UNIVERSAL CONSTRAINTS ACROSS SIGN LANGUAGES:

SINGLE FINGER CONTACT HANDSHAPES

James Woodward

Introduction

Linguists investigating American Sign Language (ASL) have expressed interest in a theory of marking for sign language phonology; i.e. the level of sublexical structure in sign language analogous to but not dependent on the phonological level of spoken languages. Battison (1974) and Siple (1978) are notable pioneers in recognizing physiological constraints on manual signs. Lane (et al. 1967) and Poizner and Lane (1978) have attempted to find perceptual bases for similarities in formational aspects and to develop a feature analysis of handshapes and locations by using tests of perceptions of a visually degraded signal. Frishberg (1975) and others (Woodward & Erting 1975, Woodward & De Santis 1977) have shown that signs in ASL and French Sign Language undergo natural language change, comparable to "unmarking" in spoken languages. Boyes (1973) proposed a four-stage model of handshape acquisition of ASL. McIntire (1974, 1977) retained the notion of four stages but slightly modified the description of the handshapes acquired in each stage.

As De Santis (1980) has pointed out, however, much of this hypothesizing about sign language is based on data from White middle class linguistic consultants. Moreover, most studies have used data from the performance of only one or two consultants. De Santis (1980) and Woodward (1978a) attempted to expand studies of marking by looking at certain locations and handshapes across nine different sign languages from five different sign language using groups.

In this paper I will examine the phenomenon of single finger sign contact in data from ten different sign languages. Table 1 summarizes the sources, but it should be noted that only some of the data were collected by trained linguists, notably those from ASL, FSL, India, Providence Island, and Rennell Island. Despite difference in compilers' disciplinary

ISSN 0302-1475

training, all sign languages show the same patterns and similar frequencies for handshape formation.

	Language	Source	Lexical entries
1	American	Stokoe et al. 1965	1,692
2	Australian	Jeanes et al. n.d.	919
3	British	B.D.A. 1960	325
4	Finnish	S.L. Commission 1973	2,974
5	French	Oleron 1974	872
6	Japanese	Jap. Dict. of Sign	1,078
7	Providence I.	Field data, 1977	1,035
8	Rennell Is.	Kuschel 1974	217
9	Swedish	Bjurgate 1968	2,541
10	Indian	Yasishta et al. 1980	896

Table 1. Sources of data.

The hypothesized relationships are shown below:

French Sign Language	American, Finnish, French, Swedish
British Sign Language	Australian, British
Asian Sign Language	Japanese
Indigenous SL 1	Providence Island
Indigenous SL 2	Rennell Island
Unknown affiliation	Indian (New Delhi)

The French Sign Language group is the best researched of these hypothesized SL families. Old French Sign Language (OFSL) was used until about 1880, at which time it was forced underground by oralists' prohibition of deaf instructors in France. Modern SL in France is a highly restricted version of OFSL. ASL is historically related to OFSL, but there is evidence of a heavy language mixture and possible creolization of FSL with indigenous varieties of SL in the United States from about 1817 (Woodward 1978b). Von der Lieth (1967) points out that Swedish and Finnish Sign Languages are related to OFSL, but modern FSL, ASL, and Swedish and Finnish SLs are not mutually intelligible. (See Jordan & Battison 1976, [1987], and Battison & Jordan 1976 for a discussion of intelligibility across sign languages.)

The British Sign Language group may have a tenuous connection with OFSL, but seems to be a separate group of directly related (by colonization) languages distinct from the FSL group. Stokoe (1965: xxxii) reports much more difficulty in establishing communication with British signers than with French signers. It is important to distinguish between communication of signers and mutual intelligibility of sign languages. The former can and often does occur without the latter (See Battison & Jordan 1976).

Japanese Sign Language is not related historically to the French or British groups, although it appears to have some connection with sign languages used in Hong Kong and on Taiwan.

Indigenous sign languages are those used in isolated deaf communities with no connection to other sign language users. Providence Island in the Caribbean is extremely isolated,and has three to six times the normal (0.1%) incidence of deafness--at least 17 deaf people out of about three thousand (Washabaugh, Woodward & De Santis 1978). Signers there use a sign language different from those on mainland Colombia, of which Providence is a province.

The other indigenous sign language, reported by Kuschel (1975), in contrast to that of Providence Island, is used by only one deaf man and his immediate neighbors on Rennell Island, a Polynesian outlier, which has approximately 1,200 persons and a history of no other deafness in twenty or more generations.

