

Determination of Places to Provide Feedback for Scientific Writing: Focusing on the Analysis of the “Compromise” and “Give-up” Strategies

Kimie Yamamura

Ph.D. Student, Department of Language and Information Sciences, Graduate School of Arts and Sciences, The University of Tokyo

Introduction

1.1 Purpose

The present study explores teaching methods for scientific writing in Japan, where English is used as a foreign language. It attempts to determine places to provide feedback, in particularly for graduate students, who are native speakers of Japanese majoring in science at a research-based university, so that they can write scientific descriptions as precisely as they can do in Japanese.

1.2 Research Question

The primary research question of this study is how instructors, including those who are not familiar with scientific topics, can determine places to provide feedback, not in terms of correcting grammatical errors, but in terms of improving precision in scientific descriptions.

2.4.2 Coding Procedures to Identify Problems

- The protocol data that showed difficulties a participant experienced in the Solution Process were extracted and categorized by codes in the Table 3 shown below.

Table 3. A list of codes of problems

	Sense of readers
	Planning
	Style
	Grammar
	Command of vocabulary and expressions
	Spelling
	Rule
	Information accuracy

The codes enclosed by a yellow line were grouped together as Solution Process.

Method

2.1 Participants

The participants were eleven graduate students who were native speakers of Japanese majoring in science at a research-based university.

Table 1: Participants

No.	Name	Gender	Age	Major	Grade
1	Osamu	M	22	Physics	1st-year MA
2	Reiji	M	22	Physics	1st-year MA
3	Nana	F	23	Chemistry	1st-year MA
4	Shigeru	M	24	Geology	2nd-year MA
5	Minami	F	25	Biology	2nd-year PhD
6	Shinichi	M	22	Physics	1st-year MA
7	Momoko	F	23	Biology	2nd-year MA
8	Leo	M	25	Biology	1st-year PhD
9	Serina	F	24	Biology	2nd-year MA
10	Tatsuya	M	23	Physics Biology	1st-year MA
11	May	F	23	Biology	2nd-year MA

Results

Table 4. The problems the participants faced during the writing sessions

The numbers of utterances of each codes are the average of those of eleven participants. The standard deviations show the differences are large (or small) among the participants. The percentages were obtained by dividing the number of utterance of a code to the total number of utterance.

Codes of Problems	Number of utterances	(SD)	Percentage
Sense of readers	2.5	(2.5)	8.2%
Planning	7.7	(4.6)	25.0%
Style	0.9	(1.1)	2.9%
Grammar	2.1	(1.7)	6.8%
Command of vocabulary and expressions	14.5	(7.7)	46.8%
Spelling	1.4	(1.0)	4.4%
Rule	0.9	(2.2)	2.9%
Information accuracy	0.9	(1.9)	2.9%

2.2 Data Collection Methods

- Writing task
- Interview using stimulated recall
- Semi-structured interview
- Questionnaire

2.3 Data Collection Procedures

- The participants wrote an English letter in scientific context to the researcher by hand.
- Their handwriting and movements of the body from the waist up were recorded.
- Interview ② was conducted while the video was shown to the participants as a stimulus.
- Interview ③ was conducted.
- Questionnaire was conducted after 3 months.

2.4.1 Coding Procedures to Identify Solution Process

- The interviews ② & ③ were recorded and transcribed for analysis. The protocol data (interview data) were divided into Introspection or Other. Then the protocol data that showed participant's processes to solve them were categorized by codes enclosed by a yellow line, and these codes were grouped together as Solution Process.

Table 2. A list of codes to identify solution process

Introspection	Identifying a problem	Sense of discrepancy Ideas generated from description
	Exploring a solution	Consideration Conflict
	Applying strategies	Affirmation Retrieval from memory
		Avoidance for compliance with the rules Compromise
	Not writing	Give-up
External factor		Time pressure
Other	Objective perspectives	Writing style
		Explaining the intention

