REASONING WITH PATTERNING TASKS

Adam R. Scharfenberger
The Ohio State University

This study examines one student's reasoning with patterning tasks through the lens of recursive, covariation, and correspondence thinking. The data come from a clinical interview using patterning and relationship items from the Trends in International Mathematics and Science Study and the National Assessment of Educational Progress math assessments. Preliminary results indicate the case study student showed the capacity to use recursive, covariation, and correspondence thinking successfully, while the context of the task influenced the approach.

The case study student solved Patterns and Relationships items from the 2011 Grade 4 Trends in International Mathematics and Science Study (TIMSS) math assessment and patterning items in the Algebra content from the 2007 Grade 4 National Assessment of Educational Progress (NAEP) math assessment during a clinical interview (Ginsburg, 1981). The interview took place in the spring of the student's fourth grade year. The student attended a public elementary school in the United States. The patterning items selected from TIMSS and NAEP allowed the student an opportunity to engage in recursive, covariation, and/or correspondence thinking (Stephens et al., 2017).

Preliminary findings suggest this student used a variety of strategies successfully on the patterning and relationship tasks. He demonstrated recursive, covariation, and correspondence thinking on different questions depending on the context or representation of the pattern. For example, the student used a recursive approach when engaging with the number pattern 3, 6, 9, 12 and asked to determine a future number in the pattern. The task contained multiple choice answers of A. 26, B. 27, C. 28, and D. 29.

S: There's a pattern of three. So, I'm just going to count by threes until I get to one of these numbers [one of the multiple choice answers].

He then listed the numbers 15, 18, 21, 24, 27 and determined the answer was 27, choice B.

The student used covariation thinking with a growth pattern task to predict the number of circles in a future figure number. Knowing that Figure 5 of the pattern contained nine circles and that each new figure increased in size by two circles from Figure 1 to Figure 5, he determined there would be 19 circles in Figure 10 without listing how many circles there would be in Figures 6 through 9. The visual image of the growth pattern may have helped guide the solution strategy (Fischbein, 1987).

When presented with a task displaying a relationship in a two-column table, the student used correspondence thinking to determine the relationship between the columns. He saw that when he multiplied the numbers in the input column by two and added one, he obtained the numbers in the output column.

In conclusion, this student showed the capacity to reason through recursive, covariation, and correspondence approaches depending on the context of the problem.

References

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