
Students' Awareness of Translation Competence: A Text-mining Approach¹⁾

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Abstract

This paper reports on an exploratory qualitative study investigating students' awareness of translation and translation competence through the course of English-Japanese translation workshop at the university level. To collect data, semi-open metaphor-making Sentence Completion Tasks (SCT) were given to 27 Japanese students enrolled in the workshop. The study explored how the images of translation formed with expertise and real-life translation experience, which was led into their awareness of translation and translation competence. An attempt was made to analyze the students' SCT text data by quantitative content analysis, or text mining, and to visualize it by lexical co-occurrence networks, using KH Coder. The results showed students' images at the beginning included the perceived degree of difficulty of translation, complex and challenging work of translation, but also fun in experiencing it as well. The post-survey results are indicative that translation experience helped them obtain a more diverse and richer image as well as become more sensitive to what it takes to do good translation work.

1. Introduction

Social significance of translation has been receiving increased attention from both researchers and practitioners. Translation is considered to be a

1) This paper is partly based on the poster presentation at the Second Asian Translation Studies Conference, held at Meiji University, Tokyo on July 9, 2016: "How Images of Translation Form with Expertise through the Course of Translation Workshop."

communication act starting from the source text and ending with the target text (Munday, 2012), but not only that: it is a cross-cultural communication act (Fujinami, 2007) requiring cultural and pragmatic competence. In recent years, though, pedagogical significance of translation and interpreting education in Japanese universities has also been emphasized (Naganuma, 2008; Sometani, 2010; Ishihara & Ono, 2012; Torikai, et al., 2014 to name a few). A number of interpreting and translation courses were introduced into curriculum, while traditional translation approach for reading instruction seems to persistently continue in part. Developing translation competence seems as complex as developing first- or second-language creative writing, or even more so because translation requires pragmatic and cultural awareness relevant to the social and cultural context involved, in addition to professional linguistic skills in the given two languages. Having said that pedagogical significance of translation has been emphasized, only a handful of studies including Tanabe (2015) have attempted to understand how students change by experiencing translation, to the writer's knowledge at the time of this writing. Feeling such need, this study is aimed at exploring how students' awareness of translation and translation competence was enhanced through a course of English-Japanese translation workshop at a university.

2. Translation Education in Japanese Universities

According to Sometani (*op cit*), the number of interpreting and translation courses offered in undergraduate or graduate programs in Japan has gone up, particularly with a five-fold increase between 1997 and 2005. He explained that, as of 2005, there were 105 university undergraduate or graduate programs and 139 courses of interpreting. Translation education is offered in over 180 undergraduate or graduate programs, having 550 courses of translation-related subjects according to the 2008 survey by Mizuno, Naganuma, and others (2008). Today, the number is still expected to be growing. The major languages concerned were English-Japanese or Japanese-English, with a few offered in other languages such as Chinese and French.

Torikai (*op cit*) explained about the benefits of offering translation and interpretation courses at the university, citing the 2012 Science Council of

Japan report. Some important points she raised were: 1) to “translate” means to acquire plural perspectives through the experience to reflect on cultures of the self and others; 2) translation experience will raise students' awareness of the cultural differences and characteristics residing in languages; 3) in order to assure linguistic and cultural diversity of the people living in Japan, the necessity for more advanced professional skills in interpreting and translation should be widely recognized (p. 220; translation mine). Offering translation education is not always profession-oriented, but it could be an effective way to widen students' perspectives on culture, language, and pragmatic knowledge. Students will become more aware of cross-linguistic differences of the source/target languages and be able to appreciate the characteristics of both languages or beauty of the art of translating itself. As pointed by many researchers, the issues such as value, place in curriculum, assessment, and quality assurance of translation education are still yet to be studied fully.

3. Qualitative Research and Software

An increasing number of researchers have emphasized the usefulness of computer and software particularly for qualitative research practice until today (Inaba & Kakai, 2011). Computers can be used for taking, transcribing, and editing field notes; coding; storing and retrieving text data; analyzing content by word frequency or co-occurrence; displaying data; verifying hypotheses to construct theories; visualizing the findings (*ibid*) in the phases of data reduction, data display, and conclusion drawing/verification (Huberman & Miles, 1994). Development of computer-assisted qualitative data analysis software (CAQDAS) or qualitative data analysis software (QDA) demonstrates the rising necessity for support tools which make content analysis consistent, speedy, expressive, and consolidating (Inaba & Kakai, *op cit*).

Content analysis is one of the research methods used to analyze qualitative textual data. To do it quantitatively, quantitative text analysis methods, or text mining, have been used particularly in social science and health science (Hsieh & Shannon, 2005), having a long history in the US since 1960s, and in Japan since 1990s when a large size of newspaper text database was analyzed for the first time. Quantitative text analysis, or text mining, is defined as “any systematic

reduction of a flow of text (or other symbols) to a standard set of statistically manipulable symbols representing the presence, the intensity, or frequency of some characteristics relevant to social science (Shapiro and Markoff, 1997, p. 14).” Researchers do not necessarily agree on one definition, however. Akiba & Kawabata (2004) further defined it as “a method that quantifies qualitative data (language data) by coding and applies quantitative analysis (numerical analysis) in order to conduct content analysis (in Higuchi, 2014; Translation mine. Those in parentheses were added).” In 2000s, more advanced, useful quantitative text analysis—text-mining—software, such as KH Coder and Tex-ray, was developed. With the spread of computer-assisted analysis, text-mining approach using software has been taken for marketing and social inquiry (Higuchi, *ibid*). Higuchi’s definition is that “quantitative text analysis is a method of content analysis in which textual data is sorted and analyzed by using quantitative analysis approach (p. 15).”

