

A Support System for Revising Titles to Stimulate the Lay Reader’s Interest in Technical Achievements

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Abstract

When we write a report or an explanation on a newly-developed technology for readers including laypersons, it is very important to compose a title that can stimulate their interest in the technology. However, it is difficult for inexperienced authors to come up with an appealing title.

In this research, we developed a support system for revising titles. We call it “title revision wizard”. The wizard provides a guidance on revising draft title to compose a title meeting three key points, and support tools for coming up with and elaborating on comprehensible or appealing phrases.

In order to test the effect of our title revision wizard, we conducted a questionnaire survey on the effect of the titles with or without using the wizard on the interest of lay readers. The survey showed that the wizard is effective and helpful for the authors who cannot compose appealing titles for lay readers by themselves.

1 Introduction

When we read a document, we usually read its title first, and then we read the body text only if the title catches our interest. Therefore, when we write a report or an explanation on a newly-developed technology intended for readers including laypersons, it is very important to compose a title that will stimulate their interest in the technology. However, technical specialists are not necessarily good at composing appealing titles, because it isn’t clear what sort of titles will stimulate the interest of lay readers in the technology.

In the field of NLP and linguistics, there are few researches which help the specialists compose appealing titles for lay readers. Several researches have been reported on title generation (Jin and Hauptmann, 2000) (Berger and Mittal, 2000) and readability of texts (Minel et al., 1997) (Hartley and Sydes, 1997) (Inui et al., 2003). However, the researches on title gener-

ation focus on generating a very compact summary of the document rather than composing an appealing title. The previous researches on readability mainly see it as comprehensibility rather than interestingness.

In this regard, our previous study (Senda and Sinohara, 2002) clarified what sort of content and wording in titles are effective in stimulating lay readers’ interest in the technology by an analysis of a parallel corpus of Japanese technical paper titles and Japanese newspapers headlines. The study categorized the effective content and wording of the titles into the following three key points.

Key Point 1 (for Wording) Instead of technical terms, use synonymous plain terms even where the plain term is not synonymous with the technical term in a precise sense.

Key Point 2 (for Content) Describe what the technology is for, rather than what the technology does.

Key Point 3 (for Content) Describe the advantages of the technology, rather than the method of realizing the technology.

Our next goal is to enable inexperienced authors to compose a title according to these key points. To this end, we developed a support system for revising titles. We call it “title revision wizard”. The wizard provides a guidance on revising draft title to compose a title meeting the key points, and a few support tools for coming up with and elaborating on appealing phrases. In this paper, we report on the title revision wizard, and a questionnaire survey on the effect of titles composed with and without using the wizard on the interest of lay readers.

2 Method for Revising Titles Intended for Lay Readers

It is difficult for inexperienced authors to change their “specialist-centered mind-set” and come

