

# Development of Web-based Teaching Material for Simultaneous Interpreting Learners using Bilingual Speech Corpus

Hitomi Tohyama

Graduate School of Information Science, Nagoya University, Japan

hitomi@el.itc.nagoya-u.ac.jp

Shigeki Matsubara

Information Technology Center, Nagoya University, Japan

matubara@itc.nagoya-u.ac.jp

**Abstract:** CIAIR of Nagoya University, a simultaneous interpretation corpus between Japanese and English has been constructed over five years. The size of transcribed data is about 1 million words and this corpus therefore would deserve to be called the simultaneous interpretation resources of the largest-in-the-world class. This paper suggests a method of extracting the data for training future simultaneous interpreters from the corpus according to difficulty order. This method was developed based on the simultaneous interpretation theory having been constructed upon the analysis of the corpus. This paper also describes two kinds of tools for supporting learners to acquire the complex skills of simultaneous interpretation. These tools made it possible to help them by providing the new way of learning the interpretation skills, which is to show the professional interpreters' techniques as visible examples, instead of the traditional way of training interpreters in college, just to interpret tape-recorded lectures during the lesson.

## 1. Introduction

In recent years, many universities and educational institutions have been providing the curriculum for developing practical human resources that especially focuses on training undergraduates and graduate students who have specialized potential (Rikkyo Univ. 2005, Nagoya Univ. 2005). Courses on interpretation are one of those curriculums and quite a few universities open the courses on interpretation theory and the seminars for acquiring interpretation skill. In this academic climate, there has been growing interest in the study about interpreter education (Kornakov 2000).

Today, many materials for learning English have been produced and some of them are specialized for e-learning. However, there have been just a few effective materials and training courses developed for the students who already have high English proficiency and who can speak English fluently. Little effort has been made for developing support materials that can be used for teaching simultaneous interpretation skill. The reasons of this low level of attention to developing materials for simultaneous interpretation skill are (1) that effective training theory is yet to be established because researchers still don't understand the whole aspect of simultaneous interpretation, the human brain activity which requires the maximum level of human working memory and (2) that there exists no enormous data of English-Japanese simultaneous interpretation. Therefore, the construction of simultaneous interpretation theory based on enormous data and the development of simultaneous interpreter training materials by analyzing the data has long been awaited.

This paper suggests a method of extracting the data for training future simultaneous interpreters from a bilingual corpus (Kawaguchi, et al. 2003). This method was developed based on the simultaneous interpretation theory having been constructed upon the analysis of the corpus. This paper also describes two kinds of support tools for learners. These tools support learners to acquire difficult skills such as "controlling utterance speed," "interpreting timing," "controlling the length of pause," "dividing the whole speech into interpretation units," and "utilizing the

interpretation patterns.” These tools made it possible to help them by providing the new way of learning the interpretation skills, which is to show the professional interpreters’ techniques as visible examples, instead of the traditional way of training interpreters in college, just to interpret tape-recorded lectures during the lesson.

In this paper, we describe the design of the CIAIR (Center for Integrated Acoustic Information Research) Simultaneous Interpretation Corpus in Section 2. In Section 3, we propose the way to develop training materials by using the corpus while referring the simultaneous interpretation theory constructed from data analysis. In Section 4, we describe tools for training simultaneous interpretation skill, which have been under development with the teachers and instructors engaging simultaneous interpretation training. In Section 5, we consider the significance of developing support tools for training interpreters by using simultaneous interpretation corpus and also discuss the further issues.