KH Coder is a widely-used tool for text mining. Text mining analyzes unstructured text of natural language by parsing and morpheme analysis, to extract useful information segments based on word frequency count or correlations, according to an IT terminology dictionary (<http://e-words.jp>). Conventionally, textual data analysis was either dictionary-based approach (by coding) or correlational approach (by multivariate analysis) (Ecchu, et al., 2015). However, KH Coder has made it possible to incorporate both approaches in a complementary way, but yet to maintain procedural freedom and objectivity of the data treatment (Ecchu, et al., *ibid*).

4. The Current Study

4.1. Purposes of the Study

The purposes of this study are to explore 1) students’ awareness of translation and translation competence, 2) its change between pre- and post-survey, and 3) what new perspectives about translation competence the students gained from their real translation experience and expertise.

4.2. Participants

The participants were 27 (26 females and 1 male) university students of

Japanese as a native language, who were enrolled in a semester-long workshop course called English Skills Workshop focusing on translation between English and Japanese. They were all non-English majors. The course was taught by the present writer.

The workshop was part of the general education and was designed to help students learn various theories and perspectives on translation and experience actual translation practices in a variety of genres: literature translation, children's books translation, entertainment translation (film and CD music), and industrial translation. For the course, process-oriented instruction was taken as its pedagogical approach. It also incorporated teacher-written feedback and several exchanges of revision drafts based on the feedback.

4.3. Data Collection

As a data collection instrument, semi-open Sentence Completion Task (SCT) was used. The participants were asked to write freely to complete the sentences in Japanese, as shown in the Table 1. For each sentence, only the beginning part was given and, therefore, the students were able to continue to write freely up to any length they wanted. The tasks were intended to elicit the participants' open answers on images and awareness of "what translation is" and "what skills and abilities they felt translators are required to have," which would project their perception about translation and translation competence. As a preliminary pilot

Table 1 : Sentence Completion Tasks (SCT)

Original Japanese tasks given to participants	English translation
あてはまる言葉をできるだけたくさん書いてください。	Complete the sentence by filling the blank with the word(s) you can think of. Write as many as you can.
質問 1 : 「翻訳は、～い。翻訳は～だ。」の形で書いてください。	Q1: "Translation is ____."
質問 2 : 「翻訳ができるためには、～が必要だ。」「翻訳には～が必要だ。」の形で書いてください。	Q2: "Translation requires ____." "In order to translate well, one needs ____."

study, the same tasks had been given earlier in 2015 to another group of the same attributes. For this main study, the SCT tasks were given to the participants twice by the present writer: in the first week of April, 2016 when the course started and in the last week of July, 2016 when the course ended. The participants were informed of the purposes of the research and how their data will be treated. Then they all agreed to provide their responses anonymously. It took them about 15 to 20 minutes to complete the tasks. The original Japanese tasks and their English translation are shown in Table 1 below.

For the SCT tasks, the participants wrote freely and as many sentences as they could. As a result, there were 156 responses to the pre-survey task one (Q1) and 191 responses to the post-survey Q1; there were 129 responses to the pre-survey task two (Q2) and 162 responses to the post-survey Q2.

4.4. Data Analysis

To start the procedures of text mining by KH Coder, Excel data sheets of participants' responses of pre-survey Q1, post-survey Q1, pre-survey Q2, and post-survey Q2 (See Q1 and Q2 in Table 1.) were prepared as separate analysis files and were put into the software. Their responses were all written in Japanese, and, therefore, the Japanese text was subject to the analysis based on the Japanese morpheme analyzer *ChaSen*, within KH Coder. To take some examples of word extraction, the Q1 responses included:

- (1) 翻訳は難しい。

Honyaku wa muzukashii.

translation - (particle) - difficult: Translation is difficult.

- (2) 翻訳は時間がかかるものだ。

Honyaku wa jikan ga kakaru monoda.

translation - (particle) - time - (particle) - consume - something - (particle):
Translation is something that consumes time.

In the case of above examples (1) and (2), only the words of *muzukashii*, *jikan*, and *kakaru* were extracted and were later translated into 'difficult', 'time', and 'consume', respectively. When counting the words, functional words such as postpositional particles (*ga*, *wa*, *ni*, for example) and auxiliary verbs (*nai*, *desu*, *da*, for example) were

excluded automatically. *Suru*-ending-verbs (noun+*suru*) such as 表現する (*hyogen-suru*; to express) and their noun forms such as 表現 (*hyogen*; expression) were counted as one node.

In the first phase of the analysis, frequent words were extracted by the KH Coder word count command from each respective SCT task data set (four sets in total), and then a word list was created to make a data summary. In the second phase of the analysis, lexical item co-occurrence network maps were created by using the networking command to examine the centrality and connections of the words.

5. Results and Discussion

5.1. Word Extraction and Frequency

In the collected textual data, which the participants provided before and after the course, 160 different types of words (nodes) were found in the pre-survey Q1 responses (Translation is _____.) with the mean item frequency of 2.18 times ($SD=3.15$); 206 different types of words were found in the post-survey Q1 responses with the mean item frequency of 2.31 times ($SD=3.43$). Then, 138 different types of words were found as to the pre-survey Q2 responses (Translation requires _____. In order to translate well, one needs _____.) with the mean item frequency of 1.99 times ($SD=2.38$); 206 different types of words were found as to the post-survey Q2 with the mean item frequency of 2.01 ($SD=2.33$). Details of the word frequency are shown in Table 2 below.

The list of the extracted words of the frequency of three times or over is shown in Table 3. The number of other words that appeared fewer times is also indicated at the end of each column for reference.