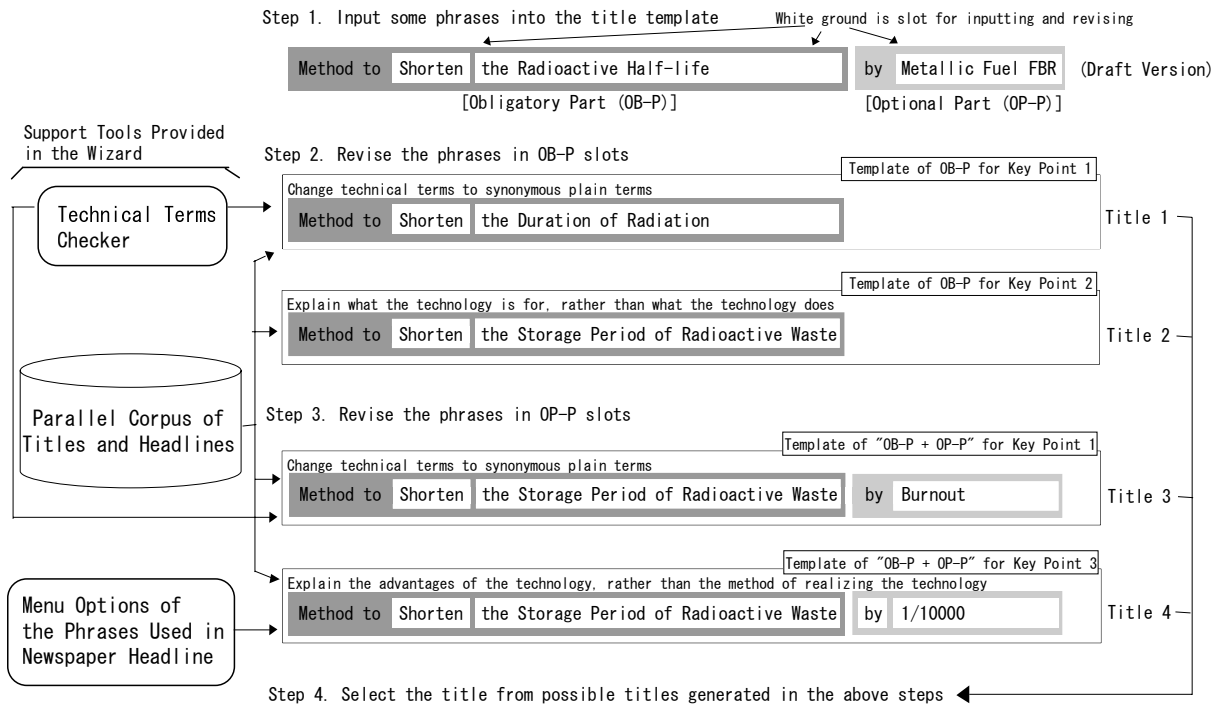


Figure 1: Steps in the Procedure for Revising draft title Using the Wizard

up with appealing titles for lay readers even when they know the three key points.

In our title revision wizard, therefore, the authors first input draft title into the title template, and then compose candidates of title by revising the phrases of the draft title according to the wizard’s guidance with the help of the support tools provided.

The steps in the wizard’s procedure are illustrated in Figure 1¹. In the following, we explain the steps with reference to Figure 1.

2.1 Inputting Some Phrases into the Title Template

In step 1, the user inputs draft title into the title template displayed in the wizard window. The title template consists of an “OBligatory Part” (OB-P) and an “OPTional Part” (OP-P). The OB-P phrase describes what the technology does, and OP-P phrase describes the method used to implement the technology or the advantages of the technology.

2.2 Revising the Obligatory Phrases

In step 2, the wizard presents only OB-P to the user, and hides OP-P. The user revises only the OB-P phrase according to the two key points.

First, the user changes technical terms to the synonymous plain terms according to key point

1. In the template 2-1 in step 2, the technical term “the Radioactive Half-life” is changed to the plainer term “the Duration of Radiation” from this viewpoint.

Secondly, the user changes the phrase in the OB-P slots to describe the purpose of the technology rather than what the technology does, according to key point 2. In the template 2-2 in step 2, the phrase “Shorten the Radioactive Half-life” is changed to the phrase “Shorten the Storage Period of Radioactive Waste” from this view point.

These revised OB-P phrases without optional phrase are recorded as candidates of “simple” title for future selection in step 4. At the end of step 2, for future revision in step 3, the user selects one title that he/she deems the better one from these candidates of title.

2.3 Revising the Optional Phrases

In step 3, the wizard presents new title combining OB-P phrase (selected at the end of step 2) and the OP-P phrase (inputted in step 1) as a draft title. The user revises only the OP-P draft phrase according to the two key points.

First, the user changes technical terms to synonymous plain terms according to key point 1. In the template 3-1 in step 3, the technical term “Metallic Fuel FBR” in the slot is changed to the plainer term “Burnout” from this viewpoint.

