How do Japanese researchers cope with language difficulties and succeed in scientific discourse in English?: interviews with Japanese research article writers.

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Abstract

This study examined through interviews, 13 Japanese researchers' awareness of language difficulties when writing scientific research articles in English and their learning and writing strategies for producing them. As they increase their experience in writing, adopting English rhetoric does not seem to cause any difficulty but lack of vocabulary remains a problem for a long time. To overcome their difficulties, they seem to adopt two types of strategies: the first is to learn English through working with academic texts in their field (subject knowledge-oriented), and the second is to raise their sensitivity to English language through contact with English speakers (language-oriented strategies). From use of the first type they learn that scientific language is highly codified, and the majority seems to give up on improving their English after mastering the codified language. Only 5 of 13 adopt the second type. It is interesting that 3 of the 5 are internationally recognised researchers, who stated they used English in both their thinking and writing processes. Their comments on language use suggest that researchers should persist in improving their English, and must be aware of the power of language and its impact on readers, in order to succeed in the discourse community.

Key words: writing and learning strategies, scientific research articles, Japanese researchers.

1. Introduction.

The presentation of scientific findings in English is all the more crucial for scientists because even in non-English speaking countries, scientific journals are published in English. In order to succeed in science, not only do non-English-speaking scientists have to cope with new developments in their field but they also must master English writing. Non-English-speaking scientists face enormous difficulties in succeeding in the discourse community. To understand their difficulties in writing research articles or dissertations, interviews and questionnaires were used in the study with both experienced and novice researchers working in an English-speaking and a non-English-speaking environment (Dong, 1998; Flowerdew, 1999a.b.; Gosden, 1996; Parkhurst, 1990; Shaw, 1991; St. John, 1987).

The novice and experienced researchers here were postgraduate students and professional researchers. These studies showed that regardless of the experience and linguistic environment, non-English-speaking researchers share difficulties such as lack of vocabulary. To overcome these difficulties, they adopt learning and writing strategies such as extensive reading and close examination of linguistic forms in published articles (Dong, 1998; Flowerdew, 199b; Parkhurst, 1990; Shaw, 1991; St. John, 1987).

However, as can be imagined, their writing experience and the language environment affect their learning and writing. These studies show that most professional researchers (St. John, 1987) are aware of the rhetorical difference between their native culture and Anglo culture, whereas the majority of postgraduates (Dong, 1998; Shaw, 1991) are not so aware. Awareness of rhetorical difference, and difficulties caused by it, seems to change with experience.

In writing in English, Japanese professional researchers seem to be aware of a necessity to adopt a different rhetorical pattern; English academic texts tend to take a deductive approach, while Japanese ones prefer inductive patterns (Kobayashi, 1984; Kubota, 1998). They may also need to change their approach to readers in constructing a text in English. After analysing Japanese newspaper articles, Hinds (1990) claimed that readers of Japanese texts are responsible for finding the link between the topic in paragraphs and the main theme, thus spending more effort on texts than do readers of English.

Recently, however, questions were raised about the extent to which Japanese writers' difficulties are related to these differences. McCagg (1996) reanalised the same newspaper articles and found that as long as readers of Japanese newspaper articles share similar cultural backgrounds with those of writers, they do not have more responsibility for successful understanding of texts. Furthermore, after analysis of Japanese students' writing and interviews with them, Kubota (1998) argues that Japanese students' difficulty in composing an English text may be related to their lack in experience in writing and English proficiency. She emphasizes that good writing skills in the mother tongue may have a positive effect on their English writing, and that Japanese professional writers seem to be more aware of readers than are novice writers.

Indeed experience seems to compensate for non-English-speakers' disadvantages working in a non-English-speaking environment such as the lack of exposure to English. Previous studies have shown that experienced writers seem to be less affected in their choice of working or 'thinking' language by the language environment than are novice writers (Gosden, 1996; Shaw, 1991; St. John, 1987). For example, in Japan nearly half of Gosden's novice researchers (6 out of 16) reported writing the entire paper in Japanese and then translating it into English. They felt they had no other choice, since it was too difficult for them to write in English from the beginning of their apprenticeship. However, professional writers in St. John's study (1987) in a non-English-speaking environment mixed English and the mother tongue in the writing process.

