

# Application of Dual-Process Theories in Mathematics Education (and vice versa)

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The gap between intuitive and analytical thinking is of fundamental concern for mathematics education research and practice. There are interesting similarities and differences between the intuitive/analytical framework in mathematics education (ME) on the one hand, and the System 1/System 2 distinction in dual-process theories (DPT) on the other, but these links so far have hardly been noticed by either of the two communities. In this presentation I discuss the application of DPT in ME, and, conversely, a possible contribution of ME research to DPT. To this end, I compare a typical use of DPT in cognitive psychology (the *bat-and-ball task*, Kahneman, 2002) with a recent DPT analysis of a *group-theory task* from a college-level abstract algebra class (Leron & Hazzan, in print).

In ME research, students' performance on the group theory task would traditionally be explained by analyzing their faulty knowledge of the relevant logic or mathematics. The DPT interpretation, which invokes general cognitive mechanisms, clearly adds a new perspective for ME researchers.

Cognitive psychologists largely study *everyday* cognition: Tasks such as the bat-and-ball, 'Linda', or the card selection task, do not require prior tutoring or deep reflection. These situations *invite* System 1 responses. In contrast, the group theory phenomenon occurred in the context of a university abstract algebra course, where the name of the game is abstraction and formal proofs, and where the students were explicitly prompted to explain their answers. This context would clearly seem to invite System 2 responses. This is a further testimony to the power of intuitive thinking, that might still 'run the show' even in college-level mathematical classrooms.

## References

Kahneman, D.: 2002, 'Maps of bounded rationality: A perspective on intuitive judgment and choice' (Nobel Prize Lecture), in *Les Prix Nobel*, Frangsmyr, T (Ed.). Accessible at <http://www.nobel.se/economics/laureates/2002/kahnemann-lecture.pdf>

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