

A Study of Notation and Sign Writing Systems for the Deaf

Mihoko Kato, Toyohashi University of Technology

A notation system for sign language is strongly needed to advance the study of its structure. Two pioneers, William C. Stokoe, who proposed a notation system for American Sign Language (ASL), and Lynn Friedman, who analyzed ASL from a phonological point of view, worked towards this end. However, their notation systems are rather impractical for general users because they are too technical, much like phonetic alphabets in spoken languages. Therefore, it is necessary to employ another writing system to describe a sign or a signed sentence for everyday purposes. A more suitable sign writing method for this purpose is “SignWriting” by the American movement analyst Valerie Sutton. Her system was applied to Japanese Sign Language (JSL) and the results indicated that the system was effective enough to “write” Japanese Sign Language.

Though further study is needed to make the SignWriting system simpler, more understandable and totally universal, the system seems to be able to contribute to the development of a literary tradition among deaf people. Indeed, there are newsletters and books written in SignWriting in some countries and the practical usage of the system in literacy education has had a great impact on the education of deaf children.

Sign language for deaf people has special features that are quite different from those of spoken language. Sign language is an iconic language compared to spoken language, which is more of an arbitrary one. Another crucial difference between the two languages is that sign language does not have its own writing system. Therefore, in order to write descriptions of signs, line drawings, photographs and illustrations have commonly been used, but these represent only a very small moment in the process of actual signing.

A notation system for sign language was strongly needed to advance the study of its structure. Pioneers, such as William C. Stokoe, who proposed a notation system for American Sign Language (ASL), and Lynn Friedman, who analyzed ASL from a phonological point of view, have made it possible to show the structure of a sign. However, these notation systems are impractical for general users because they are too technical, much like phonetic alphabets in spoken language. Therefore, it is necessary to invent another “writing system” to describe a sign or a signed sentence for everyday purposes.

In this paper, after describing previous notation systems in sign language, the most suitable sign writing method for these purposes – the Sign Writing System proposed by Sutton – is examined through its application to Japanese Sign Language. In addition, a practical usage of the Sign Writing System for deaf education in Germany is discussed, and a proposal to incorporate this method into the education for Japanese deaf children is put forward.

Some Notation Systems of Sign Language

Linguistic studies of sign languages started in 1960. In that year, William C. Stokoe wrote *Sign Language Structure*, and it was followed by his *Dictionary of American Sign*

Language on Linguistic Principles (Stokoe, Casterline, & Croneberg, 1965). In this dictionary, Stokoe et al. suggested a notation form for ASL and claimed that each sign of ASL has three factors that distinguish it from the other ASL signs; he called these factors “aspects” since they are ways of looking at elements that occur simultaneously.

Following him, Lynn Friedman analyzed the elements from a phonological point of view in 1977, and, in 1968, Jim Kakumasu proposed a notation system of Urubu sign language (USL), both of which were unique. Based on these ideas, a Japanese group of sign language researchers devised a notation system for JSL. According to their analysis, signs are actually composed of three different elements: hand shape (including palm orientation), hand location, and hand movement. These three elements are analogous to phonemes in a spoken language. This group assigned a symbol to each element and completed the notation system for JSL.

The next section will describe the notation systems for the sign languages devised by the previously mentioned individuals.

Stokoe’s Notation System

In his *Dictionary of American Sign Language on Linguistic Principles (DASL)* (1965), Stokoe et al. claim that each sign of ASL has three elements that distinguish it from all other signs, and he called these factors “aspects.” For instance, consider the following three groups of ASL signs as shown in Figure 1. Among the first group of signs, CANDY, APPLE, and JEALOUS, the only difference is in hand configurations. The second group, SUMMER, UGLY, and DRY, can be distinguished only by a difference in the place of articulation. The last group, TAPE, CHAIR, and TRAIN, has just a difference of movement. This was proposed as proof of the existence of (at least) the following three aspects:

1. Hand Configuration (the distinctive configuration of the hand or hands making a sign),
2. Place of Articulation (the place where a sign is made),
3. Movement (the action of the hand or hands).

Stokoe decided to call the active hand the “designator” or “*dez*”; the place, the “*tabula*” or “*tab*”; and the action, the “*signation*” or “*sig.*” A sign is produced by a combination of these three aspects and Stokoe made the formula for writing ASL as follows:

With the understanding that all separation of real human communication into word-size units is a little artificial, we can proceed to a representation of the separate signs of the American sign language by symbols for the three elemental aspects of a sign. If we use “T,” “D,” and “s” as cover symbols for any possible *tab*, *dez*, and *sig.*, we can write a sign thus: TD^s. This formula or convention for writing a sign indicates that at or in some place (T), visibly distinguished from all other sign language places, a hand configuration (D), distinctly different from all others used in sign language, performs an action(s), visibly unlike all other such actions. (Stokoe, 1965, p. viii)

There are twelve symbols in Stokoe’s formula that stand for *tab* aspects, nineteen for hand configurations used as *dez* – some of which are also used as *tab* – and twenty-four for



Figure 1: Minimal Contrasts Illustrating Major Formational Parameters
(Klima & Bellugi, 1979, p. 42)

sig aspects. Some of his symbols are shown in Table 1, and Table 2 shows a part of Stokoe's Dictionary of ASL in 1965.