In St. John's study, only one professional researcher still wrote in Spanish. This single researcher stated that translation was the only way he could produce a research article within his contextual and linguistic constraints. But instead of translating word by word from Spanish to English, he developed a form of Spanish consisting of very concise, short expressions which were easier to translate to English (1987, p116). To be successful in the research article writing, it seems necessary for writers to balance what is best for them in a linguistically disadvantageous context.

In recent studies, the disadvantage of being in a non-English-speaking environment is linked to the periphery as opposed to the centre of the discourse community (Casanave, 1998; Flowerdew, 2000). As entering the professional discourse community is a long, stressful process (Belcher, 1994; Blakeslee, 1997), novice researchers in a non-English-speaking environment seem to feel all the more isolation (Flowerdew, 2000) and the lack of a sense of belonging to the community (Casanave, 1998). In fact, even in the US, non-English-speaking graduate students report to have relatively little contact with English speaking researchers (Dong, 1998). The next question would be how experience can bridge the gap between the periphery and the centre of the discourse community and help to succeed in scientific discourse.

Flowerdew's studies shed light on the plight of non-English-speaking academics working on the periphery and trying to publish in English-medium academic journals. He used a questionnaire (1999a) and conducted interviews (1999b) with Chinese academics in Hong Kong across disciplines. On top of the difficulties mentioned by other non-English-speaking researchers, Hongkong researchers pointed out difficulties they face to be active in publication such as the length of time needed for writing research articles in English.

These Hongkong researchers, however, were in a privileged position relative to many because they were working in a bilingual context with English as their working language. It would be interesting to examine how linguistically less privileged researchers cope with difficulties in writing research articles. Furthermore, although the questionnaire and interviews in Flowerdew's studies involved large numbers of academics in Hong Kong, they included a relatively small number of established academics, i.e., those at professorial level. For the questionnaire, professors

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numbered only 14% of the total respondents (585) while associate professor and assistant professors numbered 29% and 37% each and lecturers and assistant lecturers were 15% and 3% (Flowerdew, 1999a). In his interview study (Flowerdew, 1999b) only two of 26 interviewees were professors from two disciplines: engineering and Chinese history. To understand how non-English speakers develop their learning strategies in writing scientific research articles, it seems necessary to compare perspectives of junior and established researchers in a less privileged language environment.

2. Present study.

This study asked 13 Japanese researchers (2 lecturers, 3 associate professors, and 8 professors) working in Japan about their language difficulties and disadvantages, and the strategies that helped them to cope with those difficulties in writing research articles. As some fields are more globally oriented than others (Flowerdew, 1999a), I chose researchers in some of the most international disciplines, i.e., science and engineering. All of those interviewed were professional researchers and thus at a more advanced stage than in Gosden's study. In fact, 7 of them were the supervisors of Gosden's interviewees.

2. 1. Research questions.

Two main research questions were asked, operationalised by more specific interview questions.

1) What kind of difficulties are non-English-speaking professional researchers aware of in writing research papers?

Do you find rhetorical differences difficult?

Do you think your Japanese cultural background is part of your difficulties?

What aspect of the use of lexicon/grammar/phraseology do you find difficult?

What kinds of disadvantages in the publication process have you experienced as a result of these difficulties?

2) What learning / writing strategies do they employ to cope with these difficulties?

How did you learn to write a research article in English?

What do you pay attention to in writing in English?

How do you use Japanese and English in thinking and writing?

2. 2. Subjects and methods.

2. 2. 1. Subjects (interviewees).

Those interviewed were categorized into two groups: 5 junior and 8 senior researchers, reflected by their academic position (2 lecturers, 3 associate professors, and 8 professors). Of the 13 Japanese researchers, 7 were at the Tokyo Institute of Technology, 2 each at Osaka University, and Osaka City University, and one each at Osaka Institute of Technology and Kyoto University. All the professors were in their late 50s, while lecturers and associate professors were in their mid 30s to early 40s. All but 2 (one professor in biology and one lecturer in medicine) had some experience working outside Japan after completing their PhDs in Japan (either short-term- 3 to 4 months-or 2 to 4 years, in countries such as Germany, the UK, and the USA). However, it has to be mentioned that as all were educated in Japan until completing the PhD, their exposure to and contact with their English counterparts in the socialisation process were much more limited than those of Flowerdew's subjects.