Table 2 : Word Frequency in Pre-/Post-survey SCT

	Q1		Q2	
	pre-survey	post-survey	pre-survey	post-survey
nodes	160	206	138	206
mean frequency	$M=2.18$	$M=2.31$	$M=1.99$	$M=2.02$
(SD)	$SD=3.15$	$SD=3.43$	$SD=2.38$	$SD=2.33$

Table 3 : Nodes and Frequency (3 times and over)

pre-survey Q1		post-survey Q1		pre-survey Q2		post-survey Q2	
nodes		nodes		nodes		nodes	
難しい (difficult)	25	難しい (difficult)	21	言語 (language)	16	知る (know)	11
大変 (a lot of work)	15	楽しい (fun)	14	語彙 (vocabulary)	12	力 (competence)	11
時間 (time)	12	時間 (time)	11	知る (know)	11	語彙 (vocabulary)	10
楽しい (fun)	10	人 (person)	11	知識 (knowledge)	10	辞書 (dictionary)	10
深い (profound)	9	大変 (a lot of work)	10	日本語 (Japanese)	9	知識 (knowledge)	9
言語 (language)	6	辞書 (dictionary)	6	英語 (English)	8	言語 (language)	7
必要 (necessay)	6	英語 (English)	5	時間 (time)	8	時間 (time)	7
大切 (important)	4	個性 (individuality)	5	センス (sense)	6	日本語 (Japanese)	7
使う (use)	4	深い (profound)	5	ボキャブラリー (vocabulary power)	5	能力 (ability)	7
違う (differ)	3	翻訳 (translation)	5	経験 (experience)	5	翻訳 (translation)	7
訳す (translate)	3	訳す (translate)	5	必要 (necessay)	5	英語 (English)	6
言葉 (words)	3	違う (differ)	4	書く (write)	4	必要 (necessay)	6
語彙 (vocabulary)	3	奥** (depth)	4	読解 (reading comprehension)	4	単語 (lexical item)	5
表現* (express)	3	自分 (self)	4	理解 (understanding)	4	文法 (grammar)	5
		出る (show)	4	たくさん (a lot)	3	様々 (diverse)	5
		大切 (important)	4	スキル (skill)	3	理解 (understanding)	5
		必要 (necessay)	4	意味 (meaning)	3	意味 (meaning)	4
		それぞれ (each)	3	言葉 (words)	3	言語 (language)	4
		たくさん (a lot)	3	持つ (possess)	3	作者 (author)	4
		一つ (one)	3	辞書 (dictionary)	3	忍耐 (patience)	4
		言葉 (words)	3	単語 (lexical item)	3	表現* (express)	4
		作業 (work)	3	能力 (ability)	3	文 (sentence)	4
		作者 (author)	3	表現* (express)	3	訳す (translate)	4
		達成 (achievement)	3	文法 (grammar)	3	意図 (intention)	3
		知識 (knowledge)	3	翻訳 (translation)	3	経験 (experience)	3
		直訳 (direct translation)	3	力 (competence)	3	考える (think)	3
		読む (read)	3			使いこなす (able to utilize)	3
		日本語 (Japanese)	3			持つ (possess)	3
		反映* (project)	3			自分 (self)	3
		疲れる (tiring)	3			正しい (correct)	3
		複雑 (complex)	3			読み手 (reader)	3
		文 (sentence)	3			難しい (difficult)	3
		面白い (interesting)	3			文章 (text)	3
		良い (good)	3			豊か (rich)	3

* suru as part of verb formation is not counted as a node.

** oku was used as a pre-fix for fukai.

#Node 語彙 is translated as vocabulary and ボキャブラリー is translated as vocabulary power according to the context.

5.1.1. What is translation? (Pre-survey)

The open-ended sentence Q1 would elicit students' perception of "what they think translation is/can be" and "how they think translation is/can be." There were 14 different types of words that were used three times or over, where the

most frequent word 難しい (*muzukashii*, difficult) was used 25 times, 大変 (*taihen*, a lot of work) was used 15 times, and 時間 (*jikan*, time) collocated with かかる (*kakaru*, consume) was 12 times. These were coded as the *perceived degree of difficulty* of the translation work and *a lot of work*, respectively. In contrast, the word 楽しい (*tanoshii*, fun) (12 times) shows their *likeness and interest* already at the beginning of the course. In relation to that, emergence of the word 深い (*fukai*, profound) often collocated with 奥 (*oku*, depth) indicates they thought translation would be *deep and profound*, not simple nor superficial. Other words such as 言語 (*gengo*, language), 語彙 (*goi*, vocabulary), and 表現 (*hyogen*, express or expression) would show their awareness of the required *linguistic competence*.

5.1.2. What is Translation? (Post-survey)

In the post-survey results, a wider variety of words emerged in their expressed images in Q1 responses than in the pre-survey, with 34 words on the list. Like the pre-survey results, though, the most frequent word was 難しい (*muzukashii*, difficult) (21 times), followed by 楽しい (*tanoshii*, fun) (14 times). Again, the high frequency of the words such as 難しい (*muzukashii*, difficult), 時間 (*jikan*, time) (11 times), and 大変 (*taihen*, a lot of work) (10 times) indicated the respondents' feeling of *difficulty* remained even until the end of the course. However, the more diverse words tended to emerge with respect to the following categories as shown in Table 4:

The respondents came to have more diverse and richer images of translation. Another interesting finding about the post-survey Q1 responses is that the new words such as 個性 (*kosei*, individuality), 違う (*chigau*, differ), 自分 (*jibun*, self) collocated with 出る (*deru*, show), and それぞれ (*sorezore*, each) emerged. They are categorized as expressing *individuality*. A further interesting finding is that they used the words 人 (*hito*, person), 自分 (*jibun*, self), and 作者 (*sakusha*, author), indicating their awareness of the *individual player* involved in the process of translation. The words 楽しい (*tanoshii*, fun) and 面白い (*omoshiroi*, interesting) were used, too, showing their awareness of *fun* in the work of translation, which emerged together with *profoundness* expressed by 深い (*fukai*, profound), 奥 (*oku*, depth), and 複雑 (*fukuzatsu*, complex). The words 英語 (*eigo*, English), 日本語 (*nihongo*, Japanese), 語彙 (*goi*, vocabulary), 言葉 (*kotoba*, words) that show their *awareness of the nature of language*, or cross-linguistic aspects, were also mentioned.

