Study of Sign Language Expression of Medical Sign Language Words

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Abstract—**This paper will outline the construction of a database of medical sign language words. The authors of this paper investigated the more straightforward expression of medical sign language by analyzing the problems of the existing sign language words. As a result of a number of investigations into sign language expressions, by paying attention to more straightforward sign language expressions and focusing on the consistency of movements and the unification of expressions, we have created representations for 1,324 words on the basis of the existing movements.**

Keywords–Sign Language; Medicine-Clinical Terms; Database

I. INTRODUCTION

The medical field is one of the areas in which sign language interpreting is required. Although sign language for medical use has already been investigated, the sign language expressions have not yet become widely popular. This is due to certain problems such as different expressions for words with the same meanings depending on the book, the existence of a number of sign language expressions that are not commonly used, and inconsistency in the creation of sign language words. Moreover, medical terminology includes many technical terms, and it is difficult to accurately understand the explanations of doctors and nurses and translate them into sign language [1].

This paper will examine the sign language expression of medical terminology. In Section II, for the existing medical sign language expressions, an examination will be undertaken of the problems with the existing method of creating medical sign language words. In the database of medical sign language words, an examination of the method of creating words will be undertaken by the authors of this paper. In Section III, this paper will explain the development of the Kogakuin medical sign language word database, KOSIGN V5 (hereinafter, "KOSIGN").

II. EXISTING MEDICAL SIGN LANGUAGE EXPRESSIONS

The medical sign language expressions presented in existing books involve problems, including those listed below [2] [3].

1) Expressions that are not commonly used are included.
2) There is no consistency in the expressions, even for related words.
3) Inappropriate methods are adopted when creating words, ignoring convenience for people in terms of making movements.
4) Sign language movements are presented as still images in books, so it is difficult to understand the specific movements involved.

Moreover, in terms of the problems of medical terminology itself, there are numerous technical terms and it is sometimes difficult to correctly understand their meanings.

III. METHOD OF USING KOSIGN TO CREATE WORDS

In creating the words, we focused on the consistency of movements and the unification of sign language expressions. Moreover, while creating the words, we took into account the convenience for people in terms of making movements and a more straightforward method of expression. We created words mainly for commonly used words in a hospital setting, such as names of body parts, organs and bones, medical conditions and diseases, hospital departments, tests and equipment, and drugs. Table I shows word classification and examples.

TABLE I. Medical word classification and example words

Classification	Example words
Body parts	Head, Face, Body, Skin, Eye
Organs and Bones	Stomach, Skull, Spine, intestine, lung
Medical Conditions and Diseases	Cold, High Blood Pressure, Stomatitis, Dizziness
Hospital Departments	Surgery, Gastroenterology, Internal Medicine
tests and equipment	echocardiography, MRI, endoscopic
drugs	mouthwash, antibiotics, powdered medicine, tablets
others	doctor, receptionist, medical history, recurrence

A. Consistency of Expressions

Sign language words in KOSIGN are created in such a way that if words are related, the same expressions are used. In this paper, Japanese Sign language words are represented in $\{CAPITAL\ LETTERS\}$.

For example, for words such as $\{XXX\ DISEASE\}$ and $\{YYY\ SYNDROME\}$, the expressions are unified in all the words by placing either

$\{DISEASE\}$

or

$\{SYNDROME\} = \{VARIETY\} + \{DISEASE\}$

at the end.

Figure 1 shows an example of "Heart disease". The animation images used in Figure 1 were created using TV program Making Language (TVML), which is currently being developed by NHK Science & Technical Research Laboratories.

