Strategically Logical: Experience-Related Changes in Strategy Use on Deductive Problems

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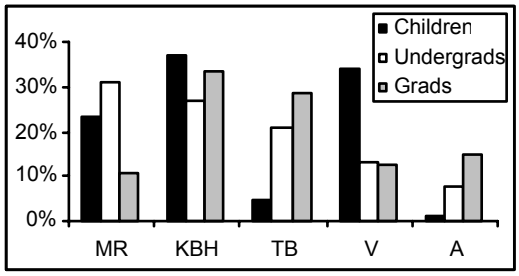
We propose a conceptual framework for explaining logical reasoning in terms of competing strategies. The Logical Strategy Model (LSM; Morris & Schunn, in press). describes a series of strategies that differ in their functionality. Algorithmic strategies (e.g., token-based, verbal) are more costly (i.e., longer processing time) but more accurate, while heuristic strategies (e.g., analogies, matching rules, knowledge-based rules) are less costly but less accurate. The LSM was tested with 45 undergraduates, 23 graduate students, and 15 children ages 8-11. Each subject was given 24 deductive problems and asked to reflect on how they solved a problem by selecting one of five descriptions of a strategy.

We conducted this experiment to test three predictions of the LSM: (1) subjects should report using a variety of strategies across the problem set, (2) the use of algorithmic strategies should be associated with more correct responses while the converse should be true for heuristic strategies, and (3) increasing experience should be associated with greater use of algorithmic strategies.

Prediction #1- Variation in strategy use

Figure 1 shows that all strategies were reported as being used. The most commonly reported strategies were as follows: KBH for grad students and children, and matching rules for undergrads.

Figure 1. Overall percentage of strategy use by self-report



Prediction #2- Is strategy self-report related to accuracy?

A series of correlations examined the relationship between the number of correct responses for each strategy. Across all groups, self-reporting the use of an algorithmic strategy was strongly correlated with correct responses ($r = .64$). This relationship was strongest for graduate students ($r = .76$), less strong for undergraduates ($r = .48$) and children ($r = 43$). In contrast, self-reported use of heuristic strategies were negatively correlated with correct responses ($r = -.35$). This evidence suggests that the self-report method corresponds to actual cognitive operations.

Prediction # 3- Strategy selection and experience

An analysis of individual strategy use coded each subject for consistent use or consistent disuse of a particular strategy if a subject used any strategy on more than 75% of trails or less than 10% of trials. We found that grads (35%) were the most consistent but also the most likely to use algorithmic strategies. Children (27%) were consistent in their use of heuristic strategies. Undergraduates demonstrated the lowest level of consistent single strategy use among the three groups (5%), most likely from being in transition between heuristic and algorithmic strategies.

Results indicate (a) that subjects used a variety of strategies over the problem set, (b) that strategy choice was related to performance in that reporting algorithmic strategies were associated with greater accuracy, and (c) the strategy selection was related to experience.

References

Morris, B. & Schunn, C. (in press). Rethinking Logical Reasoning Skills from a Strategy Perspective. In M. Roberts & E. Newton (Eds.), *Methods of thought: Individual differences in reasoning strategies*. Psychology Press.