The importance of grammatical style in mathematics tests for second language learners and low performing students

Ida Bergvall
Department of Education, Uppsala University

This study is a work in progress which aims at investigating how different grammatical styles in mathematics test items in TIMSS 2011 might be of importance for the performance of low achieving students and second language learners. The method that will be used in the study is correlation analysis. Some tentative results show that there is a correlation between academic style in the text items and the results for both groups of student. The results also show that the correlation is different in different content domains.

Introduction

In previous study the role of language in mathematics tests is in focus. The language used in school mathematics has been described one possible reason for students having difficulties with the subject (Schleppegrell, 2001). The subject of mathematics taught in compulsory school has as any subject its own structure of language with its special style and linguistic features (Schleppegrell, 2007; Abel & Exley, 2008). For the student, the development of a mathematic school language is dependent on personal previous experience and knowledge of conventions for academic language and the teaching they are attending at school. The teachers, thus, need to be aware of the various linguistic challenges that school mathematics can entail for different groups of students, with different background and experiences, in a heterogeneous classrooms of today (Schleppegrell, 2001; White, 2012).

Aim

This study aims to highlight how different grammatical styles in mathematics test items can be of importance for low achieving students and second language learners, their performance on tests and if there are differences between different cognitive domains of the subject.

Method

The empirical data that this study will be based on consists of mathematic items and student test scores from the international study *The Trends in International*

Mathematics and Science Study 2011 (TIMSS 2011), grade eight. TIMSS 2011 contained 218 mathematics items and approximately 150 student solutions are available for each item and each group of students.

Two examples of grammatical styles that have been included in the study so far are *everyday style* and *academic style*. The language features indicating a certain style, so called *style markers,* is for everyday style the amount of verbs per word in each item and the amount of nouns per word for academic style.

The dependent variables are composed by student test scores from two groups of students; low achieving students and second language learners. To allow a comparison of results from items with different total scores the *percent right* or *p-value* on each item was used as the dependent variable. The p-value is the item average score divided by the maximum score of the particular item.

Statistical method of analysis
The statistical analysis is planned to be conducted in three steps:
1. An analysis and presentation of the independent variables.
2. A correlation matrix between the dependent variables, percent right for the different student groups, and the independent variables consisting of different types and functions of grammatical style.
3. A multiple regression analysis between the dependent variables, percent right for the different student groups, and the independent variables consisting of different types and functions of grammatical style, which has shown a correlation in the correlation matrix.

Preliminary results
Some tentative results indicate a correlation between academic style in the text items and the results for both groups of student. The correlation is negative the content domain of algebra while a high academic style actually has a positive correlation with the results in the content domain number. The positive correlation in the content domain number is a somewhat surprising and needs to be further analysed. Even more style variables needs to be added.

References
Abel, K. & Exley, B. (2008). Using Halliday's functional grammar to examine early years worded mathematics texts. *Australian journal of language and literacy*, 31(3), 227-241.

Schleppegrell, M. J. (2001). Linguistic features of the language of schooling. *Linguistics and Education*, 12, 431–459.

White, S. (2012). Mining the text: 34 text features that can ease or obstruct text comprehension and use. *Literacy Research and Instruction*, 51, 143–164.