Indian Sign Language (of the New Delhi region), though influenced slightly by British and American sign languages, definitely belongs to a group different from any so far discussed (Vasishta et al. 1980).

With the foregoing data, I here examine the relative frequencies of signs using handshapes with single finger internal contact.[1] There are four possible handshapes involving single finger internal contact, but not

[1] As defined here, contact does not include restrained handshapes (e.g. the 'W' or "restrained '8'" as in HATE) in which the thumb holds down another finger. These restrained handshapes I consider three-finger extension handshapes, because restraint by the thumb also occurs in single finger extension (Woodward 1982) and two-finger extension (Woodward 1982).

all sign languages make use of all four of them. The four are index contact ('F' handshapes), mid contact ('8' handshapes), ring contact ('7' handshapes), and pinky contact ('6' handshapes).

Analysis.

Table 2 shows the occurrence in the ten sign languages of signs with single finger internal contact handshapes when all the signs in the published corpus are included. Table 3 shows the distribution when numeral handshapes (i.e. ASL **6, 7, 8, 9**) and signs borrowed via fingerspelling from spoken languages are included. Both suggest an implication ordering: if the language has handshapes with ring finger contact, then it will have others with little finger contact; if little finger contact, then middle finger contact; and middle finger contact handshapes imply the presence of index finger contact handshapes. As would be expected, the frequency of the index finger contact is greater than that of the others.

Language	Signs	Index	Middle	Pinky	Ring
American	1692	3.70%	0.20%	0.00%*	0.00%*
Indian	896	2.70%	0.10%	0.00%	0.00%
Australian	919	2.40%	0.00%	0.00%	0.00%
British	325	2.20%	0.00%	0.00%	0.00%
Finnish	2974	1.40%	0.00%	0.00%	0.00%
French	872	3.90%	0.00%	0.00%	0.00%
Japanese	1078	5.50%	0.00%	0.00%	0.00%
Prov. Is	1035	5.30%	0.00%	0.00%	0.00%
Rennell Is	217	0.50%	0.00%	0.00%	0.00%
Swedish	2541	2.30%	0.00%	0.00%	0.00%

* Occurs in the language but not in the data

Table 2. Actual frequencies of signs with 1-finger contact handshapes (All signs included).

Language	Signs	Index	Middle	Pinky	Ring
American	1692	3.10%	0.20%	0.00%*	0.00%
Indian	896	2.00%	0.10%	0.00%	0.00%
Australian	919	2.10%	0.00%	0.00%	0.00%
British	325	2.20%	0.00%	0.00%	0.00%
Finnish	2974	1.30%	0.00%	0.00%	0.00%
French	872	3.60%	0.00%	0.00%	0.00%
Japanese	1078	5.53%	0.00%	0.00%	0.00%
Prov. Is	1035	5.20%	0.00%	0.00%	0.00%
Rennell Is	217	0.50%	0.00%	0.00%	0.00%
Swedish	2541	1.90%	0.00%	0.00%	0.00%

*Occurs as a variant of restrained 'W' handshape.

Table 3. Actual frequencies of 1-finger contact handshape signs (Numerals & spoken language borrowings excluded).

Handshapes are more marked as one moves right across the columns. Although neither ring nor pinky finger contact occur in the data, both do occur in ASL. Ring finger contact is slightly less frequent than little finger contact. Middle finger contact occurs in only two sign languages and then only in a very small number of signs. All sign languages make use of index finger contacting handshapes, but it does not occur frequently in any sign language.

The relative markedness of these single finger contact handshapes also holds when we look at the locations in which the handshapes are used. Table 4 shows that if such a handshape is used on the arm it can occur also in trunk location; if on the trunk, then also on the face; and if on the face, then on the other hand or in neutral space (zero *tab*). That is, if a handshape can occur in a more marked location, it tends to occur also in a less marked location(cf De Santis 1978). The data fit this implicational pattern nicely.

Language group	0	1	2	3	4
Hand or Zero Tab	-	+	+	+	+
Face Tab	-	-	+	+	+
Trunk Tab	-	-	-	+	+
Arm Tab	-	-	-	-	+

Table 4. Implicational ordering of locations where 1-finger contact handshapes may occur.