Table 4 : Code Categories

code	words
<i>translation work:</i>	訳す (<i>yakusu</i> , translate), 翻訳 (<i>bonyaku</i> , translation), 直訳 (<i>chokuyaku</i> , direct translation)
<i>awareness of the nature of language:</i>	英語 (<i>eigo</i> , English), 日本語 (<i>nihongo</i> , Japanese), 言葉 (<i>kotoba</i> , words), 言語 (<i>gengo</i> , language), 文 (<i>bun</i> , sentence)
<i>linguistic sub-skills:</i>	語彙 (<i>goi</i> , vocabulary), ボキャブラリー (vocabulary), 文法 (<i>bunpo</i> , grammar), 表現 (<i>hyogen</i> , express)
<i>knowledge:</i>	知る (<i>shiru</i> , know), 知識 (<i>chishiki</i> , knowledge), 理解 (<i>rikai</i> , understand or understanding)
<i>experience:</i>	経験 (<i>keiken</i> , knowledge)
<i>support strategy:</i>	辞書 (<i>jisho</i> , dictionary), 使いこなす (<i>tsukai konasu</i> , able to utilize)
<i>profoundness:</i>	深い (<i>fukai</i> , profound), 奥 (<i>oku</i> , depth), 複雑 (<i>fukuzatsu</i> , complex)
<i>likeness and interest:</i>	楽しい (<i>tanoshii</i> , fun), 面白い (<i>omoshiroi</i> , interesting)
<i>a lot of work:</i>	大変 (<i>taihen</i> , a lot of work), 作業 (<i>sagyō</i> , work), 疲れる (<i>tsukareru</i> , tiring)
<i>perceived difficulty:</i>	難しい (<i>muzukashii</i> , difficult)
<i>time:</i>	時間 (<i>jikan</i> , time)
<i>individuality:</i>	人 (<i>hito</i> , person), 個性 (<i>kosei</i> , individuality), 違う (<i>chigau</i> , differ), 自分 (<i>jibun</i> , self) often collocated with 出る (<i>deru</i> , show), それぞれ (<i>soreshore</i> , each), センス (<i>sensu</i> , sense)
<i>the source text author's eyes:</i>	作者 (<i>sakusha</i> , author), 反映 (<i>han'ei</i> , project),
<i>individual player:</i>	人 (<i>hito</i> , person), 自分 (<i>jibun</i> , self), 作者 (<i>sakusha</i> , author), 読み手 (<i>yomite</i> , reader), 様々 (<i>samazama</i> , diverse)
<i>sensitivity to context:</i>	意図 (<i>ito</i> , intention), 豊か (<i>yutaka</i> , rich), 意味 (<i>imi</i> , meaning)
<i>sense of achievement:</i>	達成 (<i>tassei</i> , achievement)
<i>competence:</i>	力 (<i>chikara</i> , competence), 能力 (<i>nouryoku</i> , ability)
<i>personal quality:</i>	忍耐 (<i>nintai</i> , patience)
<i>culture:</i>	文化 (<i>bunka</i> , culture), 母国 (<i>bokoku</i> , native country)

In addition, 辞書 (*jisho*, dictionary) was an additional entry in the post-survey, which can be categorized as *a support strategy* helping their translation. They felt the effective and careful use of dictionaries was essential.

5.1.3. What does translation require? (Pre-survey)

The open-ended sentence Q2 could elicit students' perception of "what skills and abilities they felt translators are required to have" or "what is necessary in order to translate well." The word count list (Table 3) shows the most frequently used word was 言語 (*gengo*, language), and the words 英語 (*eigo*, English), 日本語 (*nihongo*, Japanese) were high usage words as well. These are categorized as *awareness of the nature of language* in both languages, while *linguistic sub-skills* such as 語彙 (*goi*, vocabulary), ボキャブラリー (vocabulary), 文法 (*bunpo*, grammar), 表現 (*hyogen*, express) also emerged, often collocated with 力 (*chikara*, competence) or 能力 (*nouryoku*, ability). An interesting finding was the use of the words 知る (*shiru*, know), 知識 (*chishiki*, knowledge), 理解 (*rikai*, understand or understanding) which were coded as *knowledge*. Even at the beginning of the course, the respondents felt it was essential to understand and have the knowledge of the background of the author and his work, the trade related to translation, and the ways to gather general information. A further interesting point was that they realized that the translator's sense, in terms of their individual sensitivity to the language and creativity, and *experience* also play a key role.

5.1.4. What does translation require? (Post-survey)

Compared to the pre-survey results of Q2, the participants' images began to cover a wider range of words from the *knowledge* category: 知る (*shiru*, know) (11 times), 知識 (*chishiki*, knowledge) (9 times), and 理解 (*rikai*, understand or understanding) (5 times). The results also included the words of the *competence* category as well as *support strategy* words such as 辞書 (*jisho*, dictionary) and 使いこなす (*tsukai konasu*, able to utilize), *time* words such as 時間 (*jikan*, time), *personal quality* expressed by the words such as 忍耐 (*nintai*, patience), *individual players* including 作者 (*sakusha*, author) and 読み手 (*yomite*, reader), and their *sensitivity to context* expressed by 意図 (*ito*, intention), 豊か (*yutaka*, rich), and 意味 (*imi*, meaning).