Thus, Stokoe first showed the importance of analysis of ASL signs as a language, and his linguistic studies of ASL had a great influence on other sign language specialists.

Friedman's Notation System

Friedman's presentation is derived in part from Stokoe's description of his notation parameters. However, she suggests that Stokoe's description and phonemicization were inadequate to fully explore the parameters of sign language. In her paper, "Formational Properties of American Sign Language" (1977), Friedman presents alternative phonetic and phonemic analyses for three parameters, that is, hand configuration, place of articulation and orientation (of the hands in relation to the body), and a phonetic and feature analysis of the movement parameter. The phonemic inventory of the hand configuration parameters and the analysis of orientation are her own (see Table 3).

Table 1. Some Stokoe's Symbols Used for Writing the Signs of ASL

Tab symbols: $\square, \cup, [], \sqrt{}, u, 3, ,$
Dez symbols: A, B, 5, C, D, W, Y, O, R
Sig symbols: X, T, $\infty, \square, \#, V, \ell, \div, \omega,$

Table 2. Stokoe's Dictionary of ASL (Stokoe, 1965, p. 4)

A^α	From finger spelling practice of indicating the apostrophe in possessives (s-allocher of dez) and equivalent to any possessive suffix in English. Usually added after a noun is spelled: $C_{alice} A^\alpha$ $B^1 B^\alpha \supset$ 'Alice's book' — it may also be used after a sign — $C_{the} \cap 5_{D\perp} A^\alpha AA^{N\sim} \supset$ 'the man's car'.
$\dot{A}^\alpha \text{ --- } \omega$	(dez with thumb extended and vertical; sig a sharp short clockwise arc or rapid small oscillation) $N \times$ <i>ten</i> ; first form also <i>ten dollars</i> ; second form also <i>ten cents</i> . Context will indicate the monetary use, or the 'dollar' or 'cent' sign may follow. See Appendix B.
\dot{A}^α	(sig describes a question mark) $\times N$ <i>any</i> . Signs used immediately after this sign may remain separate or form compounds with it, as: $\text{---} \dot{A}^\alpha B^\alpha N$ <i>anything</i> . But note that 'anyway' in the sense of 'regardless' is a single sign: $B, B_{\epsilon} \dot{A}^\alpha \sim$.

Friedman's idea of orientation is different from Stokoe's in the respect that she recognizes it as one of the independent parameters of a sign. She claims that orientation has to be defined for each hand shape, so that we may know which part of the hand is facing which direction in relation to the body. Friedman divided Stokoe's classification into many more categories.

Kakumasu's Notation System

Jim Kakumasu analyzed USL on two levels: the gestemic level and the syntactical level. He explained the notation system as follows (Kakumasu, 1968):

1. alphabetic symbols indicate the points of reference of body or place,
2. numerical superscripts indicate types of motion and positions, and are separated by periods,
3. parts of body acted upon are given first in order,
4. succeeding letters and/or numerals augment or amplify the action,
5. asterisk (*) indicates left hand, otherwise all signs are with the right hand,
6. plus sign (+) means "followed by ---,"

Table 3. Notation Symbols by Friedman (Friedman, 1977, pp. 28-29)

Phoneme	Variant	Environment	Phoneme	Variant	Environment
/A/	A		/V/	V	
	\bar{A}	contact with thumb tip		\bar{V}	end shape with BEND FINGERS movement
	S	inconic signs Side contact loans neutral end or initial shape		\bar{V}	inconic signs
/O/	O		/3/	V	
	tapered-O	free variation		3	end shape in sings with BEND FINGER movement
	b O	end shape (in double-shape signs with colosure of L)		$\bar{3}$	
/B/	B	free variation	/Y/	Y	
	\bar{B}	free variation		\bar{Y}	reduction
	\hat{B}	required in signs with thumb tip contact end shape in double-shape sings with BEND KNUCKLES movement		\hat{Y}	assimilation iconic signs
/C/	C		/8/	8	
	\bar{C}			$\bar{8}$	CLOSE or OPEN movement
	\hat{C}	plurality end shape in sings with BEND FINGERS movement		7	
/6/	6		/T/	unpread-7	
	$\bar{6}$			T	
	$\hat{6}$			\bar{T}	
/F/	F		/M/	M	
	\bar{F}			\bar{M}	
	b O	reduction		N	
/G/	G		/D/	D	
	X_1			b D	free variation
	X_2	contact with middle joint		E	
/L/	L		/G ₂ /	G ₂	
	\bar{L}	end shape in sings with BEND FINGERS movement		K	
	L w/bent thumb	iconic signs anchored index finger		I	
/H/	H		/W/	W	
	\bar{H}			R	
	\hat{H}	plam-side contact			

7. parentheses enclose entities,

8. braces ({ }) indicate simultaneous action or position of body parts, and

9. hyphen (-) indicates sequences.