Feature explanation of single finger contact

I propose the features + *ulnar* and + *central* to explain the differences in the frequency and use of single-finger contact handshapes in sign languages generally. Table 5 shows handshapes with these features specified:

Index	Middle	Pinky	Ring
- ulnar	- ulnar	+ ulnar	+ulnar
- central	+central	- central	+ central

Table 5. Features on 1-finger contact handshapes.

It is obvious that *ulnar* is more heavily weighted than *central* because both index and middle finger contact handshapes, the least marked, have the feature - *ulnar*; while pinky and ring finger contact have the more marked characteristic of + *ulnar*. A handshape with the feature - *central* is more likely to occur than the handshape with + *central* (i.e. index *vs.* mid; pinky *vs. ring*). Assigning a marked characteristic (***m***), to the combination of + *ulnar* and + *central*, we obtain the description shown in Table 6:

Index	Middle	Pinky	Ring
		m ulnar	m ulnar
	m central		m central

Table 6. Weighted features on 1-finger contact handshapes.

This analysis complements an earlier analysis of singel finger extension (Woodward 1982), in which I proposed that frequencies of signs with single-finger extension handshapes could be described with the features +/- ulnar and +/- central.[2] The features *central* and *ulnar* are unmarked for single-finger extension handshapes, with the former being the more heavily weighted. A comparison of single finger extension with single finger contact suggests that for all handshapes that involve

[2] Woodward (1985) suggested an analysis for single-finger and 2-finger extension without the feature *central* The present analysis, however, suggets that it is useful to include the feature *central* in the explanation of both extension and contact handshape occurrence, even though the feature *central* is redundant for single finger extension.

single finger manipulation, the features *-ulnar* and *- central* enhance the frequence of occurrence. If the remaining fingers are closed (as in single finger extension), *central* is more heavily weighted than *ulnar*, but if the remaining fingers are open(as in single finger contact), the more heavily weighted feature is *ulnar*.

With two possibilities for weighting the features differently, the preferred weighting is *central* heavy, *ulnar* light. Single finger extension handshapes, with the heavy weighting of *central*, are much more commonly found in sign languages than are handshapes with single finger contact (Tables 7 and 8).

Language	No. of signs	1-finger extension	1-finger contact
American	1692	16.1%	3.9%
Indian	896	20.5%	2.8%
Australian	919	16.8%	2.4%
British	325	20.6%	2.2%
Finnish	2974	18.7%	1.4%
French	872	13.5%	3.9%
Japanese	1078	23.9%	5.5%
Prov. Is	1035	21.6%	5.3%
Rennell Is	217	17.1%	0.5%
Swedish	2541	17.4%	2.3%

Table 7. Frequency of occurrence of 1-finger extension & contact signs (All signs included).

Language	No. of signs	1-finger extension	1-finger contact
American	1692	14.6%	3.3%
Indian	896	19.6%	2.1%
Australian	919	16.3%	2.1%
British	325	20.6%	2.2%
Finnish	2974	18.6%	1.3%
French	872	12.9%	3.6%
Japanese	1078	23.9%	5.3%
Prov. Is	1035	21.6%	5.2%
Rennell Is	217	17.1%	0.5%
Swedish	2541	17.4%	1.9%

Table 8. Frequency of occurrence of 1-finger extension & contact signs (Numerals & borrowings excluded).

Conclusion.

This analysis of the frequency of signs with certain feature constellations in handshape supports the contention that a theory of marking can be developed for sign languages along the same lines as those for marking in spoken languages--only the physiology of the articulating organs differs. The data from published descriptions of ten sign languages show the same trends as those bound by Greenberg (1966); i.e. the occurrence of more marked (more complex) units will imply the occurrence of less marked (more natural) units, and more complex units will be less frequent than more natural ones. Moreover, the more complex units tend to be acquired later in the individual's language acquisition process.

We have seen, to recapitulate, that sign languages with single finger contact also have single finger extension, and that there are many more signs with single finger extension in a sign language than signs with single finger contact. The data from studies of children acquiring ASL also indicate that handshapes with single finger extension are learned before or at the same time as handshapes with single finger contact..

The same set of features, *ulnar* and *central*, can explain both single finger extension and single finger contact. Languages with the feature + *central* will also have - *central*; languages which have the feature + *ulnar* will also have the feature - *ulnar*. Furthermore, handshapes that are - *central* will outnumber those handshapes that are + *central*, and handshapes that are - *ulnar* will be more frequent than those that have the feature + *ulnar*. For single finger contact (open handshapes), *ulnar* is more heavily weighted than *central*; for single finger extension (closed handshapes), *central* is more heavily weighted than *ulnar*.