## 2. CIAIR Simultaneous Interpretation Corpus

A simultaneous interpretation corpus (between Japanese and English) has been constructed by CIAIR (Tohyama, et al. 2004). The CIAIR has aimed at the realization of the multi-lingual communication supporting environment and construction of a simultaneous interpreting theory (Tohyama, et al. 2006[6,7,8]). The corpus recorded both monologue and dialogue data. The contents of the corpus are daily topics (economics, history, and, culture, etc.). The corpus targets English and Japanese. The recording time is 182 hours in total. The speech data has been all transcribed and visualized (as Figure 1 shows). The size of transcribed data is about 1 million words, and the corpus would deserve to be called the simultaneous interpretation corpus of the largest-in-the-world class. This corpus consists of three parts, the speech data, the text data, and environment data. Moreover, a bilingual/parallel corpus of simultaneous interpretation has also been constructed as a part of this project. The discourse tag and the utterance time tag were given to the corpus. In this paper, we discuss the teaching material development that uses monologue data. Moreover, each monologue speech is interpreted by two or four professional interpreters. Therefore, it becomes possible to compare those interpretation examples in a sample of utterance. The speech was recorded for about 10 minutes per lecture.

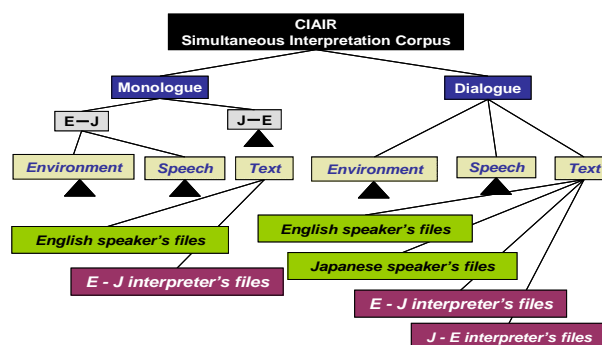


Figure 1: Structure of the CIAIR simultaneous interpretation corpus

## 3. Construction of Interpretation Theory and Classification of Data for Teaching Material from the Corpus

In many universities, the courses on interpretation are usually opened for such students who have high English competence and have TOEIC score 850 or more. Thus, the purpose of those courses is not to learn English but to acquire interpretation skill. Simultaneous interpretation skill is particularly difficult and complicated compared with consecutive interpretation because interpreters have to make his/her utterance while they are processing the incoming sentences instead of waiting for the end of sentences. In order to develop support tools for the simultaneous interpreters, it is necessary to focus on the following three points:

1. To collect the simultaneous interpreters' strategies, that is, how they follow the incoming sentences of speakers and make their utterance without delay, by analyzing enormous data of the utterance of professional simultaneous interpreters quantitatively and qualitatively
2. To extract the interpretation data according to the difficulty level of interpretation skill from the corpus built upon the simultaneous interpretation theory established so far
3. To develop the support tools which enable learners to acquire interpretation skill efficiently in collaboration with professional simultaneous interpreters and the educators of interpretation

### 3.1 Analysis of Simultaneous Interpreter's Strategies

This section briefly explains some points about the interpretation theory which has been constructed from the analysis of corpus. Strategies a), b), c) are the measures index that are used when the data for developing teaching materials is extracted in descending order of difficulty from the large-scale simultaneous interpretation corpus mentioned in Section 3.2. Strategy d) is referred in section 4.

#### Strategy a) Controlling utterance speed

According to the strategy proposed by Tohyama et al, the utterance speed of simultaneous interpreters has been observed carefully in terms of their strategy for following speaker utterances (Tohyama, et al 2005[6]). The result of analysis shows that there are two patterns in their interpretation, A Pattern and B Pattern. We can see one pattern of the strategies used by the simultaneous interpreters in Pattern A in which they control their utterance speed along with speakers' utterance speed. In Pattern B, we can see another strategy, in which they keep their utterance speed steady however fast or slow speakers speak. (For learners, B Pattern, which shows how the interpreters maintain their own utterance speed, is preferable.)

#### Strategy b) Controlling delay time

Tohyama et al. paid attention to simultaneous interpreters' distribution of interpretation delay time, rollback operation for the delay time and interpretation start timing so as to observe their following-the-original-language strategy. As a result, they identified one following pattern which the interpreter takes long delay time and various interpreting start timing and thus there are a number of delay interpretation units. The other following pattern identified is that the interpreter doesn't take almost no delay time and delay interpretation units and her interpreting timing is relatively constant.