Lexical items written in his notation system are as follows:

“G²³⁺³⁰” The hand is flicked out as if brushing off something.

I^{20.11}(A(EF¹³)²⁶)+I⁽³⁻¹⁾ 8 Thumb and index finger are spread apart and are pretending to cradle the head which is shaken from side to side. (Kakumasu, 1968)





























In order to apply Kakumasu's notation system to such a common language as ASL, further improvement of his system is necessary, because it is based upon the sign language of Urubu, which belongs to the Tupi-Guarani language family and is spoken in the state of Maranhao, Brazil. His system, however, was helpful in inventing more successful notation systems later.

The Notation System by a Japanese Research Group

Linguistic studies of JSL began much later than in the U.S.A., beginning in 1975. With the technical development of computers, effective improvement of the notation systems of sign language has been useful in analyzing the structure of signs. There are several different notation systems for JSL, but in this section, the system devised by Honna, Kanda, Oda and Kato (1984) will be introduced.

Honna et al. analyzed JSL based on the studies of Stokoe and Freidman.

Table 4. Hand Configurations by a Japanese Research Group

Basic Forms							
							
	H0	H1	H2	H3	H4	H5	H12
							
	H15	H45	H123	H125	H1234	H1235	H12345
Transconfiguration							
Contacting: 	C12		C1234		C12345		
Bending 	B1		B1		CB12=BC12		
Pinching: 	P15		P12345		C12345		
Angling: 	A12345		A12345				
Thumb Pressing: 	T125						
Covering 	V1x2						

The sign language analyzed by Stokoe and Freidman, however, was a specific language, that is, ASL. Therefore, some signs were not appropriate for their system. The point of Honna et al.'s study is that it is different from the precursors in the following respects: Honna et al. set out the goal for developing a universal notation system for sign language. A brief explanation of Honna et al.'s system is described below.

Hand Shape. Hand Shape has two categories: one is Hand Configuration and the other is Palm Orientation. Hand Configuration has two forms: Basic Form and Transconfiguration. There are six variations of Transconfiguration: Contacting, Bending, Pinching, Angling, Thumb Pressing, and Covering. Examples for each category are shown in Table 4. A line under a finger number indicates that only the underlined fingers are related to the

Table 5. Hand Location for JSL Notation System

<Space> 1) SN: Neutral Space 2) SU: Upper Space 3) SL: Lower Space
<Place> 1) Head: HD (head), FA (face), FH (forehead), EY (eye), NS (nose), MO (mouth) EA (ear), NK (neck), TH (teeth), TN (tongue), CK(cheek), CN (chin), TM (temple)
2) Trunk: BR (breast), BL (belly), SH (shoulder)
3) Arm: UA (upper arm), EL (elbow), WD (wrist, dorsal), WV (wrist, ventral)
4) Hand: HB (hand, back), HP (hand, palm), HA (hand, around), FG (finger)
<supplemental symbols> 1) fractionation of place: c (central area) s (surrounding area) 2) fractionation of space: i (ipsilateral) ct (contralateral) 3) contact with place: underline (contact)

Table 6. Symbols for Manners of JSL Notation System

touch: 扌	hold: ㄣ	strike: K	rub: ㇰ	brush: =
in-between: ㇰ	rotate: ㇰ	shake: S	alternate: Z	bend: ㇰ
tremble: W	open: ○	snap: ㇰ	close: ㇰ	pinch: ㇰ

transconfiguration. A dot on a finger number in a bending transconfiguration indicates that the finger is bent with strong force.

Palm orientation is represented only when necessary by an arrow as shown below. The symbols are used with the letters “P” (palm) and “F” (fingertips).

Palm Up ↑
 Palm Down ↓
 Palm Side ← →
 Palm Away From Body +
 Palm Toward Body —

Hand Location. The symbols for Hand Location were devised with the intention that they could be put into computers in the future to facilitate the technical analyses of sign language structure. Table 5 shows hand location for the JSL notation system.

Hand Movement. Hand Movement has three categories: Manner, Direction, and Qualification. There are fifteen manners (touch, hold, strike, rub, brush, in-between, snap, pinch, rotate, shake, alternate, bend, tremble, open, and close). The symbols for manners are shown in Table 6. When manners for both hands are produced asymmetrically, an “x” is added above the symbol.