Secondly, the user changes the phrase in the

¹The sample titles presented in Figure 1 are translated into English from original Japanese titles.

slot to describe the advantages of the technology rather than the method of realizing the technology according to key point 3. In the template 3-2 in step 3, the OP-P phrase is changed to the phrase “by 1/10000” from this viewpoint.

The title combining the title selected in step 2 and each phrase revised at step 3 are recorded as candidates of title for future selection in step 4. Before next step, the user can return to step 2 to select another OB-P phrase and revise OP-P phrase attached to the OB-P phrase in step 3 again if he/she likes.

2.4 Select the Title from Title Candidates

In step 4, the user selects one title from the candidates of title composed in the above steps.

2.5 An Example of the Wizard Window

Figure 2 is a screenshot of the Wizard. This screenshot shows the window in step 2 described in section 2.2. The Japanese text in upper pane of the window is the explanation of key point 1. The template for the OB-P Phrase for key point 1 is displayed at the bottom of the window. The buttons in the center of the pane are for accessing the support tools for coming up with and elaborating the input phrase. Detail of the support tools will be given in the next section.

Title revision wizard is implemented in PHP (Hypertext Preprocessor). Users can access the wizard using a web browser such as Internet Explorer.

3 Support Tools provided in the Wizard

In this section, we explain the three support tools provided in the title revision wizard.

3.1 Database of Paper Titles and Newspapers Headlines for Related Technologies

It is difficult for inexperienced authors to come up with a phrase meeting the three key points. We therefore prepared a parallel corpus of titles and headlines for related technologies in order to provide clues for coming up with an appropriate phrase. The database consists of about 420 titles and 440 headlines. They were categorized into 150 groups on technology that has been developed in a research institute, and covers science and technology in general. The database is (b) in Figure 1.

Figure 3 shows an example of the database window. The upper pane in the window shows the phrases in titles and the headlines describing related technologies. The lower part of the window presents search boxes for menu-based retrieval and keyword-based retrieval. The pull-down menu options are organized by technical fields. Users can search the clues for revising the title of the draft version from these search boxes as well as by scrolling through the window.

The role of this parallel corpus is basically the same as the one of “Example-Based Translation Aid (EBTA)” (Sato, 1992) (Furu-gori and Takeda, 1993) (Kumano and Tanaka, 1998). EBTA researches have shown that parallel translation examples (pairs of source text and its translation equivalent) are very helpful for translators to translate the similar text because parallel translation examples give them useful clues for translation. From the viewpoint that paper titles and newspapers headlines for related technologies are also regarded as parallel translation examples (pairs of text for specialists and its translation equivalent for lay readers) describing newly-developed technologies, the our database is expected to be helpful for the user of the wizard.

3.2 Technical Terms Checker

The author should use comprehensible term for lay readers in order to compose the titles meeting the key point 1. In order to avoid incomprehensible terms, it is important to identify difficulty level of a term that authors want to use in his/her title. We, therefore, prepared “technical term checker” estimating the difficulty level of a term.

It has been reported that human recognition level of a term correlates with its frequency of appearance (Homes and Solomon, 1951). From that standpoint, it is considered that frequency of a term on the academic website represents the recognition level of a term for the specialists of the field, and that frequency of the term on the general website represents the one for laypersons of the field. On the basis of this concept, our “technical term checker” estimates the difficulty level of a technical term on the basis of the frequencies on the academic and general website, and then inform the users about the result on three level (“plain”, “may be difficult”, “difficult”).