5.2. Word Co-occurrence Network

In the second stage of the analysis, networking mapping for each task was created to show the relations between the extracted words by using the co-occurrence networking command of KH Coder. The words of frequency two

or over were included in the map, because excluding less frequent words resulted in a less accurate organizational picture of the whole. See Figure 1 for the Q1 responses and Figure 2 for Q2 responses. The words (nodes) are connected by the line (edge) when the emergence patterns are similar; the thicker the lines are, the stronger the co-occurrence degree is. If the words are not connected with any line, their relation is weak. Proximity of the word location on the map does not indicate the relations. The size of the circles indicates the frequency of the word emergence (how many times the word was used in total); the larger the circle is, the more frequently the word was used. The dark-or-light tones of the circle indicated the centrality (to what extent the word plays a central role in the network) of the word; in the colored map, the pink is the most central, then white and light blue; in the grey scale, the darker the circle is, the more central the word is in the network (Higuchi, *op cit*; Ecchu, et al. *op cit*).

[Pre-survey Q1 network]

As shown in Figure 1 below, most frequently used words shown in larger circles were 難しい (*muzukashii*, difficult) and 大変 (*taihen*, a lot of work). Students seemed to have a strong assumption that translation would be a challenging task requiring a lot of work and time. The words of strongest centrality in the pre-survey were 言語 (*gengo*, language), 理解 (*rikai*, understand), and 読む (*yomu*, read). The collocation of 時間 (*jikan*, time) and かかる (*kakaru*, consume), 頭 (*atama*, brain) and 使う (*tsukau*, use), 深い (*fukai*, profound) and 奥 (*oku*, depth), as well as 楽しい (*tanoshii*, enjoyable or fun) and 慣れる (*nareru*, get used to) appeared as the related phrases. The responses tended to show the students' view that translation was perceived as challenging brain work, and its interpretation depends on who translates the text.

[Post-survey Q1 network]

Figure 2 below shows the post-survey Q1 results. It is far more complex, comprehensive, and richer images as to what translation is. The word with the strongest centrality was, first of all, 知る (*shiru*, know). The next central words were 言語 (*gengo*, language), 考える (*kangaeru*, think) together with 小説 (*shousetsu*, novel) and 絵本 (*ehon*, picture book), which projected their actual course work in literature translation. The words shown in the larger circles were 難し

い (*muzukashii*, difficult), 楽しい (*tanoshii*, fun), 大変 (*taiben*, a lot of work), 時間 (*jikan*, time) and かかる (*kakaru*, consume). Interesting entries were 人 (*hito*, person), 個性 (*kosei*, individuality). The words connected to a person, such as author, each, project, translate would indicate the students' perception that each person's individuality is projected into translation. An interesting finding is that the words difficult, time, and a lot of work were also connected with fun, which indicates "translation is fun although it is difficult, time-consuming, and a lot of work." A collocated phrase of 奥 (*oku*, depth) and 深い (*fukai*, profound) has come to link to the word 複雑 (*fukuzatsu*, complex).

[Pre-survey Q2 network]

The most central words of pre-survey Q2 were 力 (*chikara*, competence), and 読む (*yomu*, read), followed by 書く (*kaku*, write), 伝える (*tsutaeru*, convey), 読み取る (*yomitoru*, comprehend), スキル (*sukiru*, skill), 語学 (*gogaku*, language learning), and 文化 (*bunka*, culture). See Figure 3 below. The most frequent words, shown in the larger circles, were 言語 (*gengo*, language), 知識 (*chishiki*, knowledge), 語彙 (*goi*, vocabulary), 英語 (*eigo*, English), 日本語 (*nihongo*, Japanese), which may express their awareness of the nature of language and their perception of the required linguistic competence and sub-skills. The word 知る (*shiru*, know) was in a large circle connected with 意味 (*imi*, meaning) and 読む (*yomu*, read). In this pre-survey, the students first had an image that translation requires reading comprehension ability, in relation to the understanding of words and grammar, and that, to translate, linguistic abilities and knowledge are necessary. Reading and writing abilities were also central words on the map. In addition, vocabulary power of English is required, and experience and sense will reinforce the translation quality as well, according to the images created by the words.

[Post-survey Q2 network]

Figure 4 shows the post-survey Q2 results, which depicts the students' awareness change over the course of workshop. The most central words were 文化 (*bunka*, culture), 知る (*shiru*, know), and 母国 (*bokoku*, native country) among many. The most frequently used words, in larger circles, were 辞書 (*jisho*, dictionary), 英語 (*eigo*, English), 日本語 (*nihongo*, Japanese), 力 (*chikara*, competence), 能力 (*nouryoku*, ability), and 知る (*shiru*, know).

To illustrate some interesting changes here, the author's intention was often stated in this Q2 SCT response in the post-survey. The effective use of dictionaries was also pointed out, which may indicate that maximized use of support strategies is helpful. It was also indicative that they realized the ability to understand meaning in the context correctly is necessary. The translator's experience in real-life translation work was also a key factor. Moreover, they pointed out that translators should always keep the readers in mind, their age and culture. In this mapping, the circle of time became smaller while the circles of reading comprehension and writing almost disappeared in the post-survey map.