#### Strategy c) Controlling the length of pause

To control the length of pause is closely related to the interpretation strategy and pause influences the process in which listeners understand what they hear (Tohyama, et al 2005[7]). They conducted experiments to clarify this influence by using 31 subjects and two different types of simultaneous interpretation data, these being free-utterance lectures without a prepared script (A-style lectures), and lectures based on prepared scripts (B-style lectures). They selected 12 A-style lectures and 9 B-style lectures from the CIAIR Simultaneous Interpretation Corpus. The results reveal that in A-style lectures where the speed of speeches was relatively low, it was ascertained that the lengths of pauses appearing in interpreters' utterances were short in cases which the subjects evaluated as listener-friendly interpretation. In B-style lectures where the speed of speeches was high, it was ascertained that the length of interpreters' pauses has little influence on the subjects' listener impressions. Moreover, they found a common feature in both lecture styles: the listener impressions were based on the stability of the speech-pause period and the presence of rhythm.

#### Strategy d) Making good use of site translation pattern

The simultaneous interpreters are required to generate target speeches simultaneously with source speeches. Therefore, they have various kinds of strategies to raise simultaneity. In this investigation, the simultaneous interpreting patterns with high frequency and high flexibility were extracted from the corpus (Tohyama, et al. 2006[8]).

### 3.2 Extract the Interpreter Data According to the Difficulty

Figure 2 shows the process of extracting the interpretation data appropriate for teaching materials by the difficulty level of interpretation skill from the corpus built upon the simultaneous interpretation theory established so far. The procedure is shown as follows:

#### \*Step 1

Categorize the lecturers' speech data into two groups, the data with high utterance speed and the data with low utterance speed.

#### \*Step 2

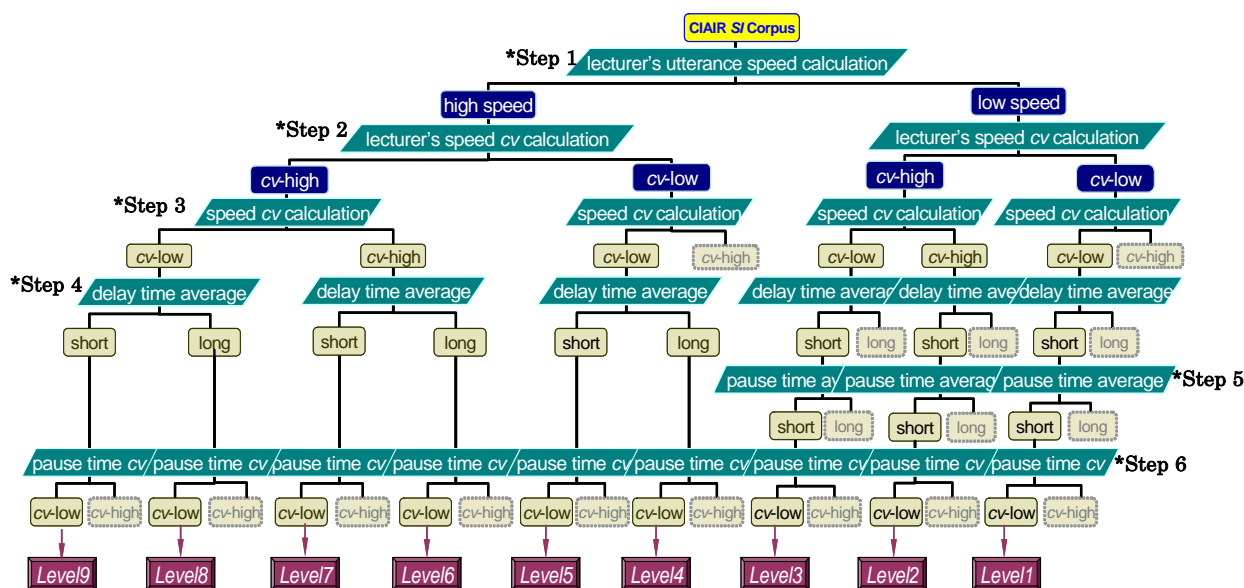
After the calculation of coefficient of variation has done, categorize those data into two groups, the group with more utterance speed variations and the group with fewer utterance speed variations.