Directions were decided by taking advantage of Sutton’s (1981, 1984) system (her system will be described in the next section). Direction includes two elements: Figure and Plane. There are two kinds of figures: a straight figure and a curved figure. A straight figure is represented by ↑, ↓, →, ←, etc., whereas a diagonal figure is shown by adding a triangular

Table 7. Categories of Qualification

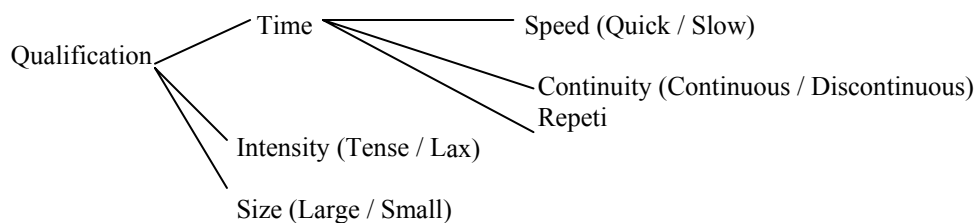


Table 8. Symbols for Qualification of JSL Notation System

	(+)	(-)
Speed	√	∩
Continuity	—	— • —
Repetition	•	•
Intensity	/	\
Size		

line to the straight figure. A curved figure is represented by adding a curved line to the straight figure. Directions are written from the receptor's point of view.

Qualification is divided into three main categories, as shown in Table 7, and each of them is given its own symbol. Symbols for qualification are shown in Table 8. The symbols are only used when they are necessary for distinct representation. Some lexical items of JSL written in this notation system are represented in Table 9.

These analyses show how complex the structure of sign language is, and how hard it is to pursue a universal notation system for sign language. Consequently, if a perfect universal system is invented in the near future, the notation system might be confined to showing how the sign is made. As mentioned above, a notation system is useful for professionals who want to analyze sign languages linguistically, but not for general users since such notation systems are too complex and technical. Therefore, another writing system that adequately describes signs and signed sentences for everyday purposes is necessary.

The next section will describe the unique notation system devised by Sutton in the U.S.A. At present, her system is used in 38 countries and regions around the world.

Sutton's Writing System of Movement

Sutton is a movement analyst. She is the inventor of a comprehensive system for recording all human movement, called the "Sutton Movement Writing & Shorthand." In 1979, Sutton began the task of simplifying "Detailed Sign Writing" so it could be easily used on an everyday basis. After this, she wrote the textbook *Sign Writing For Everyday Use* in 1981 and *Sign Writing Updates* in 1984. Since then, she has been improving her system in order to make it more pictorial, practical and accurate.

Table 9. Lexical Items of JSL Written in Japanese Notation System

Sign	Hand Shape		Location		Movement							
	R	L	Space	Place	Manner		Direction		Qualification			
					R	L	R	L	S p	C t	R p	It S z
Meet	H ₁ (↑F, →P)	H ₁ (↑F, ←P)	SN		•							
Blue	C ₁₂₃₄₅ (→P)			CK	=		↑					
Play	H ₁ (↑F, →P)	H ₁ (↑F, ←P)	SU		× z		↙	↘			..	

In her attempt to put movement on paper, she offers an effective way of symbolizing dance, mime, sports and all sign languages of the deaf. Sutton's system "writes" ASL, its variations and dialects; in addition, Sutton aims to write all other sign languages in the world.

Today Sutton's Center For Sutton Movement Writing, Inc. has created the following writing systems (Sutton, 2007):

1. Sutton Movement Writing

Sutton Movement Writing is the International Movement Writing Alphabet (IMWA) used to record all human and animal gestures. The IMWA records the details of movement-based languages. The IMWA has been specifically designed for the following five fields:

- SignWriting: for writing the movements of sign languages
- DanceWriting: for writing dance choreography
- MimeWriting: for writing classic pantomime
- SportsWriting: for writing ice skating and gymnastics routines
- ScienceWriting: for gesture-based research.

2. Sign-Symbol-Sequence (SSS)

The Sign-Symbol-Sequence is the official sequence of symbols in Sutton Movement Writing. The SSS is used in computer software to sort and look up movements in Movement Writing.

3. Sutton's SymbolBank

Sutton's SymbolBank Database is the official source for all symbols in Sutton Movement Writing. It is built into the SignBank computer program.

Sutton's writing system of sign language is composed with symbols for head and face cues, hand shape, movement (direction and manner), qualification and punctuation. Signed words written in SignWriting are created by compounding symbols of a highly pictorial design. This system has the following advantages:

