

## **On the Web Communication Assist Aide based on the Bilingual Sign Language Dictionary**

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### **Abstract**

We discuss the basic ideas behind a Japanese to American Sign Language Translation System for the Japanese users, which assists Japanese Deaf people to communicate. Our discussion covers two main points. The first describes the necessity of a Sign Language Translation System. Since there is no “universal sign language” or real “international sign language,” if Deaf people should learn at least three languages: they want to talk to people whose mother tongue is different from their owns, the mother sign language, the mother spoken language as an intermediate language, and the sign language in which they want to communicate. The second describes the use of computer, especially WWW which is very popular today. As the use of computers becomes widespread, it is increasingly convenient to study through computer software or Internet facilities. Our translation system provides Deaf people with an easy means of access using their mother-spoken language. It also provides a way for people who are going to learn American sign language to look up new vocabulary. We are further planning to examine how our system could be used to educate and assist Deaf people.

### **1. Introduction**

Although monolingual sign language dictionary systems for American, Spanish, Japanese and others have already existed, there is none to translate each sign languages. In this paper we describe a Japanese-to-American sign language translation system. This system contains Japanese indices to American signs. We have made the first trial Japanese-to-American sign language translation system. We plan also to develop this translation system further to facilitate access and language acquisition for sign language learners.

Recently some digital sign language dictionaries are available either through Internet or digital devices. Many of those utilize animation to show the sign language despite animation’s reputation for being friendly for beginners but inadequate at showing each sign in detail. In sign languages, it is important to display the face expression and also the specific finger movement. Motion pictures introduce how signs are used in each sign language structure and present clear, explicit directions. So we decided to use human motion pictures instead of animation in order to show each sign in more detail. The maximum length for a regular paper is 12 A4 pages, and that for a short paper is 8 A4 pages, including Acknowledgements and References.

## 2. American Sign Language(ASL) & Japanese Sign Language(JSL)

### 2.1.American Sign Language(ASL)

American Sign Language (ASL) is a complex visual–spatial language that is used by the Deaf community in the United States and English-speaking parts of Canada [Nakamura (1)]. The number of ASL users is almost 5 hundred thousand. It is the native language of many Hearing-Impaired people, as well as some hearing children born into Deaf families. ASL is derived from the native American sign language with some words taken from French sign language.

ASL shares no grammatical similarities to English and should not be considered in any way to be a broken, mimed, or gestural form of English. In terms of syntax, for example, ASL has topic-comment syntax, while English uses Subject-Object-Verb.

### 2.2.Japanese Sign Language(JSL)

There are two main sign languages in Japan: “Japanese Sign Language,” and “Japanese Oral Sign Language.” The former is used by Deaf people and the latter is mainly used by volunteers and is a pidgin signed Japanese, often used in formal situations, lectures, speeches. The main difference between the two is the sequence of the words. The syntax of “Japanese Sign Language” is like spoken English using Subject-Verb-Object, and the syntax of “Japanese Oral Sign Language” uses spoken Japanese order, that is, Subject-Object-Verb. In this paper, since we deal only with a sign language word dictionary and not with syntax, we will use the word “JSL” to refer to both Japanese sign languages in this paper.

### 2.3.Language Selection

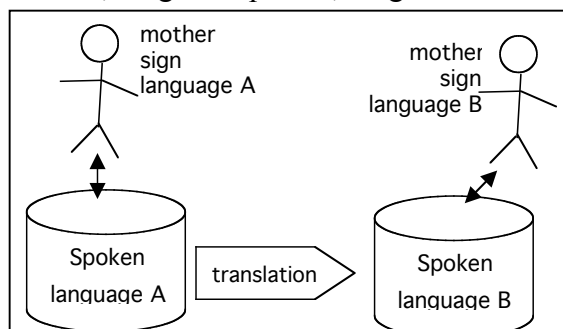
As mentioned in the previous section, in terms of syntax, ASL has more in common with spoken Japanese than with English. For example, in spoken English, they say “What is your name?,” while ASL signs “name”+“what,” whose word order is completely the same as oral Japanese. On the other hand, the word order is “what”+“name” in JSL, which is more alike spoken English. That is one of the main reasons for us to focus on ASL for a bilingual dictionary. Another reason is that ASL is the fourth most commonly used language in the U.S.A. We assume that it is easier than learning another sign language for those who already know Japanese Sign Language (JSL) and are going to learn a second [Nakamura (2)]. Further, according to some TV programs and newspaper reports, JSL is recently becoming more popular among Japanese. So we decided to provide a bilingual dictionary for those who wish to learn JSL and ASL.

