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Development of a Readability Index Attuned to the New English Course of Study in Japan (2) Development of Ozasa-fukui Year Level, ver. 3.4.1NHNC1-5WUS

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Abstract

Since 2007, we have been engaged in developing readability indices attuned to the English textbooks based on the English Course of Study in Japan, and have developed readability indices, Ozasa-Fukui Year Level, Ver. 1, 2 and 2.1. However, the Course of Study was revised and put into force from 2012 on, which made it necessary to update these English readability indices. This paper reports a project that aims to develop a new readability index, Ver. 3.4.1nhnc1-5wus, which is attuned to the new English teaching system of Japan,. In the first phase, two sets of commonly used Japanese English textbooks were digitized in order to develop readability criteria, textbook-based word dictionary and textbook-based idiom dictionary. In the second phase, first, a multiple regression analysis and a linear analysis were computed, using sentence length, word length, textbook-based word difficulty and textbook-based idiom difficulty as independent variables and the year of passages as a dependent variable, which yielded a linear function (Diff). Then, non-linear analyses were computed, using experts' readability judgment of selected English sentences as a dependent variable and the obtained linear function (Diff) as an independent variable. The computation yielded a non-linear function expression for Ver. 3.4.1nhnc1-5wus with an unexpectedly low explanation rate:
*Ver. 3.4.1nhnc1-5wus = 4.1026*exp (-123.3438*0.1709^Diff)+1*
*Diff = 0.0915*Words+0.5621*Syllables+1.6230*WordDiff+0.0822*IdiomDiff-0.2836(r^2 = 0.6400)*

1. Introduction

Since 2007, we have been engaged in developing readability indices for measuring readability, based on the textual data of the English textbooks for junior and senior high schools in Japan. In a sries of these attempts, we have so far developed three readability indices, Ozasa-Fukui Year Level, Ver. 1, 2, and 2.1, which are attuned to the English Course of Study in Japan (effective 2002-2011 for junior high school, 2003-2012 for senior high school). The main features of the three readability indices developed under this scheme are outlined in Table 1, along with other newly developed ones. [1] [2] [3] [4] [5]

Table 1 Versions of O-F Year Level Developed

Version	r^2	Dependent variable			Independent variable	Analysis
		Evaluation	Level Number	Datum size		
1	0.413	Objective	5	Big[*1]	4[*2]	linear
2	0.824	Empirical (3)	50	126	4	nonlinear
2.1	0.822	Empirical (3)	50	916	4	nonlinear
3.1nh	0.7902	Empirical (3)	40	546	4	nonlinear
3.1nc	0.8373	Empirical (3)	40	151	4	nonlinear
3.1nhnc	0.7502	Empirical (3)	40	697	4	nonlinear
3.2nh	0.9144	Empirical (3)	40	157	4	nonlinear
3.2nhnc	0.8236	Empirical (3)	40	308	4	nonlinear

3.2s	0.7702	Empirical (3)	40	126	4	nonlinear
3.3nhsnc	0.7829	Empirical (3)	40	434	4	nonlinear

[*1]All sentences contained in 15 vols. Of the textbooks.

[*2]Sentence length + word length + textbook word difficulty + textbook idiom difficulty

2. Aim

The present paper aims to develop a new readability index, i.e., Ver. 3.4.1nhnc1-5wus, of higher quality in prediction or explanation that is attuned to the newly revised English Course of Study effected in 2012 (junior high school) and 2013 (senior high school), based on the digital data of two sets of Japanese representative English textbooks for junior and senior high schools.

3. Method

First, a multiple regression analysis, a linear analysis, was computed, using sentence length, word length, textbook-based word difficulty and textbook-based idiom difficulty as independent variables and the year of all the passages of the textbooks used in the analysis as a dependent variable, which yielded a linear expression (Diff).

Then, non-linear analyses were computed, using experts' empirical judgment of English sentences as a dependent variable and the linear function (Diff) as an independent variable. The measure used for the dependent variable was a new criterion specifically developed for this analysis, which is based on the intuitive judgment of the sentences selected from the two sets of the Japanese EFL texts by three experienced Japanese EFL teachers including the first author, who are well familiar with the status quo of the English textbooks and teaching of middle-grade schools in Japan.

The textbooks used were the following two sets of English textbooks for junior and senior high schools.

- New Crown English Series 1, 2 & 3. [Junior high school] 2012, Tokyo: Sanseido.
- Crown English Communication 1 & II. [Senior high school] 2013. Tokyo: Sanseido.
- New Horizon English Course 1, 2 & 3. [Junior high school] 2012, Tokyo: Tokyo Shoseki.
- Prominence English Communication, 1 & II. [Senior high school] 2013. Tokyo: Tokyo Shoseki.

The computation was carried out using Fukui's College Analysis, a statistics computer program developed for social studies by Masayasu Fukui at Fukuyama Heisei University, Japan.

4. Results and Discussion

Since the results of the least squares analysis for the development of the Ver. 3.3nhsnc proved to be disappointingly unsatisfactory to our expectation, a new attempt was made to develop a readability index of higher validity, Ver. 3.4.1nhnc1-5wus, by reexamining and improving the data used for developing the Ver.3.3nhsnc. The basic process of the analysis was the same as that used for the development of the former three versions.

First, a multiple regression analysis, a linear analysis, was computed, using sentence length, word length, textbook-based word difficulty and textbook-based idiom difficulty as independent variables and the school years of all the passages of the English textbooks as a dependent variable. The textbooks used for the analysis were two sets totaling 10 volumes, i.e., New Horizon English Course 1, 2 & 3, Prominence English Communication 1 & II, New Crown English Series 1, 2 & 3 and Crown English Communication 1 & II. The following is the results of the linear regression analysis.

