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Investigating the exploration-exploitation trade-off in dynamic environments with multiple agents

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Abstract

Exploration and Exploitation represent two mutually exclusive goals associated with choices within an environment: search too little and the lack of information will make it difficult to distinguish good options penalizing the agent in the long run (exploiting) or search too much and suffer sub-optimal performance in the short term (exploring). Striking a balance between exploiting and exploring requires the learner to behave optimally in different environments. Managing this trade-off is an important process of our lives but isn't completely understood from a cognitive science perspective. To this end we present the findings from an experiment where the main objective was to examine how much the presence of competition and threats affects both behaviors: the presence of competition directs greater exploration and the presence of threats reduces this behavior, suggesting that learners prioritize their learning behavior in response to the presence of different types of agents in the environment.