In terms of academic experience, 12 of these researchers (1 lecturer, 1associate professor and all the professors) had experience as reviewers, and most of the professors had served on editorial boards of international journals. All were actively publishing in American, British, continental European, and Japanese journals in their fields. The professors in particular had various contacts outside Japan and have collaborated with those contacts. Of the professors (one in biology and 2 in physics), 3 were considered leading figures in their scientific fields on a global scale.

Field	Academic position	Experience as a reviewer
Biology	4 professors and 1 associate professor	yes
Physics	2 professors	yes
Chemistry	2 professors and 1 lecturer	yes
Mechanical engineering	l associate professor	yes
Medicine (anaesthesiology)	l lecturer	no
Pharmacology	l associate professor	yes

2. 2. 2. Methods.

Interviews were conducted in the 13 Japanese researchers' offices, in Japanese; the interviews (45 to 90 minutes each) were recorded and transcribed. Prior to the interviews, a questionnaire was

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distributed to ask about their experience abroad, their experience as reviewers and editors, and their publication records. My status as a total outsider to the fields of the interviewees helped these researchers to be quite frank about their language difficulties in writing research articles and about the controversies in which they were involved. Furthermore, my interest in their research appears to have encouraged them to talk about their research activities. For my data collection and the analysis, I adopted three criteria: *1"transparency, consistency, and communicability" which Rubin and Rubin (1995) proposed for their qualitative interviewing. Transparency is to understand the contextual background of these researchers for the interpretation of data, while maintaining consistency here means to consider the researchers' professional experience in the discourse community, when inconsistencies arise in the analysis of interviews. Their comments can be affected by their contextual constraints and also be based on the different types of experience such as their interaction with other researchers outside Japan. Communicability here means to present these researchers' own experience rather than to report other people's experience. My knowledge of Japanese culture and of the Japanese university system increased transparency, and the use of Japanese in the interviews was useful for clarifying inconsistent responses when they arose.

3. Results.

3. 1. Difficulties and disadvantages.

3. 1. 1. Awareness of language difficulties and rhetorical differences.

Although some were less confident than others in their English writing skills, both senior and junior researchers reported similar language difficulties and were both aware of rhetorical differences. It was interesting that only 2 of the most established researchers were aware of their disadvantages in relation to their cultural backgrounds.

The most common language difficulty all the researchers mentioned was lack of vocabulary, and because of this they have difficulties in accurately describing results and effectively staking a claim, a problem also described by non-English-speaking graduate students in the US (Dong, 1998) and Chinese researchers in Hong Kong (Flowerdew, 1999b). Two Japanese researchers in biology said that the degree of handicap associated with this lack of vocabulary may be related to the discipline, that biology may require more language skills than do other fields such as chemistry where the writer may use mathematical formula rather than language to present some of the findings. Because their vocabulary was insufficiently large to explain items accurately, they struggled to describe the shape, size, and colour of an item in English and could not highlight subtle differences.

Another common difficulty concerned hedging expressions; 6 (3 junior and 3 senior researchers)

of 13 stated that they tended to overuse hedging expressions, a practice described by Leggett (1966) as the L1 transfer. When asked about the reason, however, they did not agree in ascribing it to L1 transfer; half of them related their overuse to L1 transfer but the others were unsure as to the degree of uncertainty they were using. This biology professor's comment suggests that less confidence in language may invite more use of hedging expressions.

Interviewer: you said you tend to use ambiguous expressions.. is it to do with language or culture or

Interviewee C: it's a language problem—culture may be involved—but I just don't know how ambiguous my expressions would be for the reader—

Regarding their awareness of a rhetorical difference between English and Japanese text structure (the difference between the deductive and inductive approaches to reasoning), all the Japanese researchers stated that they knew they had to adopt a different rhetorical pattern. Nevertheless, their comments suggest that mastering English rhetoric does not seem to them to remain a serious problem. One Japanese junior researcher (a lecturer in medicine) explained his efforts to adopt the deductive approach in the discussion section.