Diff = 0.0915*Words+0.5621*Syllables+1.6230*WordDiff+0.0822*IdiomDiff-0.2836 (Diff).

At the second phase of the analysis, a nonlinear, least squares analysis was computed, using the experts' judgment of 399 English sentences as a dependent variable and the above linear function (Diff) as an independent variable. In the analysis, a least squares analysis were computed, yielding a nonlinear function expression, the Gompertz solution. The result of the Gompertz solution is detailed in the following analysis datum.

Gompertz solution

Object Variable	Year
Expression	NewDiff = a*exp(-b*c^Diff)+1
Optimal Solution	
A	4.1026
B	123.3438
C	0.1709
Num. of Cases	399
Num. of Solutions	2
Least Sq. Value	367.8962
Obs/Pred R	0.8000
Obs/Pred R^2	0.6400

As is shown in the analysis datum above, the computation yielded the following nonlinear prediction expression (NewDiff).

NewDiff = 4.1026*exp(-123.3438*0.1709^Diff)+1 (NewDiff)
Diff = 0.0915*Words+0.5621*Syllables+1.6230*WordDiff+0.0822*IdiomDiff-0.2836

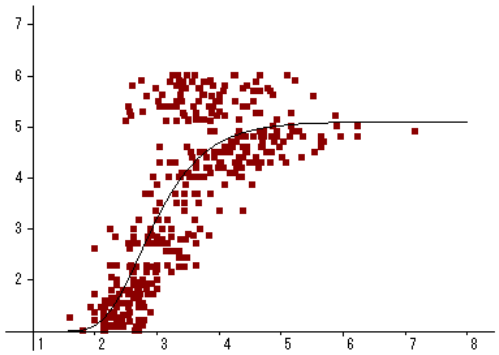

Figure 1 Dispersion and Gompertz solution

Figure 1 shows the solution of the least square analysis computed, in which experts' readability evaluation (year) on the y-axis and the prediction of the obtained solution (NewDiff) on the x-axis. The explanation rate of this solution (r^2) proved to be 0.6400, which is regrettably low, far lower than those of the other indices so far developed. This could presumably attributable to the group of readability evaluation points distributed around the area between point 2 and point 5 in the x-axis and between point 5 and point 6 on the y-axis in Figure 1, which might represent inaccurate or faulty readability judgement of the sentences by us evaluators in developing the measure for the dependent variable.

This mal-judgement could probably be due to the evaluators' lack of sensitivity to or disregard to the change of climate in the basic concept and/or value system underlying the new English course of study. In the current English language system, textbook writers are generally granted more freedom in the selection and treatment of grammatical and lexical items than in the old system and accordingly they tended to write textbooks with more freedom in the current editions than in the last ones.

In this situation tended to develop their textbooks more freely, following their own blief in the goals and materials construction philosophy, resulting in wider differences among the developed products. Without taking this into a serious consideration we readability evaluators must have paid less attention to this climate change in the current course of study, resulting in the disoriented evaluation judgements mentioned above. We must have developed our readability criterion measure in a rather careless way, just in the similar way as we did in developing the old measures used in the old computations.

For example, the following are the criterion sentences actually used as a measure for the dependent variable in the present study.

@5.8
The doctor suggested that his family take him to the seaside.
@5.9
Laughter works as if it were a strong medicine.

@6.0
Not knowing these things, many people eat Japanese food regularly.

Since these sentences are actually used as target sentences in Prominence English Communication, II (Book 5), we rather carelessly cited them as representative sentences of this textbook. A closer examination revealed, however, that they are too easy for their readability points in terms of grammar, vocabulary and sentence complexity and that they should have been allotted lower readability values.
Furthermore, having been written and edited with writers' freer hands, the two sets of textbooks used in the present study seem to have been developed based on the value systems different among each other in terms of the treatment or control of grammatical items. For example, among the three sets of the representative English textbooks currently used, New Horizon English Course and Prominence English Communication seem to be the most rigid and strict in grammar control among the three sets while Sunshine English course and Discovery English Communication seem to be more concerned with manipulation of basic grammatical lexical items and their communicative use. New Crown English Series and Crown English Communication seem to be located somewhere between New Horizon set and Sunshine set. [6] [7] [8] [9]
Although the three sets of the textbooks are different among each other in their basic attitude and philosophy concerning materials construction strategy, those characteristic features and their basic philosophy were not fully recognized nor acknowledged in developing the criterion sentences to be used as a measure for the dependent variable for the nonlinear analysis. It must be noted that this was the most serious inherent weakness of the present analysis. To solve this problem, it must be supplemented by an immediate follow-up study to improve the quality of the criterion sentence measure.

5. Conclusion

In the present study, the following function expression was adopted as an index of the Ozasa-Fukui Year Level, Ver. 3.4.1nhnc1-5wus.

NewDiff = 4.1026*exp(-123.3438*0.1709^Diff)+1
Diff = 0.0915*Words+0.5621*Syllables+1.6230*WordDiff+0.0822*IdiomDiff-0.2836 (r^2= 0.6400)

Regrettably, this index could not be used as a reliable, authentic readability index in the formal education setting in Japan since it cannot enjoy a satisfactorily high prediction value nor represent the data of the English textbooks that are widely used by the majority of students studying English in the junior and senior high schools in Japan. An immediate follow-up study should be carried out to improve the quality of explanation rate by closely re-examining the data of criterion sentences for the dependent variable.

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