Moreover, for words related to $\{BONE\}$, to clarify the expression $\{BONE\}$, it has been determined that the words be expressed by including $\{BONE\}$. However, movement words that are commonly used, such as $\{SPINE\}$ and $\{CLAVICLE\}$, are expressed without including $\{BONE\}$.
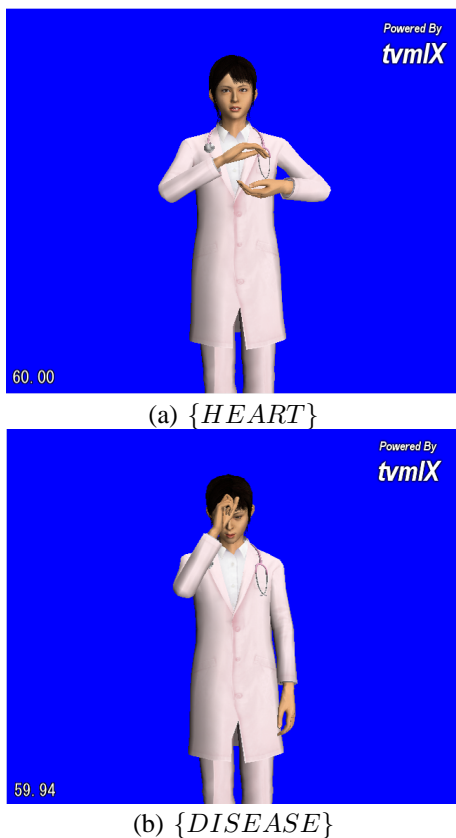
(a) {$HEART$}

(b) {$DISEASE$}

Figure 1. Sign language for the word "Heart disease"

B. Method of Creating Words

Morphological elements that are used in the expressions of sign language for medical words adopt not only the existing morphological elements, but also expressions that are similar to gestures to express medical and treatment activities. For example, in expressions related to medication, movements imitating the actions of drinking or applying are involved. Sign language sometimes expresses words by adopting movements that are similar to gestures. As a result, in the expression of medical sign language, if it is considered to be easier to understand, expressions similar to gestures are also adopted.

The signer expresses body parts that are externally visible by pointing to their own body parts. In contrast, when creating words for the names of organs that are not externally visible, the signer not only points to the position where the organ is located, but also indicates the shape of the organ.

Moreover, many explanatory sign language expressions are used to express words with difficult meanings. For example, an antacid is expressed in sign language that describes it as a medication that suppresses the rise of acid substances.

There are also expressions that use Japanese words, which are similar to explanatory sign language. This is a method of creating words to represent the expression of Japanese labels in sign language. When using Japanese words, the signer's knowledge of Japanese words is a precondition. We believe that this is not a significant problem, because the Japanese language capability of sign language native speakers has recently improved.

There are many medical terms whose meanings are explained using kanji. In such cases of expressions using kanji, the signer expresses the Chinese characters in the order in which they appear.

There are also cases when manual characters are used. In manual characters, there are cases when all the Japanese labels are expressed by manual characters, and cases when expressing some Japanese labels using manual characters plays the role of supporting the subsequent sign language expressions.

C. Database of Medical Sign Language Words: KOSIGN

The purpose of developing KOSIGN is to promote sign language by providing explanations of medical terminology and difficult terms that sign language interpreters, sign language native speakers, medical workers and other people are considered to require at the time of medical treatment. The method of creating new words is that the existing problems are analyzed and the focus is placed on the consistency of movements, the unification of expressions and a more straightforward way of making expressions.

Moreover, when using the existing sign language movements instead of creating words, investigations are also undertaken to determine whether or not the relevant movement expressions are widely used. Medical words to be created in sign language and explanatory notes were selected with the cooperation of medical workers acting as sign language interpreters, sign language interpreters, sign language native speakers and other parties. KOSIGN has determined 1,324 sign language words to date.

IV. CONCLUSION AND FUTURE WORKS

The authors of this paper have developed a database of medical sign language words. By analyzing the problems of the existing sign language, we investigated sign language expressions that are easily understood so that they will be widely used. As a result, KOSIGN has determined 1,324 words using sign language movements.

We will strive to further improve the database to achieve the popular use of the expressions of KOSIGN in the future. By examining whether or not there are other words that need to be included, we will create and add necessary words by also using the synthesis of morphological elements. In addition, we will add explanatory notes.

REFERENCES

[1] M. Terauchi, et al., "Compilation of a sign language database for use in medical practice," Proc. of the Communications in Computer and Information Science (CCIS) series, June 2014, pp. 264–269: , HCI International 2014, ISBN: 978-3-319-07853-3.

[2] Medical Sign Language Language, Medical Sign Language Series 1-3, Publication Bureau of Japanese Federation of the Deaf, Tokyo, 2009(in Japanese).

[3] F. Nakagawa, Medical Sign Language Dictionary, Hiroshima Prefectural Sign Language Interpretation Research Association, Hiroshima, 2005(in Japanese).