Interviewee A: I used to start the discussion section with a summary of the results in reference to previous work — and at the end I put the conclusion—but I stopped this pattern after the advice from somebody at the university—

Interviewer: how did you change?

Interviewee A: so I started "the discussion section", with "we found that"—like "in this research we found that—" I say what I found at the beginning of the discussion now—which I did not think of before—

A difference between junior and senior researchers was also evident in consciousness of their readership; 4 of 8 senior researchers described their difficulties in finding suitable linguistic forms to attract readers' attention. By contrast, two junior researchers stated that they are so focused on grammatical accuracy that consideration of the reader is ignored.

Another difference was shown in response to a question about the role of culture in scientific discourse. Junior researchers did not accept any influence of cultural elements on science, whereas

senior researchers were sometimes not too sure. Only 2 senior researchers (leading figures in their fields) agreed that they might be disadvantaged due to their non-Western cultural background. One of them (professor of physics, interviewee B) stated his difficulty in relation to the close link between the language and history of science.

People in America, Canada, and Western Europe, they have a long history in which natural science has developed.. so their language and language structure are well suited to constructing scientific argument—possibly because science and scientific thinking are based on Western thinking, I learnt a lot from our post-doc fellows from Germany and Belgium about the structure of the discussion section—Compared to young researchers, I should say I am more experienced, but I still need to make an effort to follow scientific thinking—Of course they say that they also have to make an effort, but their life is more closely linked to scientific thinking—for example they state the conclusion first, then explain the reason using 'because', but if we do that in Japanese daily life probably it will have various consequences.

Experience appears to play a crucial role in identifying disadvantages of Japanese researchers. How do these difficulties in writing a research article in English put Japanese researchers at a disadvantage in publishing in English?

3. 1. 2. Disadvantages for publication due to language difficulties.

Based on responses to this question, their perceived difficulties can be categorised into two types. One was the speed of writing combined with the language problems. As shown also in Flowerdew's study (1999), all the Japanese researchers felt that amount of time for writing seems to be one heavy disadvantage. Although data were the deciding factor, they seem to feel their language problems more acutely when competing against English speakers, as one professor of biology illustrated:

Interviewer: Your English may have some problems but the editor would correct them as long as you have good data ?)

Interviewee C: Yeah, data are the deciding factor, on the condition that you are not competing with English speakers—if you are—well then you will not have much chance— I often hear these cases—

The other was in correspondence with the editor whom they need to negotiate. One associate

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professor in biology described his reluctant withdrawal from an argument because of his lack of English writing skills.

Interviewer: Have you ever given up negotiation after some correspondence with the editor?

Interviewee D: Yes, on that occasion [referring to one manuscript], I could have been more assertive—I feel I wish I had better English writing skills—because in order to construct a strong argument to persuade the editor, we have to write really well. don't we—I feel it is essential to have good English writing skills for that—

In order to overcome their language difficulties, all described more than one strategy that they normally employed to learn English writing.

3. 2. How they overcome difficulties and disadvantages.

3. 2. 1. Learning strategies.

Interviews with the Japanese researchers suggest that their learning strategies can be divided into two types; the first type can be characterized as subject knowledge-oriented because these were the strategies they employed to learn English through the subject. The second type can be called language-oriented strategies as they aim to learn English speakers' perspective in the use of English. All the researchers adopted the first type such as "*reading research articles extensively*," *"experience in writing research articles,*" and *"collecting and learning useful phrases,*" as shown in previous studies (Gosden, 1996; Shaw, 1991; St. John, 1987). By contrast only 5 of 13 employed the second type; these researchers reported that to polish their writing, they read academic texts in English outside their fields and contact English speakers (English teachers and / or English speaking researchers) about the use of English in writing research articles.

As novice writers need to learn about their field through reading research articles in English, they may need to rely on subject knowledge-oriented strategies. Japanese novice writers need help not only from language teachers but also from subject specialists to understand norms and expectations of the professional discourse community (Belcher, 1994; Blackelee, 1997; Dong, 1998; Prior, 1998). Based on his experience of working with English speakers, one Japanese professor in physics (interviewee E) explained the importance of help from subject professionals.