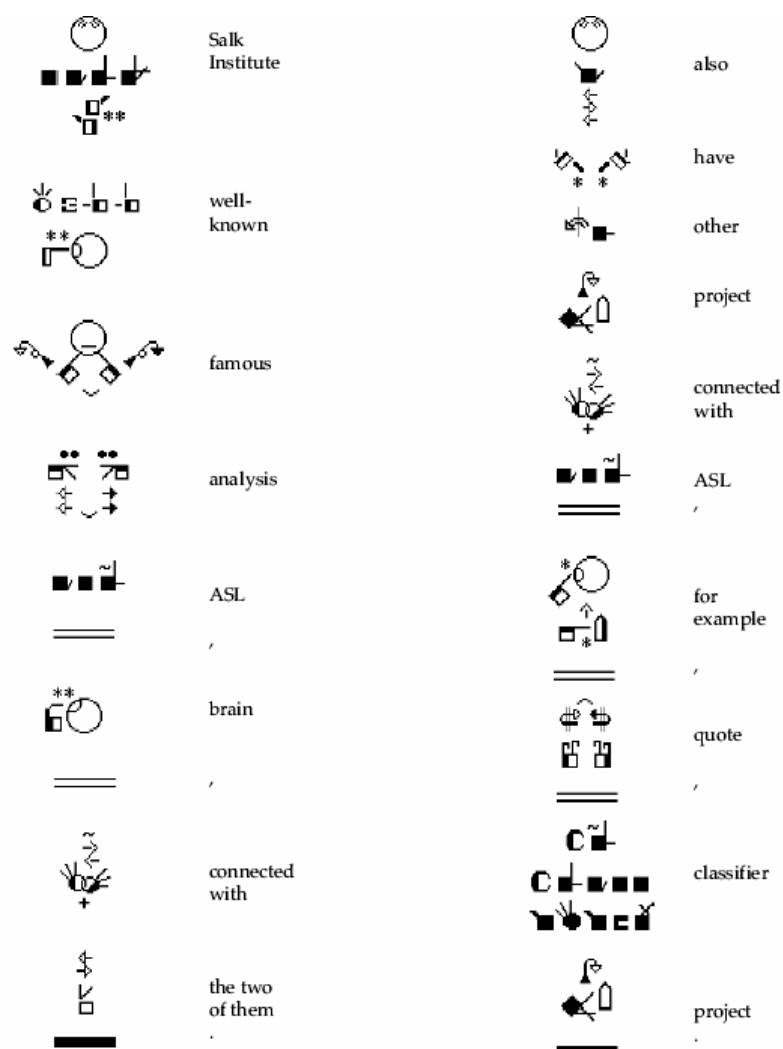


Figure 2: ASL Sentences Written in Sutton's SignWriting
(<http://www.movementwriting.org/>)

1. it is aimed at enabling us to write every sign or signed sentence of every country;
2. because the writing is pictorial, natural shapes and movements of signs can be realistically shown;
3. face expressions and body movements can be depicted, too.

Figure 2 shows ASL written using Sutton's SignWriting system.

The Application of the Sutton Sign Writing System to JSL

Method

Kato and Honna (1989) applied the earlier Sutton system to 500 JSL words in *Our Sign Language*, Vol.1 (a revised version published by the Japan Federation of the Deaf, 1987) and investigated her system from a linguistic and semiotic point of view. Although JSL had some hand shapes and movements, etc. that were not yet incorporated into Sutton's system, Kato and Honna tried to investigate its general viability for JSL words while referencing the following criteria:

1. whether the hand shape can be written precisely;
2. whether the manner and the direction of the movement can be written precisely;
3. whether any extra qualification or emphasis is appropriate to the sign writing;
4. whether the hand placement of the signing can be written precisely;
5. whether each drawing of the skeleton of the body can be written precisely;
6. whether facial expressions can be written appropriately;
7. and whether punctuation is appropriate.

In the course of the investigation, Kato and Honna (1989) proposed some amendments to the writing of hand shapes, especially in palm orientation with fingers extended and in the manner of some movements, directions and qualifications.

Results

Some common problems occurred in writing the hand shapes of JSL. Particularly for palm orientation, there were several hand shapes with unknown palm orientations. Another problem was in the palm orientation of a closed or open fist hand shape. As Sutton's system had some vagaries in the description of fist hand shapes, to clarify these contradictions, Kato and Honna improved the closed and open fist symbols. Furthermore, as there was some ambiguity in Sutton's symbols for the stretched straight fingers, Kato and Honna modified the finger-numbering system for these hand shapes.

Movement was also problematical as more manners of movement were needed in order to adequately write JSL signs. Sutton originally proposed ten manners of movement for ASL (touch, hold, in-between, strike, rub, brush, tremble, rotate in, rotate out, and shake). However, Kato and Honna suggested seven more manners with a symbol for each of them. The new manners were open, close, bend, pinch, snap, flip, and flap.

The directions of movement seem infinite and complicated, but actually they can be grasped and analyzed. Sutton's system described signing space like a room that has a front and back wall and a floor and ceiling. It assumes that there should be two planes used in SignWriting, and that all movement symbols in SignWriting should relate to these two planes: the wall and the floor plane. The wall plane is parallel to the front and back wall, while the floor plane is parallel to the floor and ceiling. Some JSL signs, however, have directions that are not parallel with either plane. Therefore, Kato and Honna improved Sutton's directions by adding non-parallel directions (see Figure 3).

