

## OVERCOMING STUDENTS' ILLUSION OF LINEARITY: THE EFFECT OF PERFORMANCE TASKS

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In a systematic line of research, we have shown that from primary school on, students develop an irresistible tendency to apply the linear model also in situations where it is not applicable. For example, we observed that the large majority of students aged 12-16 believes that if a figure is similarly enlarged with factor  $k$ , the area and volume are enlarged with factor  $k$  as well. Even with considerable support (e.g., asking to make drawings, providing ready-made drawings or giving metacognitive hints), only very few students made the shift from incorrect linear to correct non-linear reasoning.

In this short oral we will report the first results of a new empirical study, aimed at breaking the illusion of linearity by a new manipulation of the experimental context. Semi-standardized in-depth interviews (registered on videotape) were taken from 21 pairs of 6<sup>th</sup> grade students, which were assigned (by matching) to one of 3 conditions: (1) *S-condition*: a typical scholastic word problem about the area of an enlarged figure (i.e. about the number of tiles needed to cover the floor of a small and larger doll house) was given and a written, numerical answer was expected, (2) *D-condition*: students received the word problem of the S-condition, together with real-sized drawings, and (3) *P-condition*: students were introduced in the real problem context with the concrete materials and a performance instruction was given (i.e., "Get the exact number of tiles to cover the floor of the doll house."). This means that P-condition students got the same visual information as D-condition students, but additionally, the problem was presented in a performance format. We expected (based on previous research) that students would not profit from the visual information as such, but the tendency to illicitly apply linear strategies might diminish if the word problems were offered with a performance instruction instead of in a scholastic word problem format.

The results showed that all 7 pairs of students in the S-condition committed the linear error. 6 of the 7 pairs in the D-condition and 5 out of 7 pairs in the P-condition found the correct answer (and the others made a calculation error instead of the linear error). The results therefore suggest that the provision of additional visual information (in the D- and P-condition) was already enough to break the tendency to give a linear answer, while the (additional) positive role of the performance task character could not be proven. Further qualitative analyses of the interviews will yield more information about the actual role of the additional visual information in the D- and P-condition on students' problem-solving process, on the one hand, and of the additional value of the performance character of the task in the P-condition, on the other hand.