**\*Step 3**

Calculate the coefficient of variation of utterance speed. Categorize those data into two groups, one group in which speakers use the strategy that they adjust their utterance speed to that of lecturers and the other in which speakers employ the strategy that they maintain their own speed.

**\*Step 4**

Using the parallel corpus in the CIAIR corpus, calculate the time the interpreters lost while they are processing the incoming sentences in each aligned unit. (To shorten the delay time is more difficult)



**Figure 2:** Process of extracting the various interpreter data according to the difficulty

\* Parallelograms show the processing of data. \* All boxes show the text data and the speech data.  
 \* The utterance speed and the coefficient of variation can be calculated from the numbers of mora per utterance unit and time information. \*cv: coefficient of variation

**\*Step 5**

Calculate the average time of pauses in one interpretation case by using the interpreters' data. The interpretation with shorter average pause time is better, although it was clarified from our experiment that whether pause time short or long does not affect the listeners' impression when lecturers speak fast. Thus, we did not take into consideration the pauses in the cases with faster lecturers' utterance speed.

**\*Step 6**

Using the interpreters' data, investigate the variation of pause length in interpreters' utterance. The cases with the same length of pause in each utterance unit should be considered as better interpretation generated by advanced interpretation skills.

## 4. Support Tool for Acquiring Interpretation Skills

In section 3, we described the method for extracting of interpretation data (text and speech data) for teaching materials from the corpus that vary in the levels of difficulty. For example, the data in which speakers speak with fast and unstable speed while interpreters keep own speed, which means interpreter's delay time and pauses length are stable. The level 1 data which is the date with slow and stable utterance speed of lecture would be preferable for the beginners.

Next issues are how to provide those interpretation data to the learners and how to make the process of their acquiring interpretation skills easier. We have developed two kinds of support tools for future interpreters. Because

these tools enable learners to perceive the interpretation skill by using their visual and auditory sense, their learning process will be facilitated.

They have been developed as software which can be performed on the Web server, and a user can refer to the data easily by using a browser. There are 4 cases of interpretation per one lecture in the simultaneous interpretation corpus. Thus, it is possible to compare the interpretation techniques or skills seen in one interpretation case to those of the other cases.