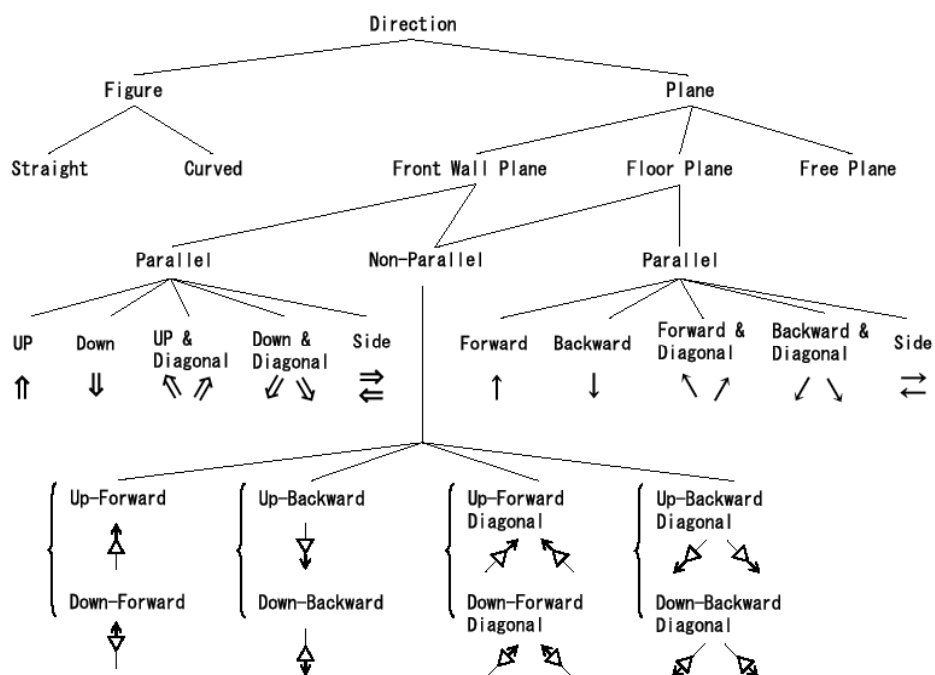


Figure 3: Directions of Movement by Kato and Honna

SIGN	old man	old woman	two people	house	live
SSW					
SIGN	mountain	go	river	wash	good-bye
SSW					
SIGN	part	old woman	see	what	see
SSW					
SIGN	see	far	get near/don't know	get near	big
SSW					

Figure 4: A Short Sentence of JSL Written in the Improved

With these slight modifications, Kato and Honna (1989) were able to write a short sentence from a nursery story, which was signed by a Japanese deaf woman. As shown in Figure 4, JSL can be effectively written using Sutton's system. Today, Sutton's system has been improved so that it can apparently write any sign language in the world more simply than before. It has also become easier for "readers" to understand. Further careful linguistic research and analysis may make the system more useful for all the signers of the world.

Educating Deaf Children using SignWriting

Hearing people live their entire lives hearing, speaking, writing and reading their own language, that is, a spoken language. Deaf people, by comparison, have great difficulty in learning and utilizing a spoken language. For very young deaf children, especially, connecting *sound* to *meaning* does not occur at all naturally, although the concept of words can be comprehended through signing.

Recently, more and more hearing teachers of deaf children have learned sign language both by joining study circles and interacting with the members of the deaf community – an encouraging pattern. Although there is still little official approval of the use of sign language in deaf education, there seems to be an upsurge of awareness of its legitimacy among teachers in deaf schools. Consequently, the use of sign language in deaf education has been increasing globally.

The most influential factor in this trend has been the dissemination of information during the latter half of the 1990s concerning the success of bilingual education for deaf children in Sweden and Denmark. In these countries, bilingualism in deaf education presupposes the use of sign language as the first language and the acquisition of the writing and reading elements of a spoken language. Using this method, deaf children are required to learn a sign language as their first language, and then utilize it to understand a spoken language.

Recently, SignWriting by Sutton has been recognized as a very important tool for improving deaf children's reading, writing, and speaking skills. The following section will describe an epoch-making example of the use of SignWriting for deaf education in Osnabruck, Germany's School of the Deaf.

SignWriting for Literacy Education at the Osnabruck School for the Deaf

There are a few deaf schools in the world where SignWriting is used: one is Osnabruck Germany's School of the Deaf. Stefan Woehrmann is a teacher at this school, who uses SignWriting in literacy education for deaf children. In addition, he develops new teaching materials using SignWriting. Woehrmann uses German Sign Language (DGS) in all conversations with his students. He started teaching SignWriting to his young deaf students in 2000 to encourage them to learn the reading and writing of German. Many of his students have gotten used to the pronunciation of both German and English words by using SignWriting. He describes the importance of teaching SignWriting as follows:

Introducing SignWriting at the beginning of the pupils' schooldays might hopefully strengthen their confidence in their literacy skills. Every hearing child is able to play reading a text which is presented together with a meaningful picture. No deaf child

has any chance to practice “free writing” as the hearing child can do. With SignWriting there seems to be the possibility to reinforce the wish of expressing the ideas in a written form long before they can express themselves on the same level in German. But we can take advantage from this because the pupils will probably accept their task to learn the adequate words in German much easier... (<http://www.signwriting.org/germany/germany05.html>)

Woehrmann (2003) considers SignWriting a possible way to describe all the important parameters of a sign sufficiently and accurately, without making excessive demands on the reader. He believes that deaf children can achieve a substantial sign language competence within a few months under normal circumstances. “Importance is a setting where deaf children are playing and learning together with support by pedagogical staff members who are fluent in sign language” (Woehrmann, 2003).