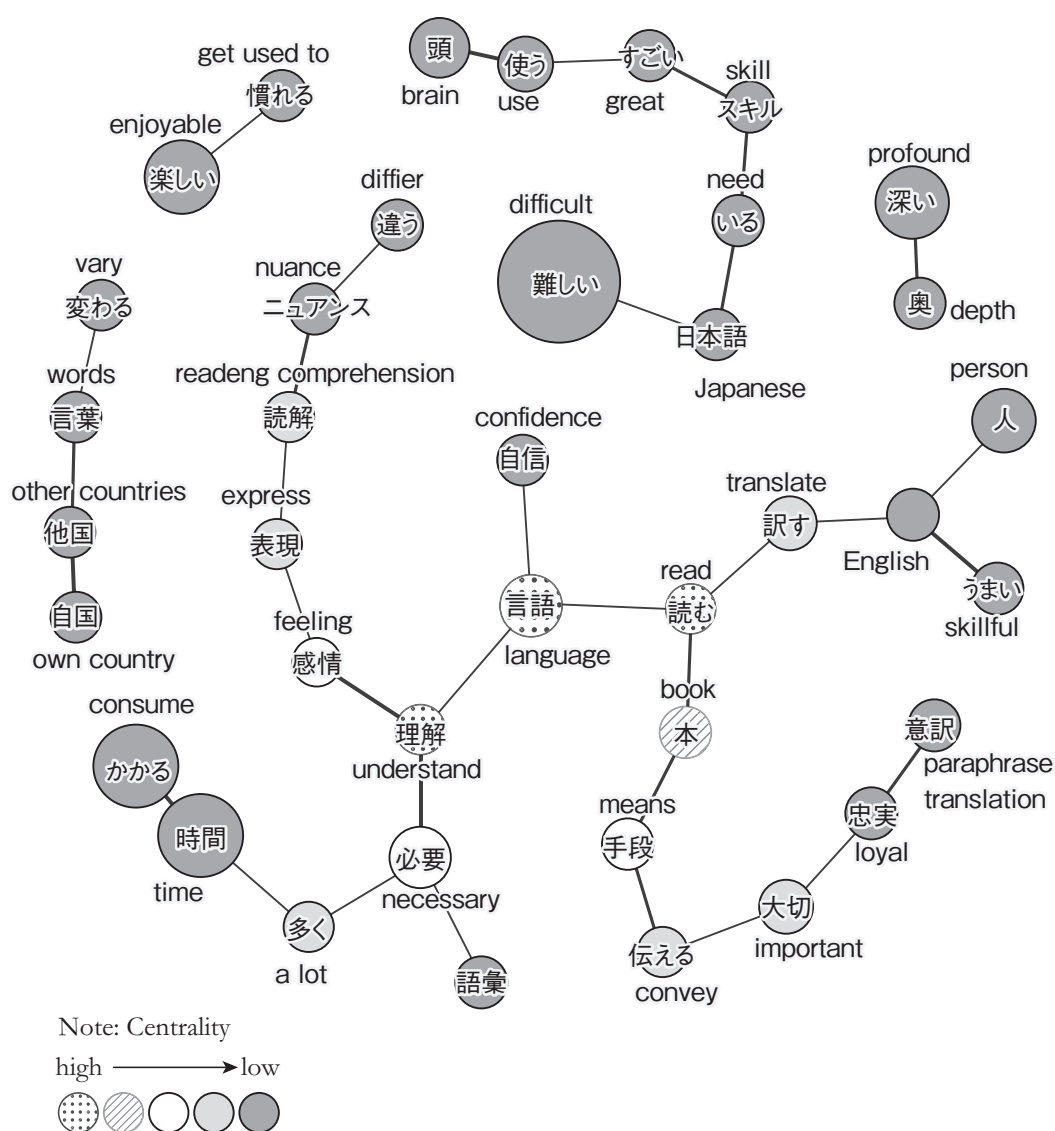


Figure 1: Pre-survey Q1 Co-Occurrence Network
(Q1: Translation is _____.)