Interviewer: Some people say that you learn English writing by working with English-speaking researchers and writing a paper together—

Interviewee E: Yes, I stayed two years in the US and another two years in Germany—these four years were very useful in learning to write in English— but it is not just a matter of English—students need help from those who understand the field, at least at the beginning—

After having employed subject knowledge-oriented strategies, researchers seem to internalize set phrases to use in writing a research article and realize that language in a research article writing is heavily codified. Codified language here means that instead of creating variety, the language is arranged into a system in which the writer employs only a limited number of linguistic forms to realise his / her intention. This was explained by one professor of chemistry (interviewee F). He described writing as deployment of lexicalised chunks (DeCarrico and Nattinger, 1992). The interviewer's "How did you learn?" led this professor to say,

"I just follow the pattern you know you remembered after reading papers—I put these expressions I have come across many times—it's not language anymore, they are like signs—I don't have time to devise sophisticated expressions— I am not good at English—"

When asked "But how did you take these phrases in?", he said,

"Well you have to read dozens of papers per year— I also have to review papers so there are quite a few papers I have to go through in a year?"

Extensive reading certainly seems to help to store up useful linguistic forms. It also enables writers to construct a persuasive argument. A lecturer in medicine (interviewee A) says:

"I have a feeling that the length of the discussion section is related to the amount of reading the researcher did— I think there must be a huge difference in the amount of reading we do and they do...um, as they do in their own language—it must be easy—"without difficulty" you know for them."

When asked "Do you feel that?", he continued,

"um--in the discussion section—we explain and interpret our findings and emphasise our results in relation to the previous work—when they make a strong argument, the discussion section becomes quite long, but even then each paragraph they write can hold together to strengthen their argument—unless they have read quite a lot of previous work and understood their strengths and weaknesses—they would not be able to do that—their argument is based on the vast amount of reading"

This Japanese researcher's awareness corresponds to finding that 40% of English-speaking researchers interviewed read the introduction section, whereas only 21% of interviewed non-English-speaking researchers do so (Burrough-Boenisch, 1999). Non-English-speaking researchers seem to be doubly disadvantaged, as both reading and writing become a hurdle for them to leap to write a research article.

Coping with these difficulties, they seem to feel two contradictory needs: a need to improve their English but also a need to spend less time on English writing. The first need was shown by their comments expressing agreement on the importance of good writing skills in writing, also demonstrated by Cantonese-speaking researchers in Hong Kong (Flowerdew, 1999a,b). Japanese researchers pointed out a relationship between writing skills and the quality of their research data; of 13 polled, 11 (7 senior and 4 junior researchers) stated that with less impressive data, they would need good written English to persuade readers.

However, also expressed was that in a highly competitive environment, they have to complete their work within a limited timescale and thus could not spend extra time on polishing up their English. Furthermore, as was shown in the successful research-proposal writers' comments in John's study (1993), with experience, they seem to become aware that the discourse community is tolerant of non-English speakers' writing.

Thus after having mastered the codified language, researchers seem to choose between two directions. The majority (8 of 13) showed no interest in going beyond mastery of the codified language. They stated that they stopped improving in English because although they may collect useful phrases by reading research articles, they have difficulty in locating the appropriate context in which to employ them. 2 Japanese researchers stated that they stopped consciously copying other people's phrases at some stage for this reason and they now use only those phrases which they feel will fit; they are happy to work within their limited codified language. As in Flowerdew's study (1999b), 8 Japanese researchers (5 senior and 3 junior researchers) preferred to realise their argument in simple English. They stated that because the purpose is first and foremost to get the message across, short sentences and simple structures sometimes serve their purposes better than copying complex English-speaker expressions which they may not be able to fully integrate.

Only three senior researchers (the three leading figures in their fields) and two junior researchers stated in the interview that they were keen on learning English, and adopted languageoriented strategies. In particular, the three senior researchers (interviewees B, E, G) described benefits of learning English speakers' perspectives to persuade readers. A comment from interviewee E showed his interest in and sensitivity to language use. He stated that he realised that after an enormous amount of reading, he should not use everything just because it appeared in a published research article, and that he tries to learn only from good writers. To the question, "how did you learn?", this professor in biology said,

"well just like other people, you need to have experience in writing—to be used to writing it's experience—"

The interviewer asked for a further explanation,

"Some people say that they adopt two types of reading, first they read the content and second they read to learn English."

