DO INDIVIDUAL STUDENTS CONSISTENTLY APPLY THE SAME INTUITIVE RULE?

Dirk De Bock[1,2], Wim Van Dooren[1,3], Dave Weyers[1] and Lieven Verschaffel[1]

[1]University of Leuven and [2]EHSAL, Brussels; Belgium

[3]Research Assistant of the Fund for Scientific Research – Flanders (F.W.O.)

In recent years, the intuitive rules theory has received growing attention in the mathematics and science education research community because, according to its advocates, it can explain and predict various kinds of responses of students to a wide variety of tasks from scientifically different content domains (see, e.g., Stavy and Tirosh, 2000). Two major intuitive rules are manifested in comparison tasks and are called "More A – more B" and "Same A – same B". A recent Belgian replication and elaboration study by De Bock, Verschaffel and Weyers (2001) has challenged the predictive power of that theory. Hundred-and-seventy-two students of grades 10, 11 and 12 solved five problems, stated in a multiple choice format with three alternatives: the correct answer, an incorrect answer in line with "More A – more B" and an incorrect answer in line with "Same A – same B". The results showed that Belgian students are less affected by the intuitive rules than their Israeli peers: for most problems, the results in line with the intuitive rules were far below chance level and several other misconceptions proved to be at the origin of students' erroneous answers.

A different kind of analysis on these data was executed to provide an answer to the following research question: *are individual students consistent in their choice for one of the intuitive rules?* We shifted from a data analysis at the item-level to an analysis of the *answering profiles* of the 172 participants. Theoretically, there are 21 ways to answer the five problems (e.g. two answers in line with "More A – more B", two in line with "Same A – same B" and one correct answer is one of these ways). By means of three-dimensional frequency diagrams, the poster shows and compares the observed distribution of the students' profiles and the theoretical (multinomial) distribution that would be expected if students answered at a random base. This analysis clearly indicated that the typical "More A – more B" or "Same A – same B" student does not exist (or is extremely rare). E.g., none of the 172 students answered more than three times in line with "More A – more B". Confronted with a problem they cannot solve, students rather seem to guess than to apply a specific intuitive rule, a finding which once again challenges the predictive power of the intuitive rules theory.

De Bock, D., Verschaffel, L., & Weyers, D. (2001). Do intuitive rules have predictive power? A replication and elaboration study on the impact of "More A – more B" and "Same A – same B". In M. van den Heuvel-Panhuizen (Ed.), *Proceedings of PME 25* (Vol. 2, pp. 321–328). Utrecht, The Netherlands.

Stavy, R., & Tirosh, D. (2000). *How students (mis-)understand science and mathematics: Intuitive rules.* New York: Teachers College Press.