Using SignWriting, Woehrmann has developed materials and documents written in everyday sign language (DGS) and offered them to his students to find a guided way into the target language (spoken language). He introduced the basic system of SignWriting to young students and has been teaching them how to gradually read and write the system. He has recognized that students can improve their skills in reading, writing, and even in speaking their target language. Figure 5 shows DGS in a document designed by Woehrmann.

As shown in Figure 5, the SignWriting documents can be compared to written ones of a spoken language, and this comparison of the two different languages and writing systems provides powerful support for understanding and acquiring the specific contents of the target language. According to Woehrmann, in a relatively short period, children are accustomed to the method of reading and writing with those bilingual materials. They are well prepared and highly motivated to work on their own with documents that consist of many pages. But the acquisition of sign language competence is only the first step; a fundamental problem remains to be solved: deaf children do not have a chance to compare the terms of the unknown target language (spoken language) in systematic alignment with the terms of their strong communication system (sign language) if they are not provided with adequate written materials and documents (Woehrmann, 2003).

During communication in sign language, deaf signers use a great deal of mouth, tongue, and lip movements as if they are speaking without voice. Woehrmann claims this action of mouthing contains important information about the exact word that is being signed with the hands because many signs seem to be identified only by the difference in mouth movement. Therefore, he decided to make use of symbols representing facial expressions in order to show the mouth movements of signers. This unique idea has led deaf students to improve their lip-reading and speaking skills, which will help them later when communicating with other people who do not know sign language. Figure 6 shows the examples of German words written in SignWriting including the mouth movements.

Japanese Deaf Education: Toward the Usage of SignWriting

In Japan, there seems to be an awakening of awareness about JSL use in deaf education, though there still is no official approval of sign language use. The crux of the matter now is

Welche	Farbe	hat	deine	Badehose	?
Meine	Badehose	ist	blau weiß	gestreift	.

Figure 5: DGS designed by Woehrmann

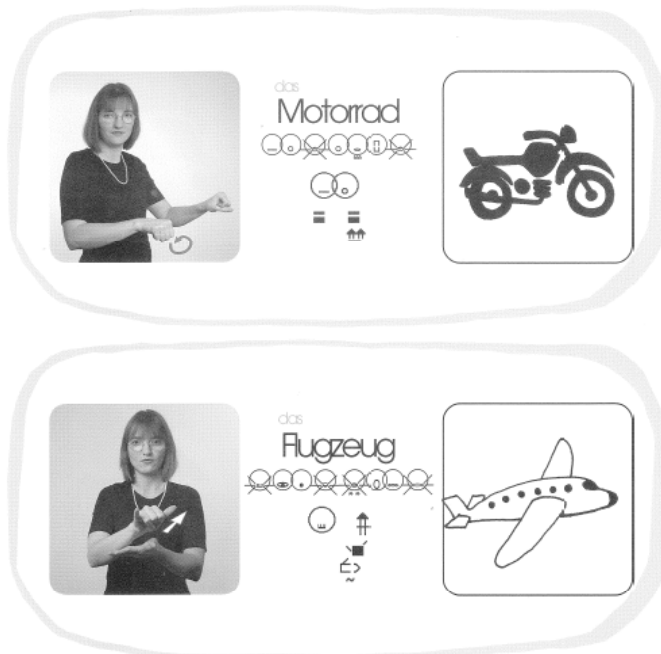


Figure 6: DGS Written in SignWriting with the Symbols for Mouth Movements (Jacobsen, 2006, p. 30)

not whether it is desirable to use sign language in deaf education, but how it is taught as a subject and how it is used categorically to indicate the *raison d'être* of sign language in deaf schools (Hansen, 1987; Lewis, 1995). The goal for deaf children is to become actively bilingual, with sign language successfully taught as their primary language and spoken language as their first foreign language (Bergman, 1994; Mahshie, 1995).

The practical attempt of combining SignWriting with sign language in deaf education in Germany shows that sign language is the key to language acquisition, and that SignWriting is not only a notation system but also a possible written form of a sign language.

Yet, teaching methods cannot always be universally applicable, and should be developed in accordance with the pedagogical environment of each country. In order to pave the way for a rational and systematic education of deaf children in Japan, the following problems are expected to be dealt with:

1. Developing bilingual education pedagogy and finding methods to produce instructors proficient in JSL, the Japanese language, and the SignWriting system;
2. Critical analysis of the SignWriting system as a practical written form of sign languages from a general linguistic point of view to make it a complete international writing system;
3. Establishing teaching methods of JSL and SignWriting;
4. Developing textbooks and documents written in SignWriting;
5. Training teachers who teach Japanese through JSL and SignWriting; and
6. Training specialists in sign language and SignWriting in order to develop JSL and SignWriting as a full-fledged independent language code.