The professor's response was,

"Yes, at the beginning I thought so—but when you are used to reading scientific articles in English, you realise that being American or British does not always guarantee being able to write good English—so I have become more selective—I ask other researchers in the field about who are the good writers in our field, and try to learn from their writing."

How do these researchers use Japanese and English when they are writing a research article?

3.2.2. Writing strategies.

As researchers gain more experience in writing, their use of the mother tongue and of English changes in the writing process. Previously, experienced non-English speakers were reported to have used a mixture of English and the mother tongue even in a non-English-speaking environment (St. John, 1987). However, the interviews showed that it is necessary to distinguish whether one uses a mixed approach for thinking or for writing, or for both. This study showed that the majority of the researchers reported that they mix Japanese and English in the thinking processes, but they write only in English (10 of 13).

Use of language for thinking and writing	Academic position
Think mainly in Japanese but write in English	4 professors,
	3 associate professors,
	2 lecturers
Think in Japanese and English, but write in English	2 professors
Think in English and write in English	3 professors

Table 1 Use of Japanese and English in the thinking and the writing processes.

Unlike Gosden's interviewees among Japanese PhD students, no Japanese researchers translated from Japanese to English in writing. In fact, one Japanese professor of biology (interviewee C) stated that he used to write everything in Japanese and translate it into English. But soon he found problems with this approach and chose only Japanese phrases and sentences that he could translate easily into English, a strategy also employed by one Spanish researcher in St. John's study (1987). However, the Japanese researcher did not stick to this strategy. He stated that soon it was quicker to write in English directly than to write in the very different Japanese structure and then translate it into English.

Some senior researchers stated that they might write an outline in Japanese, but if they are busy, they just start writing a draft on screen or on paper in English. When struggling to find the right word in English, all the researchers stated that they wrote a similar English word to check later, or looked up a word in a dictionary on the spot instead of writing Japanese words. Thus, the majority of Japanese researchers may think in Japanese about how to say something in English.

3 professors (interviewees B, E G), however, reported that they use only English in thinking and writing. It is interesting that these researchers also employed language-oriented strategies. One explained that he knew this was the case, because while thinking about an article, he even responded to Japanese colleagues around him in English. Having close contacts with other researchers outside Japan, these leaders also explained their involvement in controversial issues in relation to patents and their conflicts with other laboratories outside Japan about the originality of claims. They used English not only for presenting their work but also for communicating with other researchers in their fields.

4. Discussion.

This study has shown how Japanese researchers cope with their language difficulties and succeed in scientific writing in English. Although some linguistic difficulties such as lack of vocabulary (Flowerdew, 1999) persist, writers become used to English rhetoric by experience, as also shown in a study on cover letters (Okamura and Shaw, 2000). As long as there is a pattern to follow, the Japanese researchers did not seem to find rhetorical differences difficult. One young researcher's comment suggests that awareness of rhetorical difference is part of the socialisation process as shown in a comparison between Shaw's post-graduates and St. John's professional interviewees.

Furthermore the difference between senior and junior researchers' comment on their attention to readers in writing indicates that consideration of readers is also part of the socialization process rather than a difference in the view of readers' responsibility, a fact which supports recent findings (Kubota, 1997, 1998; McCagg, 1996). However, their difficulties in the construction of argument may lie deeper, as shown in one professor's comment on the link between language and science. The problem seems to the difficulty in identifying a problem unless they have experienced it. As senior researchers have spent a long time striving for success within their research community, they are well-placed to give an interviewer information about the difficulties and disadvantages they have encountered. Interviews also suggest that difficulties such as the use of hedging expressions cannot always be traceable to the mother tongue; the writers' comments imply that we should pay attention to the lack of confidence in writing in English.

