Ava Langford

Jesse Green

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Subject: Game Theory: A Comprehensive Guide

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Assessment:

Heiko's "A Short Introduction to Game Theory," explores various aspects of game theory. While I was annotating the article, I noticed that it provided many foundational concepts. Heiko introduces key definitions, such as normal and extensive form games, Nash equilibrium, and mixed strategies. Through this, I gained insight into how mathematics serves as the foundation of understanding decision-making in games, allowing individuals to analyze conflicts and predict interactions among players. By examining how game theory explains behavior, I was able to strengthen my understanding of the connection between probability and strategic thinking.

Heiko defines a game as "a finite number of players who interact to given rules." Each player makes decisions based on available information and desired outcomes, where their choices impact both their own results and those of other players. This interconnected structure of decision-making highlights the strategic nature of games, where players attempt to anticipate others' actions to maximize their own success.

The distinction between normal and extensive form games further solidified my understanding. Normal-form games, as explained by Heiko, consist of a finite number of players, each with a set of available strategies. These games are typically represented in matrix form, making it easier to visualize potential outcomes. Extensive-form games, on the other hand, involve players making decisions sequentially, with each move dependent on previous actions. These are often represented using game trees, illustrating the sequence of choices and the associated payoffs. Understanding these models deepened my grasp of how probability plays a role in predicting rational decision-making.

Additionally, the concept of Nash equilibrium, where no player has anything to gain by changing their strategy while others remain constant, reinforced the importance of stable outcomes in strategic interactions. While Nash equilibrium may appear to create a standstill in strategy, it instead represents an optimal state where no player benefits from unilateral deviation. Heiko also explores mixed strategies, in which players randomize their choices to optimize outcomes, further demonstrating how probability influences decision-making.

Overall, Heiko's article clarified essential game theory concepts and enhanced my appreciation of how mathematics and probability are deeply intertwined with strategic decision-making. This understanding is particularly relevant to my project, where I am designing a probability-based game to analyze how individuals develop strategies in response to others. I predict that as players gain experience, they will refine their strategies to balance risk and caution, eventually reaching a Nash equilibrium. Initially, players may adopt aggressive or conservative approaches, but over time, they will likely converge on strategies that maximize their chances of success. Additionally, conditional probability will play a significant role in

decision-making. By analyzing player behavior over multiple trials, I aim to identify emerging strategies and examine how players adapt their tactics based on observed outcomes, ultimately aligning with key principles of game theory as explored by Heiko.