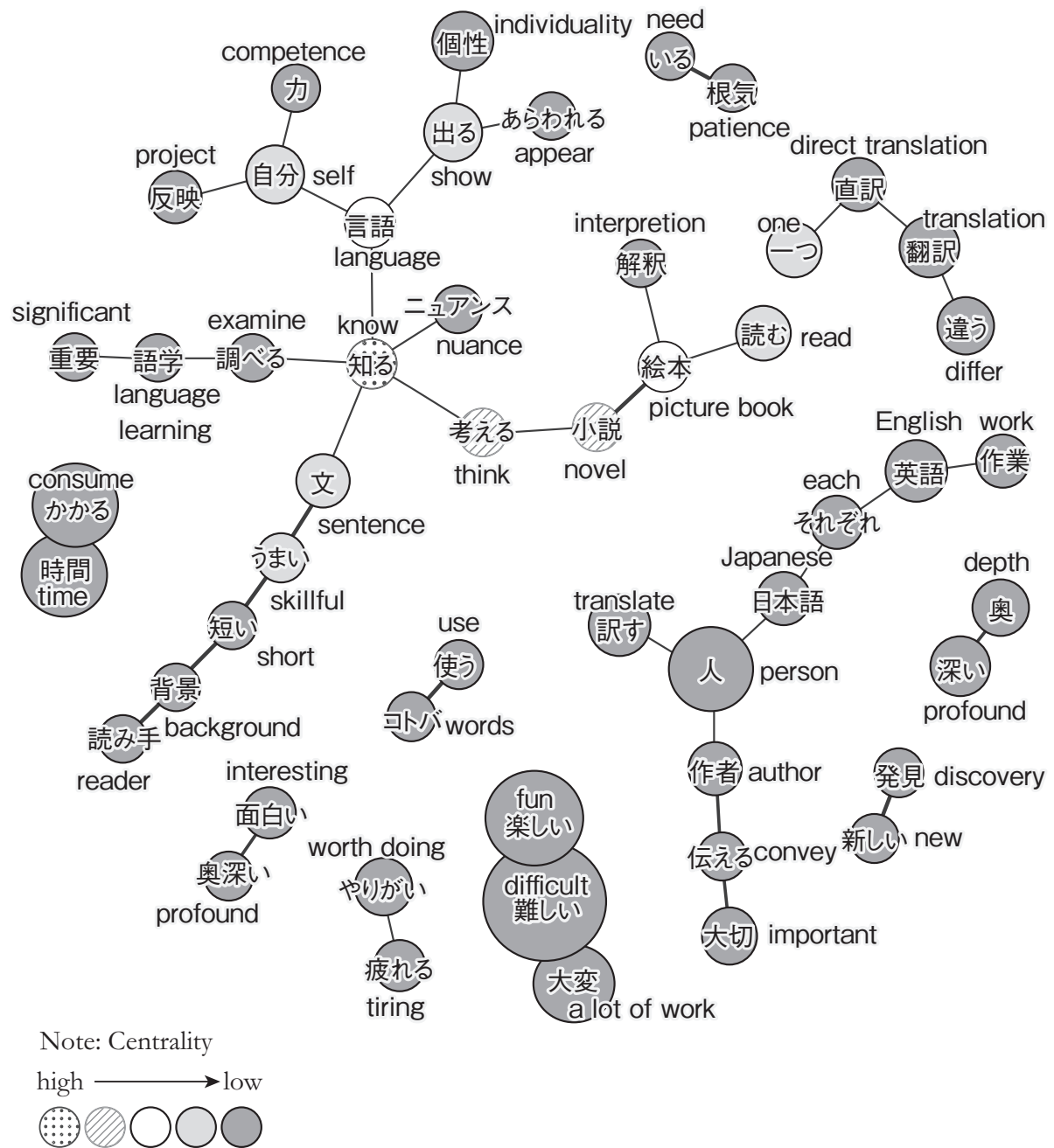


Figure 2: Post-survey Q1 Co-Occurrence Network
(Q1: Translation is _____.)

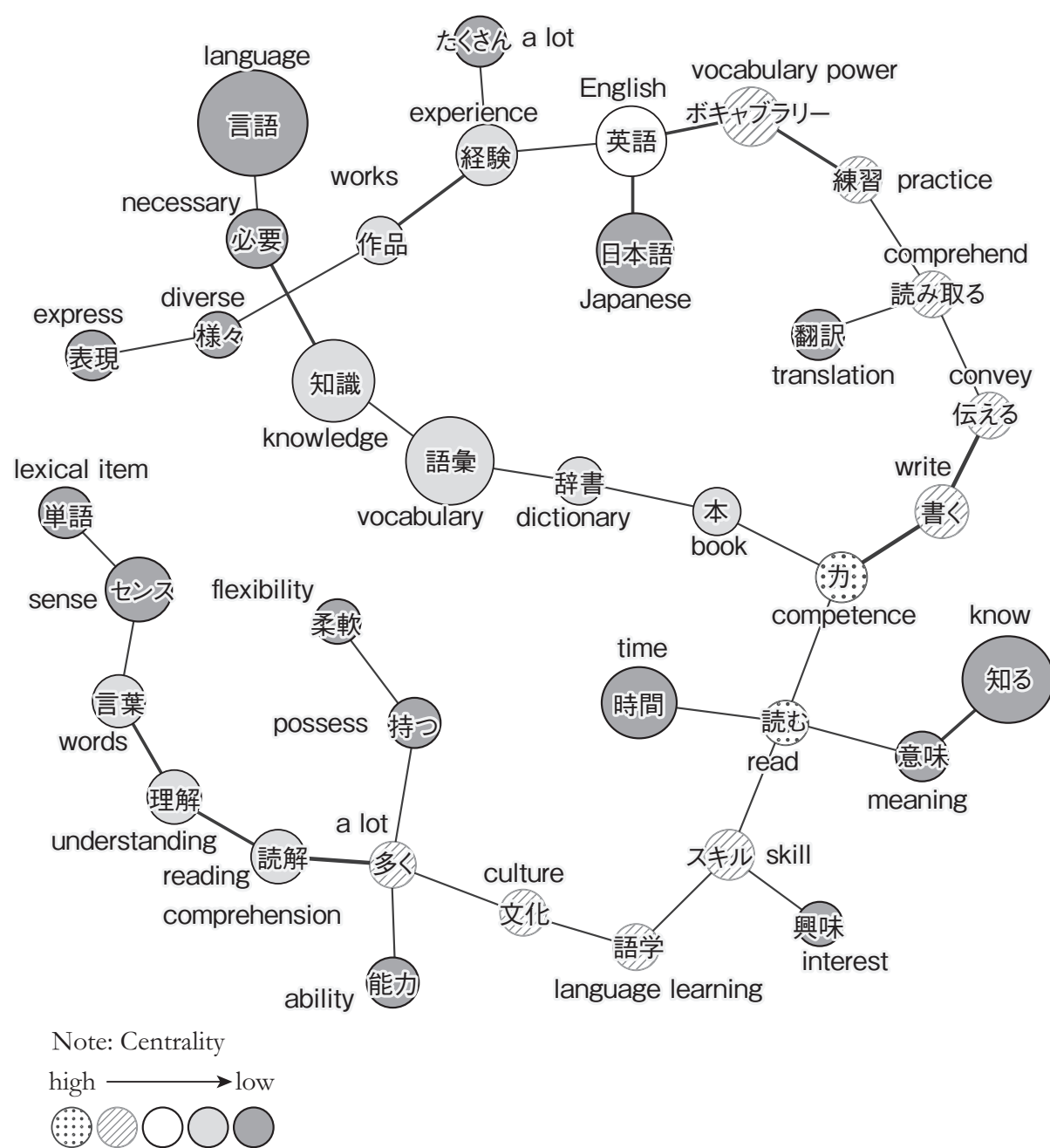


Figure 3: Pre-survey Q2 Co-Occurrence Network
(Q2: Translation requires _____. In order to translate well, one needs _____.)