To overcome their difficulties, this study indicates that their learning strategies can be categorised into two types (subject knowledge-oriented and language-oriented strategies). Novice researchers adopt the first type i.e. to learn to write a scientific research article through reading and closely working with published research articles (Gosden, 1996; Shaw, 1991; St. John, 1987). The employment of such strategies can equip researchers with the minimal but essential linguistic forms to survive in the discourse community and enables them to realise that scientific language is highly codified. For Japanese researchers working in Japan, storing the codified language in the mind seems to help them avoid relying on translation from Japanese to English and writing in English from the beginning. It is interesting that no Japanese researchers interviewed continued translating from Japanese to English, while one Spanish researcher did continue (St. John, 1987). Differences in their use of translation may have been related to English proficiency and relative distance between their mother tongues and English. Low English proficiency and a structure similar to English seem to make translation worth the effort. For Japanese researchers, mastery of the codified language is another step in moving closer to English speakers' language use or the next step for Gosden's interviewees.

However, once they have mastered the codified language, the majority seemed to decide to work within their limited English, given their time constraints. Only 5 of 13 adopted the second type to master English speakers' language use: language-oriented strategies. Three of them were the most active and internationally recognized professors, those who also used only English in thinking and writing. Their global standing and international academic network seem to have made it possible to overcome the difficulties researchers on the periphery suffer, as was shown by Casanave (1998) and Flowerdew (2000). Furthermore, their exposure to English and effort to improve English enabled them to switch to English for thinking and writing, even in a Japanese-speaking environment. With experience on a global scale, the three Japanese researchers became members not only of the scientific community, but also of an English-speaking community.

Thus, although the language-oriented strategies were not mentioned by the majority, that does not mean they are not important. Understanding scientific language as codified and impersonal, it seems difficult to see any humane element, such as the irony in scientific research articles revealed by Myers (1990). They may not see, underneath the impersonal language, the strategic use of language to interact with readers. Therefore, time constraints may overweigh a need to improve their English, but some conscious effort to go beyond their limited writing skills may pay off in the long run.

5. Conclusion.

This study examined through interviews 13 Japanese researchers' awareness of language difficulties in writing scientific research articles in English and their learning and writing strategies for writing them. With experience in writing, adopting English rhetoric does not seem to cause a problem, whereas lack of vocabulary remains a problem for a long time.

To overcome their difficulties, the interviews have shown two types of strategies. The first is to learn English through learning about their subject field (subject knowledge-oriented) and the second is to raise the sensitivity to English language through contact with English speakers (language-oriented strategies). From use of the first type, they learn that scientific language is highly codified. As they need to balance cost and benefit of spending extra time on learning English writing skills, the majority seems to give up improving English. Using simple English may be one strategy for survival. However, to be successful, the adoption of language-oriented strategies should be recommended. Non-English speaking writers should persist in improving their English, and be aware of the power of language and its impact on readers.

As the researchers interviewed were limited to certain fields in science, it would be useful to hear other researchers' perspectives. We need more work on non-English-speaking researchers' pragmatic difficulties, and on how English-speaking researchers make the best use of English language in staking a claim and persuading readers. It would be interesting to compare how English-speaking researchers and non-English-speaking researchers use seemingly fixed use of tenses, voices, verbs, and citations. A close examination of use of linguistic forms in papers written by English-speaking writers and Japanese writers may reveal a difference in relation to impact on readers. These studies may help to save non-English speakers from their pragmatic handicups in academia.

(Associate Professor, The Faculty of Economics, Takasaki City University of Economics) Note:

1. Rubin and Rubin (1995) emphasize the importance of "qualitative interviewing" in which "interviewers don't try to simplify, but instead try to capture some of the richness and complexity of their subject matter and explain it in a comprehensible way" (Rubin and Rubin, 1995, p. 76). They use transparency, consistency and communicability as the criteria; "a transparent report allows the reader to assess the intellectual strengths and weaknesses, the biases, and the conscientiousness of the interviewer" (p. 85), while "consistency" means that if there is a discrepancy, the researchers need to ckeck out the ideas and explain the reason (p. 87). Rubin and Rubin explained that the credibility of a work is not whether a "proposed theme holds generally" but whether the researcher has worked out the underlying meaning of inconsistency. "Communicability" allows the reader to picture the interview and understand the description. "It should communicate what it means to be within the research arena" (Rubin and Rubin, 1995, p. 91).

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