## 3. Problems of Digital Dictionaries

### 3.1.Problems of Spoken Language Digital Dictionaries

Recently many digital dictionaries are available on Internet or on CD-ROM. Some of the electronically accessible bilingual dictionaries and corpora include: English-French, German-English, Albanian-Spanish, English-Romanian, Greek-Russian, English-Spanish, English-Russian, English-Estonian, English-Hungarian, and Esperanto-English. These on-line dictionaries are easy to access by just viewing an Internet dictionary site.

Almost all of these dictionaries are for the people who can read and write their mother language smoothly and not for those who have some disability in their mother tongue. It is reported that the mother tongue for those who were born deaf is sign language, especially for those born into a Deaf family. The problem for those Deaf children is that it is difficult for them to learn the spoken language for their country. Since their mother tongue is sign language,



**Figure 1.** Learning Foreign Sign Language

the spoken language becomes their second language. When they want to learn another foreign language, they have to learn the spoken foreign language first, and then, the second foreign sign language to communicate (Fig. 1).

### 3.2. System Language

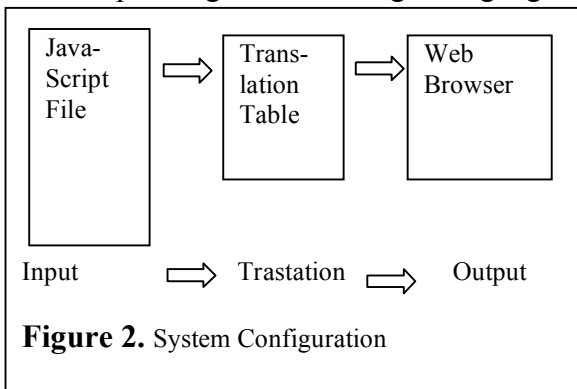
Recently, many translation sites are available on WWW. Many of these sites are utilizing Javascript Language as to build the translation pages.

Not only to give animation or motion on the WWW sites, but also it is very useful to build especially sign language Web site to use Javascript Language. Because Javascript divides us easy construction ways and also appropriate application methods to represent the sign language motion. So our system is written by JavaScript.

## 4. System Configuration

### 4.1. Overview

Fig. 2 shows our system configuration. As you can see, we can search American sign language sentence by just inputting Japanese words. Now our translation system acquires only 6 words maximum for each sentence. Once you choose words in Japanese order, our system will show you the corresponding American Sign Language sentence using Web browser.



### 4.2. Search Flow

When this translation system starts up, the word list displays the languages the user can select (Fig. 3). As you may see the alphabetical word list in Figure 3, users can make a sentence which contains maximum 6 Japanese words. Upon inputting of a sentence, the translated American Sign Language signs are shown Fig. 4.

**選択画面**

下の単語一覧から単語を(最大6個まで)選んで文章を入力してください

あ行	会う	明日	暑い	あなた	兄	姉	雨
	行く	いくつ	妹	うれしい	映画鑑賞	駅	おいしい
	夫	弟	おはよう	音楽鑑賞	音楽会		
か行	会社	買い物	帰る	学校	悲しい	かわいしい	聞く
	兄弟	嫌い	曇り	警察署	ごめんなさい	こんにちは	こんばんは
さ行	寒い	さよなら	市	姉妹	住所	趣味	好き
	祖母						
た行	食べる	誰	父	妻	釣り	できない	天気
	どちら	友達	ドライブ				
な、は行	ない	なぜ	何	はじめまして	話す	母	睡れ
ま、や行	毎日	ますい	町	見る	やさしい	郵便局	雪
ら、わ〜ん行	両親	旅行	私				

単語1    単語2    単語3    単語4    単語5    単語6

実行

**Figure 3.** Alphabetical Word List (in Japanese)



**Figure 4.** Translated American Sign Language View

## 5. Conclusion

We have already completed a Japanese sign language dictionary with 136 entries that came from the JSL dictionary for beginners [Yonaiyama and Ogata 2001]. We also used corresponding American sign language entries, but some of the words do not exist. We are planning to add more Japanese and American sign language motion pictures. The cross-referenced features in our dictionary offer students, sign language learners, and deaf people, a genuine two-language resource that enhances the opportunity to obtain communication skills in both modes. We know that introducing ASL in the English learning classroom attracts the students' interest and is effective in learning a foreign language [Pauly, M., Miyao M., and Ikeguchi C. 2003]. As mentioned earlier, the word order in ASL is from general to specific and from large to small, similar to the Japanese language. This results in easier learning of each language.

We are currently working to expand our bilingual dictionary as a translation table. We are planning to test it and obtain feedback and suggestions from Deaf people. Some comments on References:

## 6. Acknowledgements

Our thanks go to those who encouraged to continue this work, and also those who helped constructing the bilingual sign language dictionaries.

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