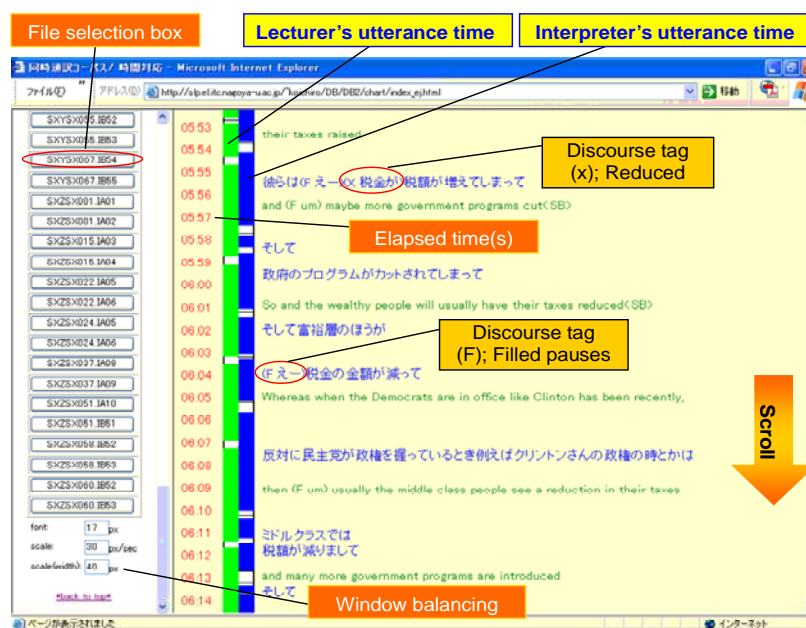


Figure 3: Sample of time chart tool

#### 4.1 Time Chart Tool

We visualized the simultaneous interpreters' utterance or, in other words, the way they follow speakers' utterance, in chronological order in Figure 3. The numbers on the left column shows how long it has passed from the beginning of the lecture. The column next to the time column shows what the lecturers and interpreters said. The learners can study the utterance timing, the length of pause and how much the interpreter's utterance overlaps that of lecturer (see section 3.2, strategy a) - c)). They can also feel the speed of the interpreter's utterance because they can listen to what had actually been said as they use this tool.

#### 4.2 Parallel Interpretation Tool

In Figure 4, we showed the learning-support tool of interpretation units developed from the parallel/bilingual corpus. Learners are able to learn how the interpreters divide the whole speech of the lecturer into interpretation units. And because utterance tags being attached, they can also observe how the interpreter corrects his or her misinterpretation while they are interpreting (Please refer to 3.2, strategy d)).

### 5. Conclusion

In this paper, the development of support tool for future interpreters using the CIAIR simultaneous interpretation corpus, the complicated strategies of professional simultaneous interpreters have been clarified. This enormous corpus also has been categorized into appropriate order of difficulty by using interpreters' strategies as index. To facilitate learners' acquiring the interpretation skills, two kinds of support tools was developed from the visible and

The screenshot shows a web browser window displaying a parallel interpretation tool. The title is "同時通訳コーパス/講演の文対応 - SXOSX020.IA05". The interface includes a table with columns for source and target files, and a main table with columns for aligned IDs, lecturer's utterances, interpreter's utterances, and utterance start-end times. Annotations include a "File link" pointing to the source file, a "File name" pointing to the target file, a "Parallel" arrow between the two columns, a "Lecturer's utterance" box, an "Interpreter's utterance" box, an "Aligned ID" box, an "Utterance ID" box, an "Utterance start-end" box, and a "Sentence break tag" box. A yellow arrow labeled "Scroll" points downwards on the right side of the table.

#	Aligned ID	Lecturer's utterance	Interpreter's utterance	Utterance start-end
0	00001 - 00:06:44	is going to	0001 - 00:06:44	
1	00002 - 00:08:40-00:11:032 N	Presidential debate	0002 - 00:08:40-00:09:783 I	アメリカか
2	00003 - 00:11:42-00:13:64	ould be the	0003 - 00:10:296-00:12:775 I	(F え)大統領に関するディベート
3	00004 - 00:13:64-00:15:46	dent for America<SB>	0004 - 00:13:096-00:14:424 I	そして誰か
4	00005 - 00:16:272-00:18:327 N	(F um) Let's see, today is	0005 - 00:14:48-00:18:255 I	より
5	00006 - 00:18:640-00:20:400 N	December fifteenth	0006 - 00:18:728-00:19:263 I	今日
6	00007 - 00:20:696-00:24:407 N	and it's been about a month and a half	0007 - 00:19:528-00:21:887 I	十二月の十五日ですの
7	00008 - 00:24:792-00:27:487 N	the (F umm) American	0008 - 00:22:472-00:24:711 I	そして( F まあ)一ヶ月半ほど
8	00009 - 00:27:880-00:29:095 N	presidential election	0009 - 00:25:160-00:26:311 I	経ってると思っんですが
9	00010 - 00:29:352-00:31:775 N	took place on (X December seventh)	0010 - 00:27:504-00:28:181 I	アメリカか
10	00011 - 00:32:600-00:34:463 N	or excuse me, November seventh	0011 - 00:28:704-00:30:487 I	大統領選挙が経ってからですええ
11	00012 - 00:34:720-00:35:719 N	and (F um)	0012 - 00:31:280-00:33:711 I	それから十二月七日に選挙があったん
12	00013 - 00:36:120-00:36:591 N	(noise)	0013 - 00:34:120-00:36:071 I	あこめんなあ、十一月七日でしたね<SB>
13	00014 - 00:38:632-00:38:735 N	(S the) (D a) the whole scandal has	0014 - 00:37:656-00:40:447 I	(F え)そしてこのスキャンダルというの
14	00015 - 00:39:080-00:43:328 N	that (F um) (F the) the race for the	0015 - 00:41:600-00:43:130 I	(F え)大統領選
15	00016 - 00:43:504-00:44:887 N	has been very close<SB>	0016 - 00:43:424-00:43:801 I	というの
16	00017 - 00:45:176-00:46:439 N	Almost every state	0017 - 00:44:136-00:46:327 I	その投票が( F え)かなり近い
17	00018 - 00:46:760-00:50:455 N	has (noise) been roughly fifty percent	0018 - 00:46:584-00:48:287 I	( F え)ほとんどの州におい
18	00019 - 00:47:040-00:57:975 N	(noise)	0019 - 00:48:936-00:49:498 I	( F え)たし、
			0020 - 00:49:976-00:51:071 I	五割五分
			0021 - 00:51:408-00:53:079 I	( F え)選が落れてしまったと