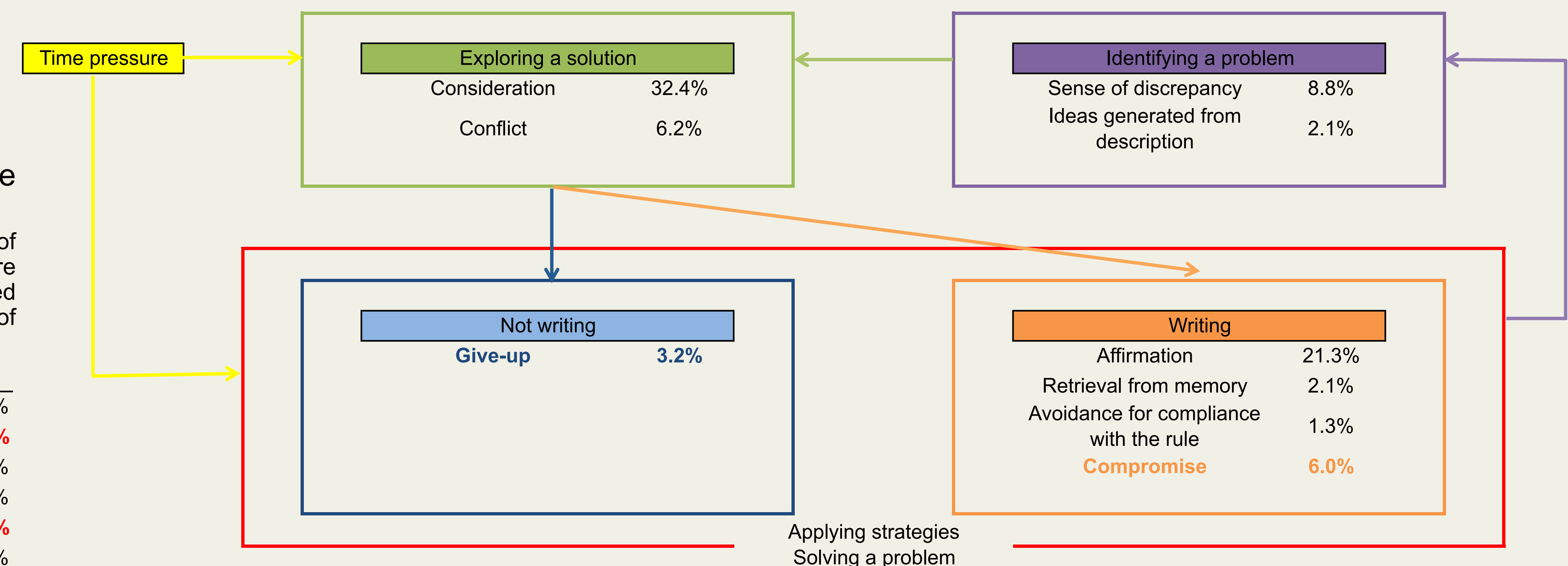


Fig. 1 A diagram of Solution Process

The diagram was created by schematizing the relationships of the codes of the Solution Process. It shows the circular process the participants experienced when solving a problem. The percentages were obtained by dividing the number of utterances of a code to the total number of utterances in the Introspection.

Discussion & Educational Implication

- The participants had the Problems in the Command of vocabulary and expressions and in the Planning.
- The participants experienced the Solution Process and applied the strategies shown in the Figure 1 to overcome the Problems.
- The protocol data and the pieces of writing show the participants experienced the Problems even at places where no grammatical errors were found in the final products.
- The protocol data of the semi-structured interviews show the participants vividly remembered the places where the Compromise and Give-up strategies were applied. **This suggests that learning effects may be high if feedback is provided at these places.**
- Scientific writing requires skills to write descriptions precisely rather than to get around a problem. It may be necessary for science students to experience the Compromise and Give-up strategies in writing sessions to realize their problems before they start their laboratory lives.
- Using an introspective method may help instructors who do not have a background in scientific fields determine places to provide feedback, and improve scientific descriptions.

Interview using stimulated recall

- 1 Kimie: And, you wrote "do you know hydrogen atom" here...
Reiji: I didn't know how long I paused here. But I thought that I had to explain about "hydrogen atom", and I was thinking about how to express it in English.
Kimie: Did you have an idea in Japanese?
5 Reiji: Well...the final sentence was different from the initial idea.
Kimie: Really.
Reiji: Yes. Initially, I came up with an image of an atom model that has a proton in the center and an electron orbiting around the proton. And, I was thinking about how to express it in English...
10 Kimie: I see.
Reiji: But I gave up describing an accurate model...I gave it up. Instead, I wrote that hydrogen contains two particles, an electron and a proton.

Reiji's Compromise

Protocol Data (Transcribed Interview Data)

Tatsuya's Give-up

- 1 Kimie: Here, "Kono kenkyu ha atarashii jinko...(This research can be applied for new artificial...)" (The researcher read aloud Tatsuya's handwriting.)
Tatsuya: I am writing "This research can be applied for new artificial intelligence." This is a conclusion part.
5 Kimie: I see. I did not expect the story to develop in this way. I was surprised that physics has connection with a brain. I thought your research may relate to elementary particles or something like that.
Tatsuya: Actually, I had wanted to explain it, but I found it beyond my ability.
Kimie: I know it is really tough. Umm...

Interview using stimulated recall

Semi-structured interview

- 1 Kimie: Do you have any places where you feel like, "I wanted to write in a different way" or "I did not want to write in this way"?
Reiji: Uh... I have several places, but the part I used "contain" is a place where I feel like I wanted to write in a different way. I used "contain" here, but in Japanese I can write the sentence as like, "the model has a proton in the center and an electron orbiting around it", so I wish I could do it in English.

- 1 Kimie: I have asked you similar questions before, but do you have any places where you feel like, "I wanted to write in a different way" or "I did not want to write in this way"?
Tatsuya: Uh... I do not know...
Kimie: Do you have any places where you wish to write in a different way?
5 Tatsuya: Well... in terms of grammar, I wish I could write almost all sentences more accurately, but uh...the content...uh...
Kimie: I think you have said that you made a major compromise around here.
Tatsuya: Uh...Yes... Uh...
Kimie: You have said that you learnt it (the techniques) by yourself or something like that.
10 Tatsuya: Yes, it is true. I have thought that. Uh...but I think I should have explained more about my research.

Semi-structured interview

The interviews were originally conducted in Japanese. The protocol data were translated by the researcher.