found in Tainan TSL used by young people and also in Gunma JSL.

In a young people's variety of Tainan TSL, a fused form is used in the expression for 'twelve'. The form is similar to that of KSL, however, the palm faces the interlocutor and the finger direction is upwards, and the bent finger is trilled just like the articulation when the selected finger is emphasized ($B_1 \wedge S_{12} > B_1S_2^{[trill]}$).

In Gunma JSL, on the other hand, parallel forms are found for 'twelve', 'thirteen' and 'fourteen', with the same palm orientation and finger direction as in KSL, but with index finger flicking twice for each number. In this language, a different phonological change took place in numbers 'sixteen' through 'nineteen', where the thumb is rubbed against the edge of the palm while other selected fingers are stretched. Changes that took place in the Gunma JSL system are notationally represented in Table 10-5. It appears that finger movement helped override the restriction in Gunma JSL that hindered number 'sixteen' from undergoing fusion in KSL.

Table 10-5 Notational represenation of the change from an earlier system to Gunma JSL

'eleven'	$B_1 \wedge S_1$		(no change)
'twelve'	$B_1 \wedge S_{12}$	>	$B_1^{[flick]}S_2$
'thirteen'	$B_1 \wedge S_{123}$	>	$B_1^{[flick]}S_{23}$
'fourteen'	$B_1 \wedge S_{1234}$	>	$B_1^{[flick]}S_{234}$
'fifteen'	$B_1 \wedge S_5$		(no change)
'sixteen'	$B_1 \wedge S_{51}$	>	$B_1S_5^{[rub]}$
'seventeen'	$B_1 \wedge S_{512}$	>	$B_1S_5^{[rub]}S_2$
'eighteen'	$B_1 \wedge S_{5123}$	>	$B_1S_5^{[rub]}S_{23}$
'nineteen'	$B_1 \wedge S_{51234}$	>	$B_1S_5^{[rub]}S_{234}$

In the above mentioned changes, forms developed as a result of fusion are different from one another, and also the languages are not geographically adjacent with one another. Thus, the changes in the three languages can be safely assumed to have taken place independently, after the introduction of the system found in modern JSL and Taipei TSL.

10.3. Examples of Full Leveling

Examples of full leveling presented here all have to do with the days of the week. The forms for the days of the week in JSL reflect the literal meaning of those in spoken Japanese. For example, the word for Monday in Japanese is *getsu-yō-bi*, literally, moon-week-day. The sign for Monday in JSL is the form for the Moon. Likewise, the word for Tuesday in Japanese is *ka-yō-bi*, literally, fire-week-day and the sign for Tuesday in JSL is that for fire. The original source forms comprising the names of the days of the week in JSL are thus still retained and recognizable. Although such signs consist of movements which are not appropriately shown in still photos, for the sake of listing the meaning of each name, the names for the days of the week are presented in Figure 10-12. It will be shown that, from this system, changes took place both in KSL and TSL. It will be shown that, from this system, change took place both in KSL and TSL. In the former, phonological change affected all the members in this group, and in the latter, completely different forms replaced all the original forms in the set.

Form (visual)						
Source Form	MOON	FIRE	WATER	TREE	GOLD	SOIL
Meaning	'Monday'	'Tuesday'	'Wednesday'	'Thursday'	'Friday'	'Saturday'

Form (visual)		
Source Form	RED ^	CLOSE
Meaning	'Sunday'	

Figure 10-12 Expressions for the days of the week in JSL (retained)

10.3.1 Phonological Change in the Days of the Week in KSL

The forms for the days of the week have been retained in KSL, however, with phonological change which affected all the components in the group. More specifically, the same source forms are retained however with the signing space reduced to the area around the mouth. Still photos showing part of signs for days of the week are listed in Figure 10-13. Although movements cannot be seen in these photos, when compared to the JSL forms in Figure 10-12, it can be seen that the space in which two hands appear is much more limited to the center of the body. This is the phonemic change known as "centralization" in sign language linguistics and as can be seen in the figure, it has affected all the components in this group.

Form (visual)						
Source Form	MOON	FIRE	WATER	TREE	GOLD	SOIL
Meaning	'Monday'	'Tuesday'	'Wednesday'	'Thursday'	'Friday'	'Saturday'

Form (visual)		
Source Form	RED ^ CLOSE	
Meaning	'Sunday'	

Figure 10-13 Expressions for the days of the week in KSL (retained with modification)

10.3.2 Replacement of the Words for the Days of the Week in TSL and Subsequent Full Leveling-like Changes

Another change that took place in the days of the week is the full replacement. This may not be regarded exactly as "leveling", however, is nevertheless described here, for it may help to understand the range of the influence of the phonological change, and also it is related to possibly subsequent leveling in Tainan TSL.