Figure 4: Sample of parallel interpretation tool

audible data of the CIAIR simultaneous interpretation corpus. As a consequence, these tools made it possible and easy to support their learning process because these tools show the learners the processional interpreters' ways of interpretation as examples while the traditional way of training future interpreters had been just to let them listen to tape-recorded lectures. The opinion on these assisting tools from professional simultaneous interpreters, the instructors of interpretation and the learners/future interpreters is being collected and these tools have gotten fairly high evaluation from them. Now we are working on the improvement of the support tools with those who are involved in interpreter education. We are planning to develop those tools with feedback function for learners in near the future. The CIAIR corpus has been already exhibited. For more details, please refer to the following URL: <http://slp.el.itc.nagoya-u.ac.jp/sidb/>

### Acknowledgments

The authors would like to thank Prof. Toyohide Watanabe, Assoc. Prof. Nobuo Kawaguchi at the Nagoya University, Mr. Aizawa and Mr. Takagi of Matsubara Laboratory alumni for their precious advice. This work is partially supported by the Grand-in-Aid for Exploratory Research (No. 17652040) of JSPS.

### References

- [1] Kormakov, P. (2000). Five Principles and Five Skills for Training Interpreters. *Volume 45, 2000s* (pp. 241-248).
- [2] Kawaguchi, N., Matsubara, S., Takeda, K., and Itakura, F. (2002). Multi-Dimensional Data Acquisition for Integrated Acoustic Information Research. *LREC 2002, Spain. Proc.* (pp. 2043-2046).
- [3] Nagoya University. (2005). [online] <http://www.lang.nagoya-u.ac.jp/kosenjin/>.
- [4] Rikkyo University. (2005). Graduate School of Intercultural Communication, [online] <http://www.rikkyo.ne.jp/%7Ez3000257/i-c/index.html>.
- [5] Tohyama, H., Matsubara, S., Ryu, K., Kawaguchi, N., Inagaki, Y. (2004) CIAIR Simultaneous Interpretation Corpus. *Oriental COCOSA2004, India. Proc.* (pp. 72-77).
- [6] Tohyama, H., Matsubara, S. (2005). A Corpus-based Analysis of Simultaneous Interpreters' Utterance Speed, *IEICE general conform 2005, Proc.* (p.88). (in Japanese).
- [7] Tohyama, H., Matsubara, S. (2005). The Relationship between Listener-impressions and Pauses in Simultaneous Interpretation. *Interpreting Research, 2005, No.6*, (pp.137-155) (in Japanese).
- [8] Tohyama, H., Matsubara, S. (2006). Collection of Simultaneous Interpreting Patterns by Using Bilingual Spoken Monologue Corpus. *LREC2006. Italy* (in print).