More research is obviously needed, especially comparative data from widely diverse sign languages, before a theory of marking can be firmly established for sign language phonology. Such pieces as we are able to fit together at this time, however, suggest a strongly ordered

hierarchy of marking for sign language handshapes and point to a natural theory of phonology for all sign languages.

REFERENCES

Battison, R.

1974 Phonological deletion in American Sign Language, *Sign Language Studies* 5, 1-19.

Battison, R. & I Jordan

1976 Communication with foreign signers: Fact & fancy, *Sign Language Studies*, 10, 53-68.

Bjurgate, Anne-Marie

1968 *Tedkensprak for Dova.* Stockholm: Victor Perterson Bokindustri AB.

Boyes, P.

[1973 A study of the acquisition of Dez in ASL. Working paper, Salk Institute, La Jolla, CA.]

BDA (British Deaf Association)

1960 *The Language of the Silent World.* Oxford: Church Army Press.

De Santis, S.

[1980 Location marking across sign languages: Arm marking. Paper at the Summer Meeting of the Linguistic Society of America, Albuquerque.]

Frishberg, N.

1975 Arbitrariness & iconicity: Historical change in ASL, *Language* 51, 696-719.

Greenberg, J.

1966 *Language Universals.* The Hague: Mouton.

Japanese Dictionary of Sign.

n.d. 2 volumes.(Psychology Department, Gallaudet University).

Jeanes, D., R. Jeanes, C. Murkin, & B. Reynolds

n.d. *Aid to Communication with the Deaf.* Carlton, Australia: A. H. Massina & Co.

1976 Comparing the intelligibility of shared & and unshared sign languages. In *Language & Communication Problems,* C. Williams ed. Washington: Gallaudet College Press. [See also SLS 10 and SLS 56.]

Kuschel, R

1974 *A Lexicon of Signs from a Polynesian Outlier Island.* Copenhagen: Psychology Laboratory, Copenhagen University. [See also SLS 3]

Lane, H., P. Boyes-Braem & U. Bellugi

1976 Preliminaries to a distinctive feature analysis of handshapes in ASL, *Cognitive Psychology* 8, 263-289.

McIntire, M.

[1974 A modified model for the description of language acquisition in a deaf child. M.A. Thesis, California State University at Northridge.]

1977 The acquisition of ASL hand configurations, *Sign Language Studies* 16, 247-266.

Oleron, P.

1974 *Elements de Repetoire du Langage Gestuel des Sourds-Muets.* Paris: Centre National de la Recherce Scientifique.

Poizner, H. & H. Lane

1978 Discrimination of location in ASL. In *Understanding Language through Sign Language Research,* Siple ed. NY: Academic Press. 271-288.

Sign Language Commission

1973 *Viittomakielen Kuvasanakirja* Helsinki: Kuurojen Liitto Ry.

Stokoe, W.

1969 Sign language diglossia, *Studies in Linguistics* 21, 27-41.

Stokoe, W., D. Casterline & C. Croneberg

1965 *A Dictionary of American Sign Language on Linguistic Principles.* Washington: Gallaudet College Press [2nd edn. 1976. Silver Spring, MD: Linstok Press]

Vasishta, M., J. Woodward & S. De Santis

1980 *An Introduction to Indian Sign Language: Focus on Delhi.* Delhi: All India Federation of the Deaf.

Washabaugh, W., J. Woodward & S. De Santis

1978 Providence Island Sign Language: A context-dependent language, *Anthropological Linguistics* March, 95-109.

Woodward, J.

[1978a Signs of marking: "Stage" four handshapes. Paper at Summer Meeting of Linguistic Society of America, Urbana, IL.]

1978b Historical bases of ASL. In *Understanding Language through Sign Language Research,* Siple ed. NY: Academic Press. 333-348.

1982 Single finger extension: for a theory of naturalness in sign language phonology, *Sign Language Studies* 37, 289-304.

1985 Universal constraints on two-finger extension across sign languages, *Sign Language Studies* 46, 53-72.

---- & S. De Santis

1977 Negative incorporation in French and American Sign Languages, *Language in Society* 6:3, 379-388.

---- & C. Erting

1975 Synchronic variation & historical change in ASL, *Language Sciences* 37, 9-12.

AUTHORS

(Continued on page 374)