

# **Masterminding in Education: Bringing cognition, emotion and motivation together in a unified mathematical framework**

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## **Abstract**

In this research project, a novel app-based version of the code breaking game Mastermind, Entropy Mastermind, was introduced and evaluated as a learning medium in undergraduate cognitive psychology and in primary mathematics education. In a quasi-experimental pre- and posttest design we investigated a) the role of individual differences in game play and learning, b) the effectiveness of Entropy Mastermind for giving students of different age groups experientially grounded access to the fundamental concepts of proportions and mathematical entropy, and c) effects of game play on students academic emotions, motivation and attitudes. Data analyses revealed significant associations between cognitive variables, emotional-motivational factors and game play parameters. We present computational modeling results of students search strategies and entropy intuitions within a unified framework of entropy measures, the Sharma-Mittal space. Potential applications in digitalized learning environments at the interface between mathematics and computer science will be discussed.