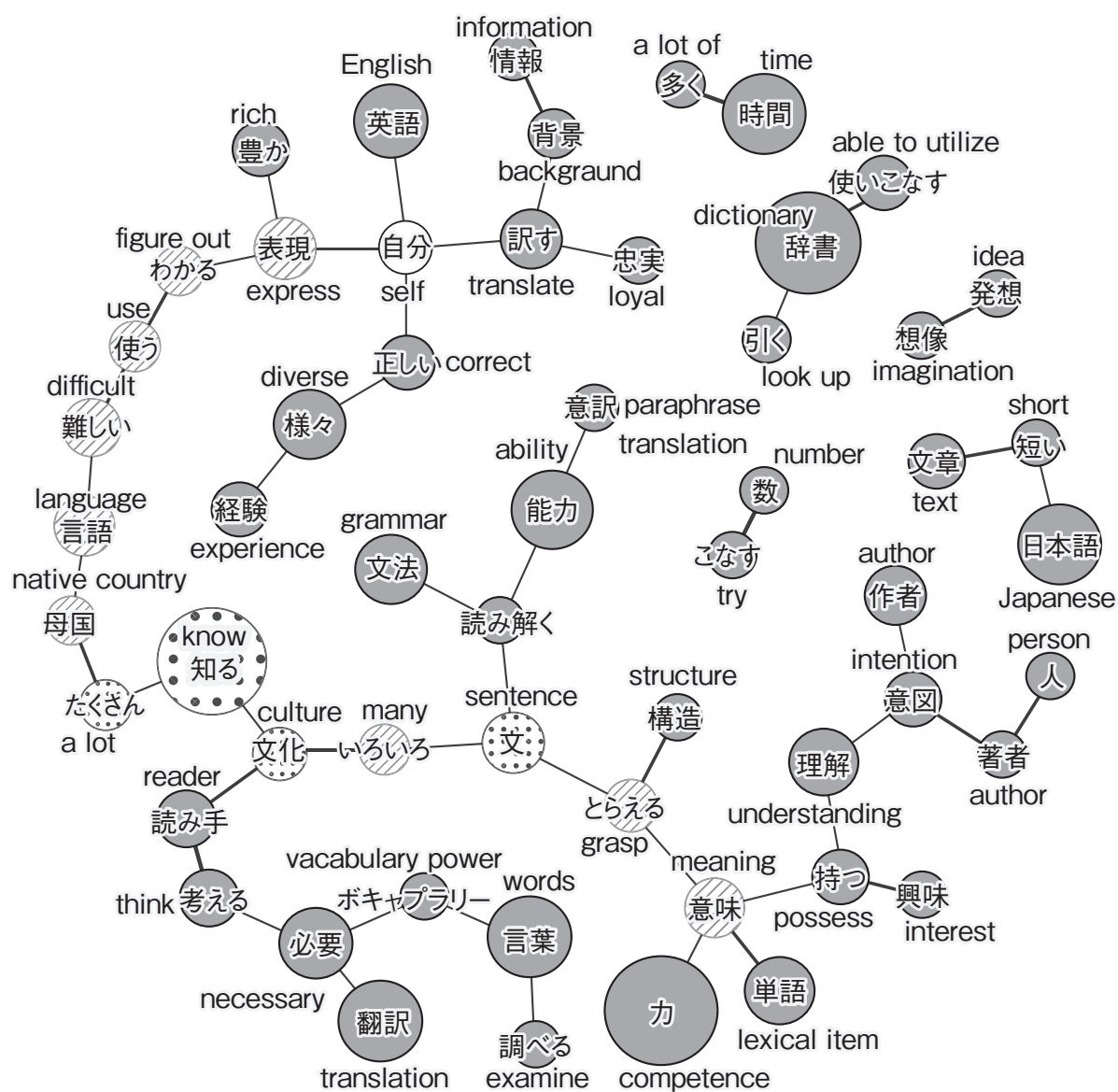


Figure 4: Post-survey Q2 Co-Occurrence Network
(Q2: Translation requires _____. In order to translate well, one needs _____.)

5.3. Students' Awareness

The results of the text-mining analysis showed mainly four major summaries of the students' images of translation in the first phase: 1) *perceived degree of difficulty* of translation, 2) *fun and likeness* of the work, 3) *profound* nature of the literary work, and 4) *required linguistic competence*. Having experienced translation work in a variety of genres through the course, the students could obtain new views: 5) *individuality* projected in interpretation of the context and expressions in the target text; that there is no one correct answer for translation equivalence, and, however, there is an incorrect answer; 6) awareness to the fact that there are *players* involved in the process, such as the author, translator (self), and also the readers; 7) awareness of the *nature of the language*; 8) having *support strategies* such as effective use of dictionaries.

One could conclude here that their real-life translation experience in process-oriented instruction and feedback exchanges helped the students be more aware of translation competence, showing the richer and more complex images of translation. What is it that someone has translation competence? What takes to be a competent translator? To those questions, the students were gradually finding the answers. To sum up, translation education can contribute to the awareness-raising in terms of cross-linguistic comparison, interpretations of the context, and pragmatic usage of the expressions of the two languages. The students have also become more sensitive to what it takes to do better translation work, displaying a wide range of required skills and aspects. As has been discussed so far, offering translation courses even in general education, not just professional job-oriented training, seems to benefit students in obtaining a new set of eyes to view the art of translating and to appreciate the profound nature of language.

6. Concluding Remarks

In this paper, quantitative text analysis, or text mining, was attempted with a hope to avoid arbitrary data treatment and subjective interpretations. The use of text-mining software made it possible to automatically extract the words of high frequency from the students' data of semi-open free writings about translation, and connect them based on the co-occurrence. It turned out that text mining was

an effective approach in that quantifying the text data gave us an overview of the general tendency, as pointed out in Ecchu et al. (*ibid*). The visualizing procedures of co-occurrence networking effectively displayed the connections between the words and their centrality within the network, which clearly gave us a better picture of what experience the students went through.

As was shown already, the results of this study suggest that translation education at university will help students acquire multiple perspectives, be more aware of the nature of language, and become sensitive to the context of what they translate. The writer would like to conclude here that incorporating translation education into university language curriculum will be a useful way to foster students' awareness to the nature of language, cross-linguistic differences and similarities, sensitivity to the context, and their individual creativity.

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