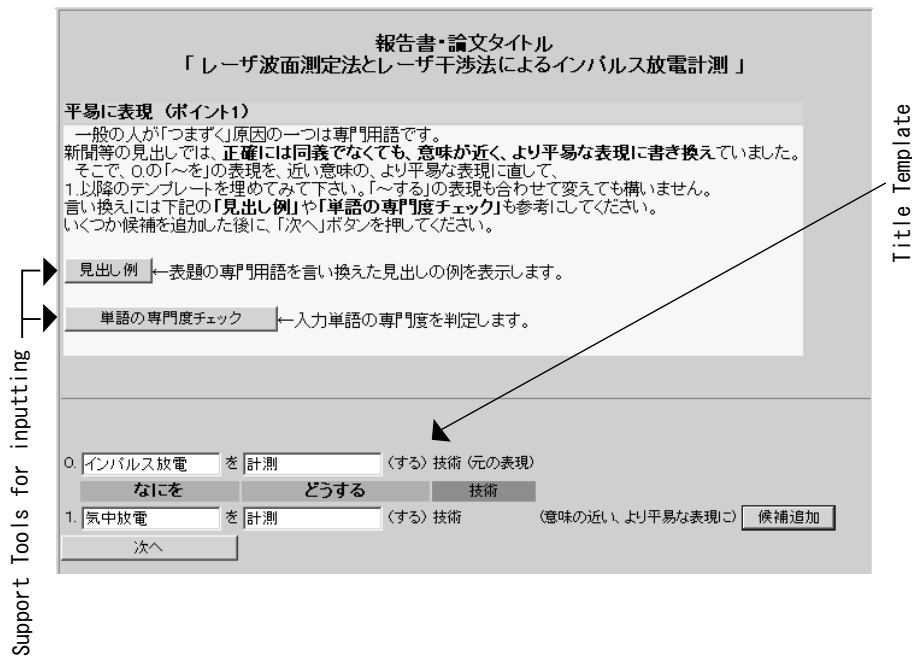


Figure 2: Screenshot of Title Revision Wizard

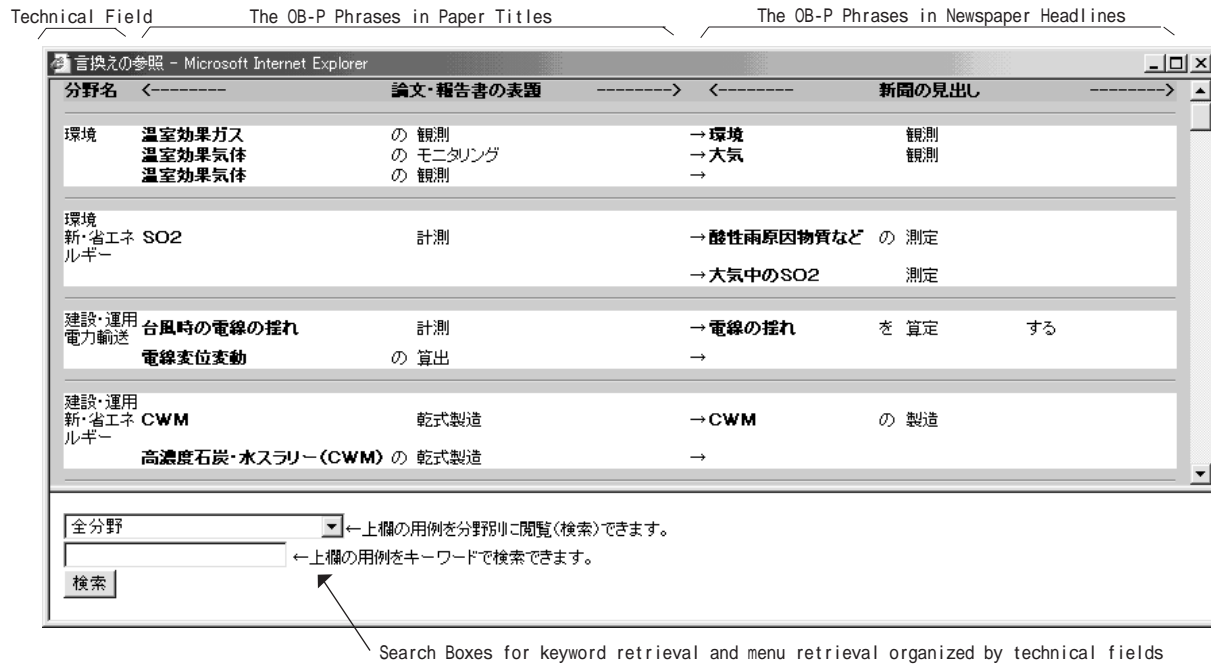


Figure 3: Parallel Corpus of Titles and Headlines for Related Technology

3.3 Menu Options of the Phrases Used in Newspapers Headlines

In order to meet key point 3, the authors have to consider how to represent the advantages of the technologies from various viewpoints, and come up with the phrase that can concisely represent the advantages. However, it is considered that those who have a detailed knowledge of a technical field are unaccustomed to represent the ad-

vantages of the technologies in a title because previous research showed that most of technical paper titles in Japanese does not included such a phrase (Senda and Sinohara, 2002).

We therefore prepared the pull-down menu options of the phrases representing technical advantages used in newspapers headlines. The menu options presents about 70 phrases categorized by the way to describe the advantages of

technology. For example, in our menu options, the following phrases are listed by the following group: high density, high concentration, high accuracy, . . . , low price, low cost, low pollution, . . . , long-lived, long distance, . . . , short time, short duration, . . . , ; etc ² .

Figure 4 shows the menu options installed at the title template for key point 3. This menu options can help the users come up with or elaborate on the phrases by offering various expressions and viewpoints.

4 Effect of Title Revision Wizard

In order to test the effect of the title revision wizard, we conducted an experiment which had 17 technical researchers revise their titles with and without using our wizard. We then conducted a questionnaire survey on the effect of the titles on the interest of lay readers.

4.1 Outline of the Experiment

We conducted the experiment according to the following procedures.

Experiment 1 (Ex 1)