Every writing system of a language needs to be taught in school (or at home) because both writing and reading a language are not inherent skills for human beings; they are acquired intentionally. Therefore, if SignWriting is valuable for literacy education in deaf schools, it also proves to have a great effect on deaf children for reading, writing, and even speaking their target language (spoken language). At the same time, having their own written language will promote a greater respect for deaf people in society as language users, and their culture (the so-called Deaf Culture) will make great advancements.

Conclusion

Since Stokoe analyzed sign language from a linguistic point of view in 1965, notation has become an important theme of sign language research, and the mechanism of sign language has been made clearer with attention from linguists in many fields today. From the description of signs written in these notation systems, the structure of a sign is revealed. This is useful for professionals who want to analyze the language linguistically, but not for general users of sign language because it is too technical. Therefore, it is necessary to find another writing system to adequately describe a sign and signed sentences for everyday purposes.

Signing by the deaf is a language in its own right, and yet it had been a language without a written form until the Sutton SignWriting system was created. SignWriting is a pictorial writing system for sign languages composed of basic elements of hand shape, movement, face

and head cues and punctuation. The application of this system to JSL resulted in indications that the system is effective enough to “write” JSL.

Although more study is needed to analyze sign languages linguistically and make the SignWriting system simpler, more understandable and totally universal, the SignWriting system seems to contribute to the development of a literary tradition among deaf people. Indeed, there are newsletters and books written in SignWriting today in the U.S.A. and other countries. Sutton’s system will also encourage not only deaf people but also the hearing to read and write signed words or sentences for the purpose of learning foreign sign languages.

In Japan, JSL has become socially recognized as a language of deaf people and there is a great interest in using it for deaf education, but there is little interest in the SignWriting system among deaf people, teachers in deaf schools, sign language linguists, and parents of deaf children. However, there is a possibility of a new approach to literacy education for deaf children by writing and reading sign language written in SignWriting. In fact, the practical usage of SignWriting in Germany has had a great impact on the education of deaf children.

Human beings naturally are born with the potential for language. Loss of hearing has little to do with this language faculty. Rather than speech, which depends on hearing, the deaf have developed a sign language that expresses concepts in spatial dimensions with hands and facial expressions. Sign language has as great a potential as any other form of linguistic organization for self-expression. As deaf people establish their cultural identity and expand social opportunities, it is expected that they will further develop this potential to its fullest extent. In order to enhance the cultural and linguistic expression of deaf people in such a context, linguistic scholarship has to carry out investigations of sign language from a general linguistic and notational point of view.

References

- Bergman, R. (1994). *Teaching sign language as the mother tongue in the education of deaf children in Denmark*. Hamburg: Signum Press.
- Friedman, L. A. (Ed.). (1977). *Formational properties of American Sign Language. On the other hand*. New York: Academic Press.
- Hansen, B. (1987). *Sign language and biligualism: A focus on an experimental approach to the teaching of deaf children in Denmark*. Clevedon, UK: Multilingual Matters, Ltd.
- Honna, N., Kanda, K., Oda, Y., & Kato, M. (1984). Shuwa no Hyooki-hoo ni tsuite [A notation system of sign language]. *Journal of the Japanese Society of Sign Language Studies*, 7.
- Jacobsen, V. B. (2006). *Das gebardenbuch* [The sign language]. Gesellschaft für Gebärdensprache und Kommunikation Gehörloser e.V. Hamburg: Germany.
- Kakumasa, J. (1968). Urubu sign language. *International Journal of American Linguistics*, 34.
- Kato, M., & Honna, N. (1989). Shuwa no mojika no kenkyuu: Sutton shuwa moji no nihon shuwa e no ouyou [A study of sign language writing system: An application of Sutton SignWriting System to Japanese Sign Language]. *Journal of Hakuba Kaki Genngo Gakkai Ronbunshuu* [The Hakuba Summer Institute of Linguistics], 3.
- Klima, E. S., & Bellugi, U. (1979). *The signs of language*. London: Harvard University Press.
- Lewis, W. (Ed.). (1995). *Bilingual teaching of deaf children in Denmark*. Denmark: Doveskolernes Materialecenter.

- Mahshie, S. (1995). *Educating deaf children bilingually*. Washington: Gallaudet University.
- Stokoe, W. C. (1960). Sign language structure. *Studies in Linguistics: Occasional Paper* (Vol. 8). Buffalo, New York: University of Buffalo.
- Stokoe, W. C., Casterline, D. C., & Croneberg, C. G. (1965). *A dictionary of American Sign Language on linguistic principles*. Washington, D.C.: Gallaudet College Press.
- Sutton, V. (1981). *Sign writing for everyday use*. Boston, MA: The Center for Sutton Movement Writing.
- Sutton, V. (1984). *Sign writing updates*. Boston, MA: The Center for Sutton Movement Writing.
- Sutton, V. (2007). *Movement writing site*. Retrieved from <http://www.movementwriting.org/>
- Woehrman, Stefan. (2003). Learn To read SignWriting (GebaerdenSchrift). *Das Zeichen*.