The days of the week in Taipei TSL today reflect that of CSL, which was introduced after the split of the earlier JSL to TSL and KSL. CSL days of the week reflect those of Chinese, where days of the week are referred to by numbers, starting with the form literally meaning 'one-week-day,' which refers to Monday with numbers going up as the day progresses to Tuesday, Wednesday, etc., as listed in Figure 10-14. The signs, with the hand shape of each number, is expressed by the movement of the dominant hand which starts from the under-the-arm position of the side of the non-dominant hand side, to the position near the signer's mouth. Once in this position, numbers one through six are shown by the hand shape, as shown in the photos in Figure 10-14.

Form (visual)						
Source Form	ONE	TWO	…	FIVE	SIX	RED
Meaning	‘Monday’	‘Tuesday’	…	‘Friday’	‘Saturday’	‘Sunday’

Figure 10-14 Expressions for the days of the week in Taipei TSL (replaced)

There are a couple of things to note about the days of the week signs in Taipei TSL. First, the original expression for Sunday has been partially retained, now limited to that for RED, and the form for CLOSE having been lost. Second, alternative forms are found for Friday and Saturday, which are also numbers corresponding to the Chinese system, however, the expression of the numbers is different from those inherited from those of the originally introduced JSL. These are shown in Figure 10-15. The sources of these number expressions are not clear yet, although at this point we speculate that the one for FIVE is archaic, while the one for SIX is a result of CSL influence. however, investigating them would be worthwhile, for that would help us clarify the mechanisms of changes that take place across items in a paradigm.

Forms (visual)		
Source Form	FIVE (archaic?)	SIX (CSL influence?)
Meaning	‘Friday’	‘Saturday’

Figure 10-15 Alternative expressions for ‘Friday’ and ‘Saturday’ in Taipei TSL

Yet another system is found today in the expressions for the days of the week Tainan TSL. In this language, they are expressed using both hands, the dominant hand showing numbers from one through seven again reflecting Monday through Sunday in CSL, however, with the non-dominant hand always showing number SEVEN, which indicates that the number shown by the dominant hand refers to the week. Such expressions using both hands applies to all the 7 days of the week in Tainan TSL, and it would be interesting to find out whether those found in Taipei TSL are the result of phonological reduction from the Tainan TSL system or two-handed to one-handed sign, or the two systems developed under the influence of CSL but independently from each other.

Alternative Form (visual)			
Source Form	ONE+SEVEN	…	SEVEN+SEVEN
Meaning	‘Monday’	…	‘Sunday’

Figure 10-16 Examples of expressions for the days of the week in Tainan TSL

10.4. Overlapping Partial Leveling and Concluding Remarks

The extent of the leveling ranges from partially shared to fully shared within each paradigm and even within a single paradigm, there may be multiple changes covering different ranges. For example, in basic kinship terms (documented in 1976 by Peng), for example, all contained an expression supposedly expressing ‘biologically related,’ articulated by the index finger of the dominant hand touching the cheek ($S_1^{\text{touch.cheek}}$) as in Table 10-6. However, in JSL, this expression is lost in the words for siblings, thus simply S_2^{up} for ‘older brother’ simply and S_3^{down} for ‘younger sister’. In TSL, the finger for touching cheek has been assimilated to the following articulator. Now the same finger is used for both touching cheek and the brother/sister indication, thus, $S_2^{\text{touch.cheek}} \wedge S_2^{\text{up}}$ for ‘older brother’ and $S_3^{\text{touch.cheek}} \wedge S_3^{\text{down}}$ for ‘younger sister’. On the other hand, the expressions for ‘parent’ have been retained in both JSL and TSL without change, while the situation for ‘grandparent’ differs considerably from the others. There are various possibilities to be examined as to why some were retained while others have changed, including the ease or non-ease of articulation, token frequency, potential conflict with existing forms and others.

Table 10-6 Kinship terms in Tokyo JSL as documented in Peng 1976

	GRANDPARENT	PARENT	SIBLING (OLDER)	SIBLING (YOUNGER)
MALE	$S_1^{\text{touch.cheek}} \wedge B_5$	$S_1^{\text{touch.cheek}} \wedge S_5^{\text{up}}$	$S_1^{\text{touch.cheek}} \wedge S_2^{\text{up}}$	$S_1^{\text{touch.cheek}} \wedge S_2^{\text{down}}$
FEMALE	$S_1^{\text{touch.cheek}} \wedge B_4$	$S_1^{\text{touch.cheek}} \wedge S_4^{\text{up}}$	$S_1^{\text{touch.cheek}} \wedge S_3^{\text{up}}$	$S_1^{\text{touch.cheek}} \wedge S_3^{\text{down}}$

(Consecutive signs are connected by the symbol “^”.)

The nature of the “paradigms” looked at in this study may appear to be different from those that are commonly investigated and the time depth of the changes investigated is about 120 years and much shallower than that commonly looked at in spoken languages. However, various relevant patterns are found in partial changes in number systems, which are not necessarily the same across dialectal varieties. Changes in days of the week show partial replacement in JSL varieties, while full replacement, which is obviously contact induced, took place in each of the two TSL varieties. We believe that further examining more cases will contribute to the cross-modal understanding of paradigm leveling.

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