1. We showed each subject his technical paper title (published after 2000) on his own developed technology. We asked him to imagine himself writing an explanation of the same technology for lay readers.
2. We asked each subject to compose three candidates of title for the explanation by his own effort (that is, without our wizard) within the 20-minute time limit.

Experiment 2 (Ex 2)

1. After Ex 1, we input original technical paper title into first title template of our title revision wizard (for draft title), and presented each subject with the wizard.
2. We asked each subject to compose candidates of titles for the same document using the wizard and select three titles from the candidates within the 20-minute time limit.

The research fields of subjects were physics, electrical engineering, material science and meteorology. There was no intermission between Ex 1 and 2.

²These sample phrases are translated into English from original Japanese phrases.

4.2 Outline of the Questionnaire Survey

In the questionnaire, each respondent was shown seven titles per one technology that each subject developed. They consisted of an original technical paper title, three titles composed at Ex 1, and three titles composed at Ex 2. Each respondent was asked to select three-most interesting titles from these 7 titles per one technology.

Respondents to the questionnaire were 108 persons and general monitors of an Internet research firm. We asked them to answer our questionnaire on a Web page which was prepared for this survey.

This means, of course, that the results of the questionnaire only contain responses from people who have some skill at using the Internet, rather than the public at large, because all respondents were able to use E-mail and access the web page. However, at least, the result helps to write document on a Web page which explains new technology for lay readers.

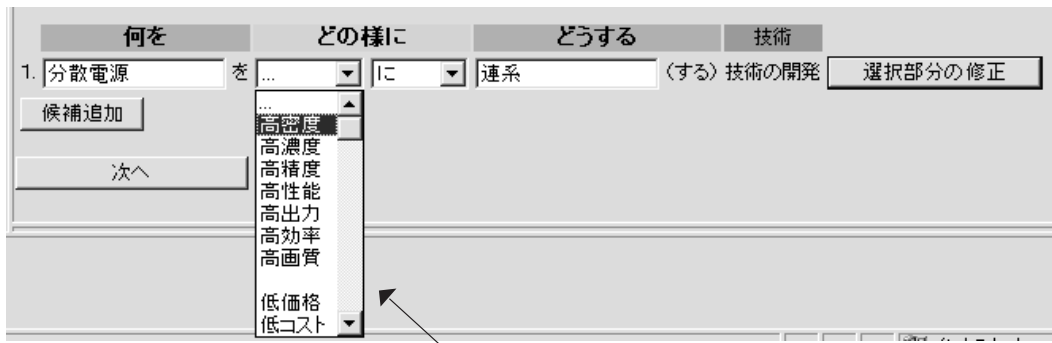
Moreover, the result is also an exercise in reaching the general lay readers over the Internet, and the use of the Internet is expected to be increasingly important in reaching the general public.

