HOW DO FUTURE MATHEMATICS TEACHERS DEAL WITH DIFFERENT TYPES OF IMPLICATIONS?

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The issue of how advanced mathematics students evaluate assertions with a false premise was considered in a study presented at PME25 (Rogalski & Rogalski, 2001). Seven items of a logical test proposed to 107 future mathematics teachers were analysed, all asking for the evaluation of the value of an implication. Students were classified depending on the orientation in their answers to three non computable assertions with a false premise: 'Logic' (*'the assertion is true as the hypothesis is false'*), 'Relevance' (*'the assertion is stupid'*, *'non sense'*), 'Falseness' (*'hypothesis always false, then assertion false'*), 'ND' (non dominant type of answer). When focusing on 'logic' students also answered logically to a social contract question. Both 'logics' and 'relevance' orientations led to correct answers to a mathematical computable assertion, and to the two Wason's selection tasks —but only 'logic' was related to correct answers to both items.

Are these results stable? Are the answers sensitive to changes in the wordings of implications ? What is the role of the computability of a mathematical implication in its assessment? We shall report here on a new study aiming at highlighting these questions, with the general purpose of a better understanding of how future mathematics teachers use the logical tool.

In this new empirical study 71 students were asked to assess the truth of assertions in 4 identical items, 3 items where the canonical "if ..then" was substituted to the original formulation, and 4 new mathematical computable assertions with false premise. We observed the following results (numerical data in a related poster):

1) stability of the distribution of patterns and stability of the correlation between patterns and correct answers to similar items;

2) effect of wording only on the classical Wason's task (searching data for assessing an implication), due to an increased use of the contrapositive;

3) effect of the type of mathematical computation needed to derive the 'target' consequence from the false hypothesis: there were more logical answers to the item "if 1=2 then 2=3" than to items such as "if $x^2+1\leq 0$ then $(x^2+1)^2\leq 0$".

Globally, even if future teachers are reasoning more logically than generally observed in the psychological litterature, they are far from a mastery of the logical tool, while this use is a determining factor of how they will manage the teaching/learning process of this tool in their future classrooms.

Rogalski, J., & Rogalski, M. (2001). How do graduate students evaluate assertions with a false premise? In M. van der Heuvel-Panhuizen (Ed.) *Proceedings of the 25th Conference of IGPME, PME25@NL* (pp. 4.33-4.41). Utrecht: Freudenthal Institute, University of Utrecht.