4.3 Analysis of Experiment and Questionnaire Survey

Figure 5 shows the (average) share of the vote which the respondents select three-most interesting titles from each author's seven titles (by method of composing). Figure 5 indicates that:

- The average share of the vote of the titles revised using the wizard are distributed within the highest range.
- The average share of the vote of the titles revised without using the wizard are distributed within the second highest range,
- The share of the vote of original technical paper titles are distributed within the third highest range,

We checked if there is a significant difference between the (average) share of the vote of original technical paper titles and the titles revised without using the wizard by *t*-test. As the result, we confirmed that there is a significant difference between these titles (the significant level is 1%). We also checked if there is a significant difference between the share of the vote of the titles revised with and without using the wizard



Pull down menu of the phrases describing the advantage of the technology

Figure 4: Pull-down Menu Options Organizing the Phrases Used in Newspaper Headline

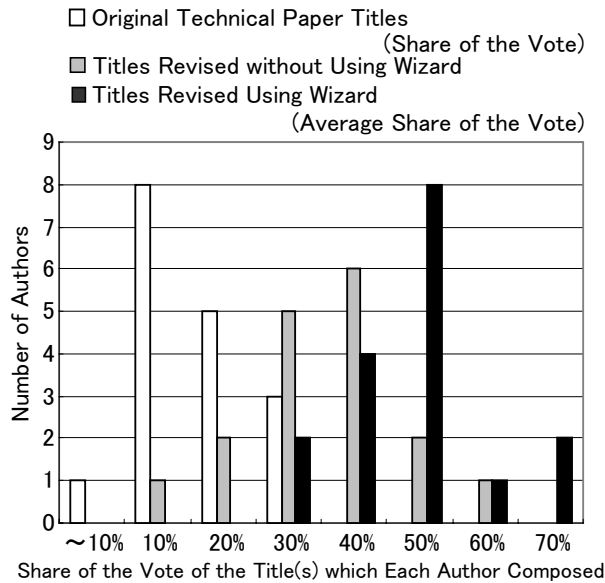


Figure 5: Histogram of Share of the Vote which the Respondents Select Three-most Interesting Titles from Each Author's 7 Titles (by Method of Composing)

by *t*-test. As the result, We also confirmed that there is a significant difference between these titles (the significant level is 5%).

These results show that the titles composed using the wizard could stimulate the lay readers' interest the most among each subject's seven titles. In other words, the authors can stably compose the more appealing titles for lay readers with using the wizard than without using the wizard.

If an author could compose effective titles by himself, he might not take an advantage from the wizard. We, therefore, focused only on seven subjects who could not compose the titles stimulating a majority of the respondents' interest without the wizard, and analyze the ef-

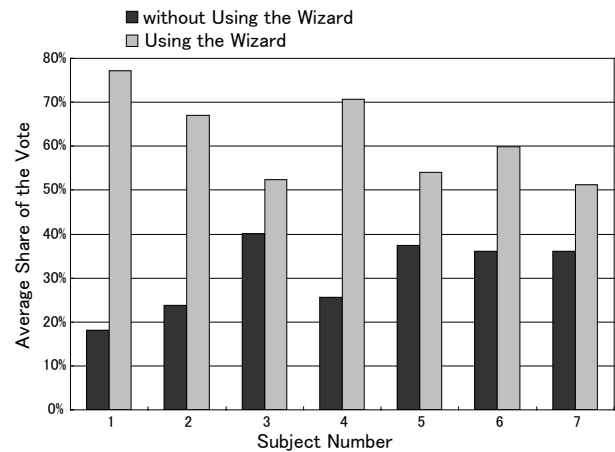


Figure 6: Average Share of the Vote of the Titles Composed with and without Using Wizard

fect of their titles on the respondents' interest in more detail.

We, then, compared the average share of the vote for the titles which each of the seven author revised with and without using the wizard. figure 6 shows that all the subjects can stably compose the more appealing titles with using the wizard than without using the wizard. We checked if there is a significant difference between the share of the vote of the titles revised with and without using the wizard by *t*-test. As the result, We also confirmed that there is a significant difference between these titles (the significant level is 1%).

As the result of the above analysis, we confirmed that the title revision wizard can help the users who cannot compose effective titles by their own efforts.

5 Conclusion and Future Work

We emphasized that, in order to stimulate the lay reader's interest in newly-developed technology, it is very important to compose an appealing title, however it is difficult for inexperienced authors to come up with an appealing title.

In this research, we developed a title revision wizard that provides a guidance on revising draft title and a few support tools for coming up with and elaborating on appealing phrases. Moreover, we verified the effect of the title revision wizard. As a result, the titles composed using the wizard can stimulate the lay reader's interest more than the titles composed without using the wizard. In particular, our title revision wizard can help the users who cannot compose effective titles by their own effort.

In future work, we will analyze the difference of the expression of the titles composed with and without using the wizard, and investigate what sort expression is effective to lay readers.

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References

- Adam L. Berger and Vibhu O. Mittal. 2000. Ocelot: A system for summarizing web pages. In *Proc. of the 23rd Annual International ACM-SIGIR Conference on Research and Development in Information Retrieval*, pages 144–151, Athens, Greece.
- Teiji Furugori and Akiko Takeda. 1993. An example-based system of writing english sentences for japanese english users. *Literary and Linguistics Computing*, 8(2):85–90.
- James Hartley and Matthew Sydes. 1997. Are structured abstracts easier to read than traditional ones? *Journal of Research in Reading*, 20(2):122–136.
- Davis H. Homes and Richard L. Solomon. 1951. Visual duration threshold as a function of word-probability. *Journal of Experimental Psychology*, 41:401–410.

- Kentaro Inui, Atsushi Fujita, Tetsuro Takahashi, Ryu Iida, and Tomoyo Iwakura. 2003. Text simplification for reading assistance: A project note. In *Proc. of The Second International Workshop on Paraphrasing: Paraphrase Acquisition and Applications (IWP2003)*, pages 9–16, Sapporo, Japan.
- Rong Jin and Alex G. Hauptmann. 2000. Title generation for spoken broadcast news using a training corpus. In *Proc. of the 6th International Conference on Spoken Language Processing (ICSLP)*, pages 680–683, Beijing, China.
- Tadashi Kumano and Hideki Tanaka. 1998. Translation examples browser: Japanese to english translation aid for news articles. In *Proc. of NLP+IA 98/TAL+AI 98*, pages 96–102, Moncton, Canada.
- Jean-Luc Minel, Sylvaine Nugier, and Gerald Piat. 1997. How to appreciate the quality of automatic text summarization? examples of fan and mluce potocols and their results on seraphin. intelligent scalable text summarization. In *Proc. of 35th Annual Meeting of the ACL Workshop Intelligent Scalable Text Summarization*, pages 25–30, Madrid, Spain.
- Satoshi Sato. 1992. Ctm: An example-based translation aid system. In *Proc. of COLING 1992*, pages 23–28, Nantes, France.
- Yasuko Senda and Yasusi Sinohara. 2002. Analysis of titles and readers for title generation centered on the readers. In *Proc. of COLING 2002*, pages 421–424, Taipei, Taiwan.